Metro Outer Development Assessment Panel Agenda

Meeting Date and Time: Thursday, 6 June 2024; 9:30am
Meeting Number: MODAP/16
Meeting Venue: 140 William Street, Perth
Public Observing: Online

A live stream will be available at the time of the meeting, via the following link: MODAP/16 – 6 June 2024 – City of Wanneroo – City of Kwinana – Shire of Murray

PART A – INTRODUCTION

1. Opening of Meeting, Welcome and Acknowledgement
2. Apologies
3. Members on Leave of Absence
4. Noting of Minutes

PART B – CITY OF WANNEROO

1. Declarations of Due Consideration
2. Disclosure of Interests
3. Form 1 DAP Applications
   - 3.1 No.65 (Lot No.2) Salcott Road, Girrawheen – Proposed Residential Building – DAP/24/02635
4. Form 2 DAP Applications
5. Section 31 SAT Reconsiderations

PART C – CITY OF KWINANA

1. Declarations of Due Consideration
2. Disclosure of Interests
3. Form 1 DAP Applications
   - 3.1 Lot 541 (2) Ovens View, Mandogalup – Child Care Centre – DAP/24/02656
4. Form 2 DAP Applications
5. Section 31 SAT Reconsiderations

PART D – SHIRE OF MURRAY

1. Declarations of Due Consideration
2. Disclosure of Interests
3. Form 1 DAP Applications
   - 3.1 Lot No. 9500 (No. 320) Gull Road, Keralup – Proposed Noxious Industry (Carbon Recycling Facility) – DAP/23/02622
4. Form 2 DAP Applications
5. Section 31 SAT Reconsiderations

PART E – OTHER BUSINESS

1. State Administrative Tribunal Applications and Supreme Court Appeals
2. General Business
3. Meeting Closure

Please note, presentations for each item will be invited prior to the items noted on the agenda and the presentation details will be contained within the related information documentation

ATTENDANCE

DAP Members

Ian Birch (Presiding Member)
Tony Arias (Deputy Presiding Member)
Neema Premji (Specialist Member)

Part B – City of Wanneroo
Cr Bronwyn Smith (Local Government Member, City of Wanneroo)
Cr Jacqui Huntley (Local Government Member, City of Wanneroo)

Part C – City of Kwinana
Deputy Mayor Barry Winmar (Local Government Member, City of Kwinana)
Cr Matthew Rowse (Local Government Member, City of Kwinana)

Part D – Shire of Murray
Cr David Bolt (Local Government Member, Shire of Murray)

Minute Secretary

Claire Ortlepp (DAP Secretariat)

Officers in Attendance

Ashlee Kelly (DAP Secretariat)

PART A – INTRODUCTION

1. Opening of Meeting, Welcome and Acknowledgement

The Presiding Member declares the meeting open and acknowledges the traditional owners and pay respects to Elders past and present of the land on which the meeting is being held.

This meeting is being recorded and livestreamed on the DAP website in accordance with regulation 40(2A) of the *Planning and Development (Development Assessment Panels) Regulations 2011*. Members are reminded to announce their name and title prior to speaking.

2. Apologies

Nil.

3. Members on Leave of Absence

Nil.

4. Noting of Minutes

Signed minutes of previous meetings are available on the DAP website.

PART B – CITY OF WANNEROO

1. Declarations of Due Consideration

Any member who is not familiar with the substance of any report or other information provided for consideration at the DAP meeting must declare that fact before the meeting considers the matter.

2. Disclosure of Interests

Nil.

3. Form 1 DAP Applications

3.1 No.65 (Lot No.2) Salcott Road, Girrawheen – Proposed Residential Building – DAP/24/02635

4. Form 2 DAP Applications

Nil.

5. Section 31 SAT Reconsiderations

Nil.

Government of **Western Australia**
Development Assessment Panels

SALCOTT ROAD, NO. 65 (LOT NO. 2), GIRRAWHEEN – PROPOSED RESIDENTIAL BUILDING

Form 1 – Responsible Authority Report
(Regulation 12)

DAP Name:	Metro Outer DAP	
Local Government Area:	City of Wanneroo	
Applicant:	Uniting WA - Ingrid Van Dorssen	
Owner:	Uniting Church in Australia Property Trust WA	
Value of Development:	$2 million Opt In (Regulation 6)	
Responsible Authority:	City of Wanneroo	
Authorising Officer:	Greg Bowering	
LG Reference:	DA2023/1397	
DAP File No:	DAP/24/02635	
Application Received Date:	23/01/2024	
Report Due Date:	27/05/2024	
Application Statutory Process Timeframe:	90 Days (Additional 35 days for extension and request for further information)	
Attachment(s):	1. Development Plan; 2. Operational Management Plan; 3. Location Plan; 4. Schedule of Submissions; 5. Applicants Response to Submissions; 6. Design Review Panel Comments; 7. Applicant Response to Design Review Panel Comments; 8. Waste Management Plan; 9. Landscaping Plan; 10. Applicant Assessment; 11. Applicant Planning Report; and 12. Applicant Response to Request for Further Information.	
Is the Responsible Authority Recommendation the same as the Officer Recommendation?	☒ Yes ☐ N/A	Complete Responsible Authority Recommendation section
	☐ No	Complete Responsible Authority and Officer Recommendation sections

Responsible Authority Recommendation

That the Metro Outer DAP resolves to:

1. **Approve** DAP Application reference DAP/24/02635 and accompanying plans in accordance with Clause 68 of Schedule 2 (Deemed Provisions) of the *Planning and Development (Local Planning Schemes) Regulations 2015,* and the provisions of the City of Wanneroo *District Planning Scheme No. 2*, subject to the following conditions:

Conditions

1. Pursuant to clause 26 of the Metropolitan Region Scheme, this approval is deemed to be an approval under clause 24(1) of the Metropolitan Region Scheme.

2. This decision constitutes planning approval only and is valid for a period of four (4) years from the date of approval. If the subject development is not substantially commenced within the specified period, the approval shall lapse and be of no further effect.

3. The use of the approved **Residential Building** must conform to the *State Planning Policy 7.3 – Residential Design Codes* definition which states:

   "***Residential Building***: *A building or portion of a building, together with rooms and outbuildings separate from such building but incidental thereto; such building being used or intended, adapted or designed to be used for the purpose of human habitation:*

   - *Temporarily by two or more persons; or*

   - *Permanently by seven or more persons, who do not comprise a single family, but does not include a hospital or sanatorium, a prison, a hotel, a motel or a residential school."*

   A change of use from that outlined above may require further development approval of the City.

4. Parking areas, driveways and points of ingress and egress must be designed and constructed in accordance with the Australian Standard for Offstreet Carparking (AS 2890) and must be drained, sealed, marked and maintained to the satisfaction of the City prior to occupation of the development.

5. The parking areas and associated access indicated on the approved plans must not be used for the purpose of storage or obstructed in any way at any time, without the prior approval of the City.

6. A detailed landscaping plan is to be provided for the subject site and adjacent verge area. The landscaping plan detailing the plant species, densities, planting locations is to achieve the required landscaping as *per State Planning Policy 7.3 – Residential Design Codes* and to appropriately screen the bin store as indicated on the plans, is to be lodged for approval by the City prior to lodging a building permit. Planting and installation must be in accordance with

the approved landscaping and reticulation plans and completed prior to occupation of the development and maintained thereafter, to the satisfaction of the City.

7. An onsite stormwater drainage system, sufficient to contain a 1:100 year storm event (over 24 hours) must be provided. Plans illustrating the system proposed must be submitted for approval when application is made for a building permit and the system must be installed during the construction of the development.

8. Lighting must be installed along all driveways, pedestrian pathways, car parking areas and in all common service areas prior to the development first being occupied.

9. All external fixtures, utilities and building plant, including air conditioning units and water tanks must be located so as to minimise any visual and noise impact on surrounding landowners and screened from view from streets, public places and adjacent properties to the satisfaction of the City.

10. Future operations on the lot must be undertaken in accordance with the approved Waste Management Plan prepared by Uniting WA dated 24 April 2024.

11. Redundant vehicle crossover to be removed and the kerbing and footpath reinstated with grass or landscaping to the specifications of the local government prior to the submissions of a Building Permit, to the satisfaction of the City.

12. A Construction Management Plan must be submitted for approval prior to lodging a building permit. This plan is to detail how construction will be managed to minimise disruption in the area and to adjoining landowners. The plan must address the following:
    a) The delivery of and delivery times for materials and equipment to the site;
    b) Storage of materials and the location and types of equipment on site;
    c) Parking arrangements for contractors and sub-contractors;
    d) The impact on traffic movement;
    e) Construction times;
    f) The relocation of public footpaths;
    g) Measures to minimise impacts of noise and sand drift and dust from the site;
    h) Tree protection zones to be established for trees identified to be retained in the approved landscaping plan (including any verge trees) where applicable;
    i) The relocation/disruption of any public transport infrastructure; and
    j) Any other matter required by the City.

    The construction management plan is to be submitted to and approved by the City prior to the commencement of any development.

Advice Notes

1. The owner/applicant is to submit the “Certification of Compliance with Development Approval Conditions” form certifying that all of the conditions specified in the approval by the Council for the development of the land have been completed in accordance with the approved plans, and the certification is to

be lodged with the Council within 14 days from the date of practical completion, and applies to all of the conditions, except for those conditions relating to on-going compliance.

Details:

Region Scheme	Metropolitan Region Scheme (MRS)
Region Scheme - Zone/Reserve	Urban
Local Planning Scheme	City of Wanneroo District Planning Scheme No. 2 (DPS 2)
Local Planning Scheme - Zone/Reserve	Residential
Structure Plan/Precinct Plan	N/A
Use Class & permissibility:	Residential Buildings
Lot Size:	2,024.91m^2
Existing Land Use:	Place of Worship
State Heritage Register	No
Local Heritage	N/A
Design Review	Individual Design Review Panel Member Referral
Bushfire Prone Area	No
Swan River Trust Area	No

Proposal:

The application proposes two Residential Buildings at No. 65 Salcott Road, Girrawheen which comprises the following:

- Each Residential Building includes five separate studio residences;
- Associated parking – five car bays;
- General site works including retaining walls; and
- An area of 527.4m^2 in the northeastern portion of the lot, which is set aside for future development.

A development plan and operational management plan have been included as **Attachment 1** and **Attachment 2** respectively.

Background:

Zoning

The subject site is zoned 'Urban' under the MRS and 'Residential' under DPS 2, with a split density coding of R20/40.

A location plan is included as **Attachment 3**.

Development

The subject site has previously been utilised as a Place of Worship which was established in 1999 and has remained in place since this date. This is to be demolished and the use to cease, should the application for the Residential Buildings be approved.

Legislation and Policy:

Legislation

Metropolitan Region Scheme
District Planning Scheme No. 2

State Government Policies

State Planning Policy 7.3 – Residential Design Codes Volume 1 (R-Codes)

Structure Plans/Activity Centre Plans

Not Applicable

Local Planning Policies

Local Planning Policy 2.4 – Site Works and Retaining for Residential Development (LPP 2.4)

Consultation:

Public Consultation

The application was advertised for a period of 14 days in accordance with Clause 64(4) of the Deemed Provisions, commencing 08 February 2024 and concluding 23 February 2024.

Advertising was undertaken by way of a notice in the local newspaper and in writing to nearby landowners/occupiers within approximately 200 metres of the proposed development. The development plans and all supporting documents were published on the City's website and a sign was installed on the subject lot for the duration of the advertising period.

A total of two submissions were received during the consultation period, both of which were in objection to the proposal.

The main issues raised in the submissions were:

- The number of parking bays provided;
- The impacts on the road network and parking whilst the development is being built; and
- Concerns regarding the dynamic of residents living in such close proximity.

A summary of the submissions received, and a response provided by the City is included in **Attachment 4** and a copy of the applicants' responses in **Attachment 5**. The main issues raised, along with those identified by the City during the assessment process will be discussed in further detail in the 'Planning Assessment' section below.

Referrals/consultation with Government/Service Agencies

Not applicable

Design Review Panel Advice

The proposed development was referred to a single panel member of the City's Design Review Panel (DRP) on 5 February 2024 upon lodgement of the development application. The DRP member provided a number of recommendations that are relevant for the consideration of the proposal, including the following:

- Rotating the proposed southern building as to ensure the over height boundary wall (double height bedroom) is relocated next to the existing dwellings boundary wall;
- Stepping down the units in the proposed southern building to reduce the siteworks to 0.5 metre maximum height;
- Provide indication of additional development on the eastern portion of the site;
- The communal bin store is to be relocated from the front northern boundary, which is a highly prominent area of public visibility;
- The applicant is to identify locations for all passive and mechanical services relating to the residences;
- Additional openings are to be provided to the external walls of the end units to enhance views and passive surveillance; and
- Provisions of a lighting plan for the safe and secure use of the residence's entries, paths, communal open spaces and car park.

A full copy of the DRP comments are included in **Attachment 6**.

In response, the applicant provided a response to the DRP recommendation (**Attachment 7**), noting that some modifications were actioned as part of this process.

There were a number of points raised by the DRP which have not been actioned by the applicant, and justification provided. However, the City is supportive of the design aspects discussed below.

DRP Comment	Administration Comment
Provide indication of additional development on the eastern portion of the site.	The applicant has advised that there are no current plans for this portion of the site, however noted this will likely be an extension to the current land use or an associated land use. The City will consider the use and built form of this portion of the site at the time of a development application being lodged.

Notwithstanding the above the applicant has not fully addressed concerns around the associated utilities, the communal bin store, lighting and retaining walls, which are discussed within the Planning Assessment.

Planning Assessment:

The proposal has been assessed against the relevant planning framework, as outlined in the Legislation and Policy section of this report. The following matters have been identified as key considerations for the determination of this application:

- Land Use Permissibility;
- Amenity impacts to surrounding properties; and
- Parking and Traffic.

Land Use Permissibility

The applicant is proposing the land use be classified as a 'Residential Building', which is defined within the R-Codes as follows:

A building or portion of building, together with rooms and outbuildings separate from such building but incidental thereto; such buildings being used or intended, adapted or designed to be used for the purpose of human habitation:

- *Temporarily by two or more persons; or*
- *Permanently by seven of more persons, who do not comprise a single family, but does not include a hospital or sanatorium, a prison, a hotel, a motel or residential school.*

In examining the proposed use, Residential Building can be considered the most appropriate land use for the following reasons:

- The applicant has outlined that the development will accommodate ten persons, who do not comprise of a single family, on a permanent basis;
- The landowners (Uniting WA) intend to retain ownership and management of the facility as a registered Tier 2 Community Housing Provider;
- Whilst the proposed use provides separate living spaces, the use will incorporate communal outdoor space and parking areas; and
- The residents have access to light touch support from the owners to facilitate social connections and provide access to training, learning opportunities and employment.

Based on the above, administration considers that 'Residential Building' is the most suitable land use for the proposed development. In accordance with the Residential zoning, the use is a discretionary land use and is capable of approval subject to compliance with the relevant provisions of DPS 2 and the R-Codes.

Built Form

The development application has been assessed against the R-Codes; however it is noted that clause 1.4 of the R-Codes dictates that the R-Codes applies to single houses, grouped dwellings and multiple dwellings. As such the R-Codes do not strictly apply to Residential Buildings however administration has assessed the proposal against the following provisions of the R-Codes in order to determine the impact of the proposal:

- 2.4 Waste management;
- 2.5 Utilities;
- 3.1 Site cover;
- 3.2 Building height;
- 3.3 Street setbacks;
- 3.4 Lot boundary setbacks;
- 3.5 Site works and retaining walls;
- 3.6 Streetscape;
- 3.7 Access;
- 3.9 Solar access for adjoining sites; and
- 3.10 Visual privacy.

These provisions are in place to ensure the built form does not impede on the amenity and liveability for the residents and adjoining properties, ensures the development is appropriately scaled, is sympathetic to surrounding

buildings/landowners and the desired streetscape. This will ensure that the proposed built form will not cause undue impacts to the surrounding area.

The development application generally complies with the above noted provisions however varies from the following:

- 2.4 Waste Management;
- 2.5 Utilities;
- 3.4 Lot boundary setbacks;
- 3.5 Site works and retaining walls; and
- 3.6 Streetscape.

These matters are discussed in further detail below.

2.4 Waste Management

Clause C2.4.3 of the R-Codes outlines where five or more dwellings are proposed, a waste management plan is to be provided and that waste storage bins are to be screened from view from communal areas, the street, public open space, and other areas accessible to the public.

A Waste Management Plan (WMP) was provided as part of the application (**Attachment 8**). The WMP outlines the required number of bins as required in accordance with the WALGA 'Multiple Dwelling Waste Management Plan Guidelines', the bin store location and relevant collection details. The WMP indicates a total of six bins will be provided (two general waste, two recycling and two garden organics), which are to be collected by the City in accordance with the City's waste collection schedule. As such, the proposal indicates a bin pad on the verge with a total width of 10.5 metres. The bin pad has been reviewed by the City's Waste Management team who have confirmed that the bin pad is of sufficient dimensions and in an appropriate location for the City's collection.

The applicant is proposing the bin stores to be located within the primary street setback area. The bin store is appropriately located away from the built form and outdoor living areas, however, is in the view of the public realm. As to not impede on the streetscape the applicant has provided a one metre wall in front of the bin store and has indicated landscaping will be provided within the verge to screen the bin store from the public realm. In addition, the applicant has provided a Landscaping Plan to assist with the assessment of the application, which is included in **Attachment 9**. The plan submitted is preliminary in nature and does not demonstrate the densities of plant species, mulch details and full landscaping within the verge. There is also a requirement 15% soft landscaping within the landscaping per site, and 30% landscaping within the primary street setback. As such, Administration recommends that a condition be imposed requiring a revised landscaping plan providing the required soft landscaping in accordance with requirements of the R-Codes and to provide the required screening of the bin store to the public realm to be approved prior to the submitting of a building permit.

2.5 Utilities

Clause 2.5.2 outlines that functional utilities are to be designed and located such that they:

i. Are located behind the primary street setback and not visible from the primary street;

ii. Are designed to integrate with the development; and
iii. Are located and/or screened so that they are not visually obtrusive and minimise the impacts of noise sources to habitable rooms and private open space both on the development site and adjoining properties.

The proposed plans do not indicate the location of utilities such as air-conditioning units, hot water systems, or clothes drying areas. This was raised by the DRP member, with the applicant advising they have not yet dealt with these items yet and intend to action this within the detailed design phase of the development.

As to ensure the utilities do not impede on the amenity of the streetscape or surrounding landowners, it is recommended that a condition be applied for external fixtures and utilities to be screened from view of the street and public places to the satisfaction of the City.

3.4 Lot Boundary Setbacks

Clause C3.4.4 outlines that boundary walls may be built to a maximum height of 3.5 metres and a maximum length of two-thirds of the length of the lot boundary that the wall abuts, provided:

i. Boundary walls are located behind the street setback;
ii. Overshadowing does not exceed 35%; and
iii. They are finished in an equivalent standard to the rest of the development.

The application proposed a boundary wall to the southern (rear) boundary which is less than two-thirds of the length however has a wall height ranging between 3.9 to 5.7 metres.

Administration resolves the variation to the boundary wall height can be considered given that the highest portion of the retaining wall directly abuts an existing boundary wall on the southern adjoining lot. As such it is considered that the any potential amenity impacts caused by the wall height of 5.7 metres are mitigated as the highest portion of the proposed wall is not visible to the adjoining lot and there are no direct impacts to the overshadowing or overlooking to this portion of the adjoining lot.

The section of the proposed boundary wall which does not abut the existing adjoining boundary wall has a maximum height of 3.9 metres (comprising of one metre of retaining and 2.9 metres wall height) which abuts the southern lots outdoor living area. Despite the wall being to the southern boundary, the boundary wall complies with the overshadowing requirements, with 15.54% overshadowing proposed, where 35% is permitted. The wall height does not impact on privacy and solar access for adjoining lot.

In addition, it is noted that no objections were received from the affected landowner/occupiers relating to the height of the proposed boundary wall or proposed retaining walls. The proposed wall height is considered to appropriately address the design principles given the boundary wall will not impede on solar access into the adjoining property and will not have undue impacts on the residents of the adjoining lot.

3.5 Site Works and Retaining Walls

Clause 3.5 outlines that retaining walls, fill and excavation forward of the street setback line are to be no more than 0.5 metres above or below natural ground level

and any retaining walls and fill within the site behind the street setback line are to comply with the following:

- 1 metre of less of retaining requires a 0 metre setback; and
- 1.5 metres requires a 1.5 metre setback.

The application proposed retaining walls which include retaining within the primary street setback area to facilitate cutting of the natural ground level and retaining to facilitate fill to the rear of the lot. The retaining within the primary street setback is proposed with stepped retaining at two levels to achieve cut of 1.21 metres from the natural ground level of the street. The proposed fill at the rear of the lot is a maximum of 1.036 metres at the southern and western adjoining boundary.

The site is sloping and as such the cut within the street setback area allows for the proposed pad level to be consistent with the predominant natural ground level of the lot. The retaining that is proposed therefore considers and responds to the natural features of the site and requires minimal excavation and fill. There will be minimal impact on the streetscape given there is no fill within the street setback area. The proposed site works and retaining is also consistent with the City's *Local Planning Policy 2.4 – Site Works and Retaining for Residential Development* given the application proposes an equal amount of cut and fill to establish the finished ground level of the site.

As previously noted, no objections were received regarding the retaining within the lot as part of the public consultation. The retaining successfully addresses the design principles outlined within the R-Codes, ensuring that the retaining can be effectively used for the benefit of the residents and does not detrimentally impact the amenity of the adjoining properties.

3.6 Streetscape

Clause 3.6.1 indicates that all dwellings are to address the street in accordance with the following:

- *The primary entrance to each dwelling must be readily identifiable from the street; and*
- *Provide at least one major opening on the dwelling frontage with an outlook to the street.*

One of the proposed buildings is facing the primary street, however it is noted that of the five residences within the building, only three have their primary entrance and major openings to the street. This is given that each residence has a flipped alternating design, with the remaining two residences providing their primary entrance to the rear of the building (noting this design is mirrored within the second building). As such, the remaining two residences have a minor opening from the proposed bedroom facing the primary street.

Administration resolves that the variation can be considered as whilst the abovementioned openings are minor in nature, the three residences facing the primary street provide both major openings and their associated outdoor living area to the primary street. This will allow for sufficient passive surveillance and social interaction into the public realm. Further, the flipped design is appropriate to achieve the required identifiable entrances given the entrances to the rear have clear pathways connecting to both the public realm and the car parking, further promoting passive surveillance within the lot.

It is considered that the variations successfully achieve the design principles and effectively contribute to the streetscape.

Surveillance into the Public Open Space

Given the lot directly abuts Hainsworth Park which is an active Public Open Space (POS) site with playing fields, it is appropriate to also consider the interface between the subject lot and the POS.

The second building to the rear of the subject lot provides three residences directly facing the POS with both major openings and their associated outdoor living areas oriented towards the POS. The applicant is proposing to replace the existing boundary fence abutting the POS with 1.274 metres high fence. This fence includes a portion of visually permeable fencing which faces the abovementioned major openings and OLA. This is therefore considered to provide passive surveillance, given there are three dwellings with major openings and outdoor living areas facing the POS. In addition, the fence is only 1.274 metres in height which allows for good visual access to and from the POS.

Lighting

The Design Review Panel member recommended that the applicant provide a lighting plan for the safe and secure use of the residence's entries, paths, communal open spaces and car park. The applicant has indicated within their justification that they have not yet considered lighting on site. It is therefore recommended that a condition be applied for lighting to be installed along driveways, pedestrian pathways, car parking areas and within common service areas prior to occupation of the development.

Parking & Traffic

Parking

Submissions raised concerns regarding the number of parking bays provided, and whether this is appropriate given the proposal can accommodate up to ten residents at any given time.

DPS 2 provides a car parking standard for Residential Buildings, requiring one parking bay per two people accommodated on site. Given ten people are to be accommodated there is a requirement for five bays on site, which is consistent with the parking provided. The application is therefore compliant with the requirement of DPS 2.

Traffic

A submission was raised with regards to potential traffic impacts whilst the use is being constructed.

A Construction Management Plan is recommended as a condition of approval, to be submitted and approved by the City, prior to lodging a building permit.

Conclusion:

The development application for the Residential Buildings on Lot 2 (No. 65) Salcott Road, Girrawheen has been assessed against the relevant legislation and planning requirements. The proposed land use is a discretionary use on the subject lot and is consistent with the requirements of DPS 2 and the relevant state and local planning policies, as addressed within this report. As such, the built form appropriately relates to the street, adjoining residential lots and public open space.

It is therefore recommended that the application be approved, subject to conditions addressing the issues raised in this report.

UNITING GIRRAWHEEN

65 SALCOTT ROAD GIRRAWHEEN

DRAWING No.	DESCRIPTION	REV
DA000	COVER SHEET	C
DA001	EXISTING CONDITIONS / DEMO	B
DA002	SITE PLAN	C
DA100	FLOOR PLAN	C
DA400	ELEVATIONS (1 of 2)	B
DA401	ELEVATIONS (2 of 2)	C
DA600	LANDSCAPE PLAN	C
DA601	OVERSHADOWING PLAN	B

NIC BRUNSDON

UNITING GIRRAWHEEN
65 SALCOTT ROAD GIRRAWHEEN

DISCLAIMER

- WRITTEN DIMENSIONS TAKE PRECEDENCE OVER SCALED DIMENSIONS.
- ANY CHANGES MADE SHALL BE DOCUMENTED AND FORWARDED TO THIS OFFICE FOR APPROVAL.
- VERIFY ALL DIMENSIONS ON SITE AND NOTIFY THIS OFFICE IMMEDIATELY OF ANY DISCREPANCIES.
- SHOP DRAWINGS MUST BE SUBMITTED TO THIS OFFICE FOR APPROVAL PRIOR TO MANUFACTURE
- CONTRACTOR TO ENSURE THAT DRAWING IS CURRENT ISSUE BEFORE COMMENCEMENT OF WORK

DRAWING TITLE
COVER SHEET

DRAWING # DA000
REV C

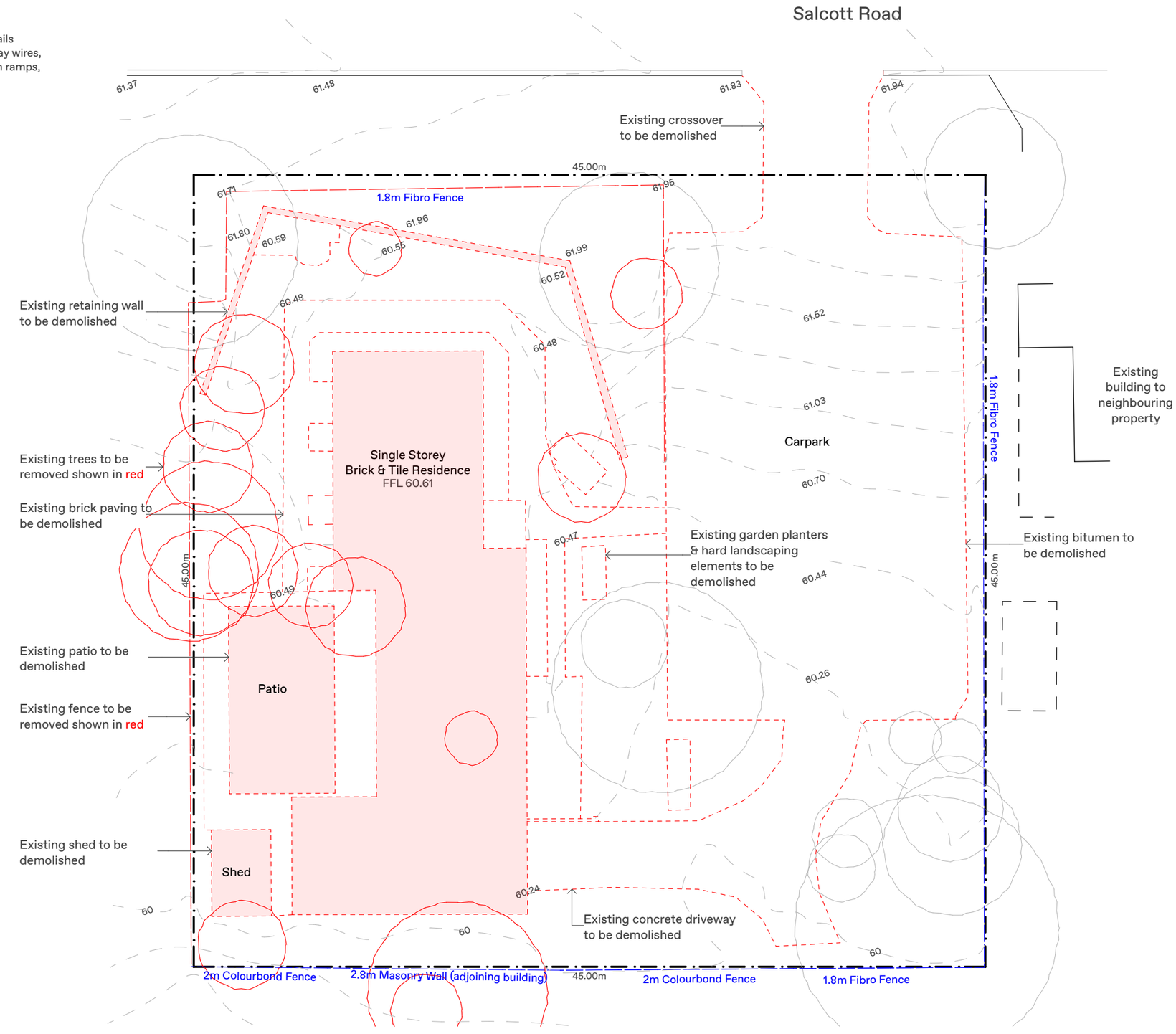
DRAWING ISSUE
DEVELOPMENT APPLICATION

PROJECT # 192_G

SCALE 1:1
PAGE A3
DRAWN JK
DATE 23/4/2024

Notes:

Refer to Site Feature Survey for verge details including any street trees, power poles, stay wires, bus stops, footpath signs, manholes, pram ramps, street signs and drainage pits



NIC BRUNSDON

UNITING GIRRAWHEEN
65 SALCOTT ROAD GIRRAWHEEN

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DRAWING TITLE
EXISTING CONDITIONS / DEMO

DRAWING # DA001

REV B

DRAWING ISSUE
DEVELOPMENT APPLICATION

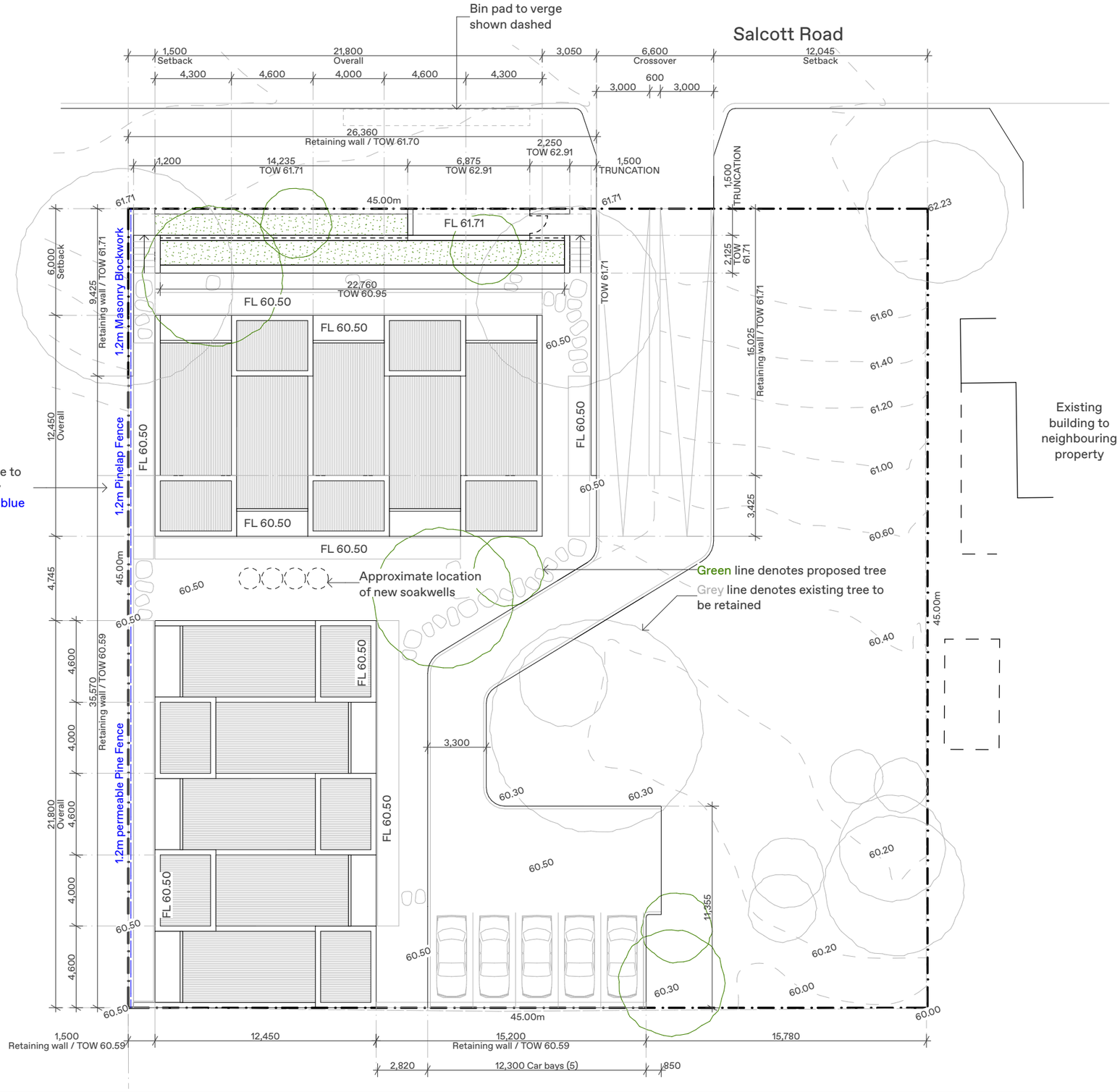
PROJECT # 192_G

SCALE 1:250
PAGE A3
DRAWN JK
DATE 3/4/2024

Notes:

Refer to Site Feature Survey for verge details including any street trees, power poles, stay wires, bus stops, footpath signs, manholes, pram ramps, street signs and drainage pits

Site Area:	2025m^2
Site Coverage:	543m^2
Site Coverage:	27%



NIC BRUNSDON

UNITING GIRRAWHEEN
65 SALCOTT ROAD GIRRAWHEEN

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DRAWING TITLE
SITE PLAN

DRAWING # DA002

REV C

DRAWING ISSUE
DEVELOPMENT APPLICATION

PROJECT # 192_G

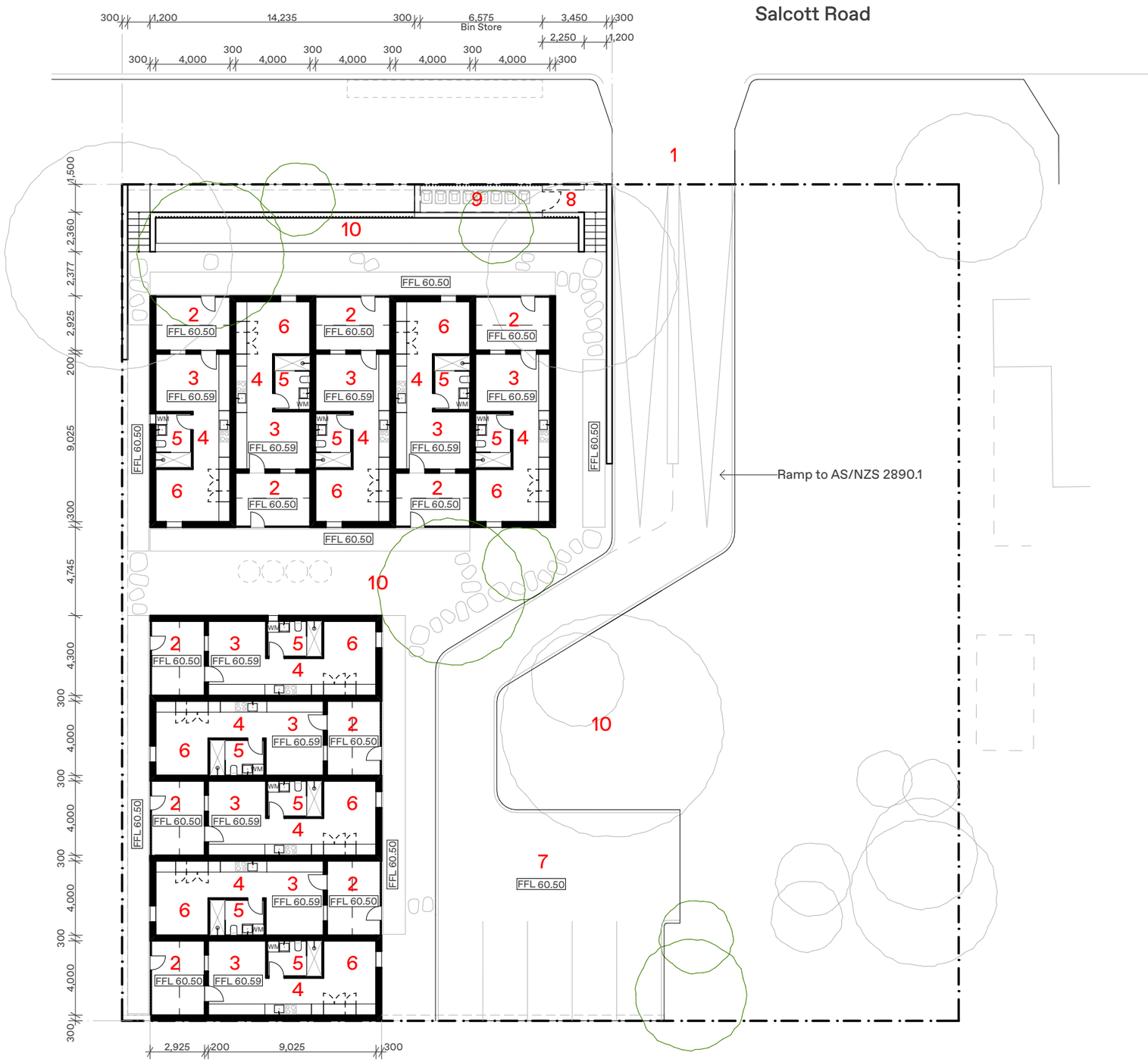
SCALE	1:250
PAGE	A3
DRAWN	JK
DATE	23/4/2024

Notes:

Refer legend below.

Legend:

1 New Crossover
2 Outdoor Living
3 Living / Dining
4 Kitchen
5 Bathroom
6 Bedroom
7 Car Bays (4) & turn-around
8 Letterbox
9 Bin Store
10 Communal Garden



NIC BRUNSDON

UNITING GIRRAWHEEN
65 SALCOTT ROAD GIRRAWHEEN

DISCLAIMER

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DRAWING TITLE
FLOOR PLAN

DRAWING # DA100
REV C

DRAWING ISSUE
DEVELOPMENT APPLICATION

PROJECT # 192_G

SCALE 1:250
PAGE A3
DRAWN JK
DATE 23/4/2024

Notes:

Trees are shown indicative only.
High level windows have no overlooking aspect, windows are >1600mm above FFL.

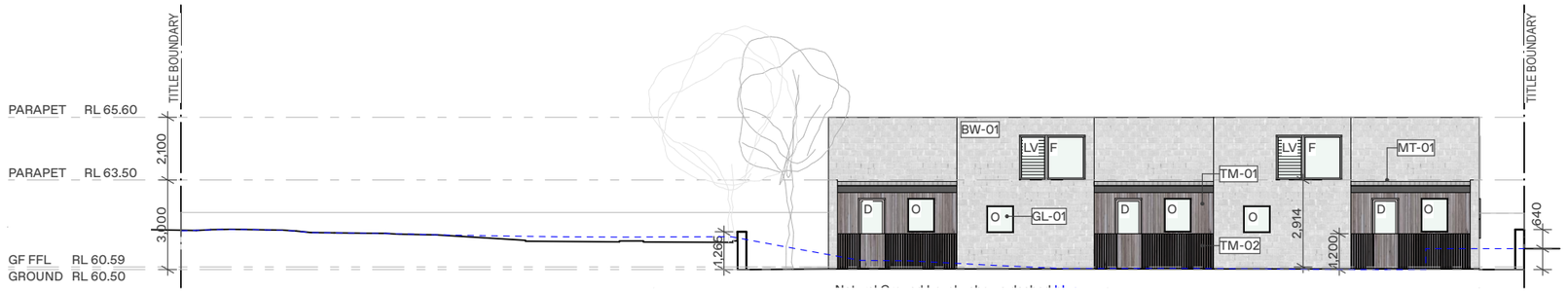
Legend:

Materials:

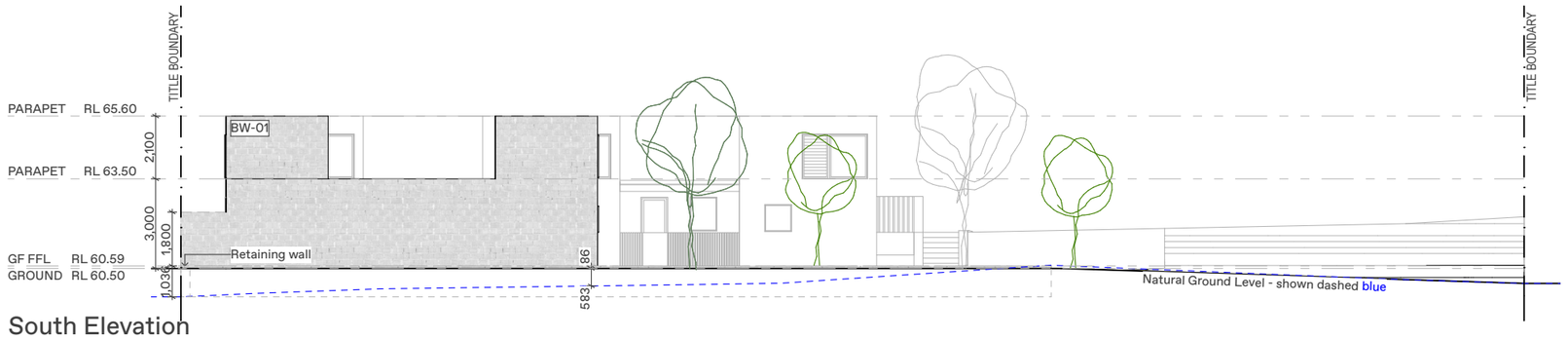
BW-01	Masonry Blockwork / Parchment or Grey TBC
TM-01	Timber Fence & Gate
TM-02	Timber Cladding
GL-01	Clear Glazing / Aluminium Frame
GL-02	Fluted/Obscure Glazing / Aluminium Frame
MT-01	Galvanised Roof Sheeting

Doors & Windows:

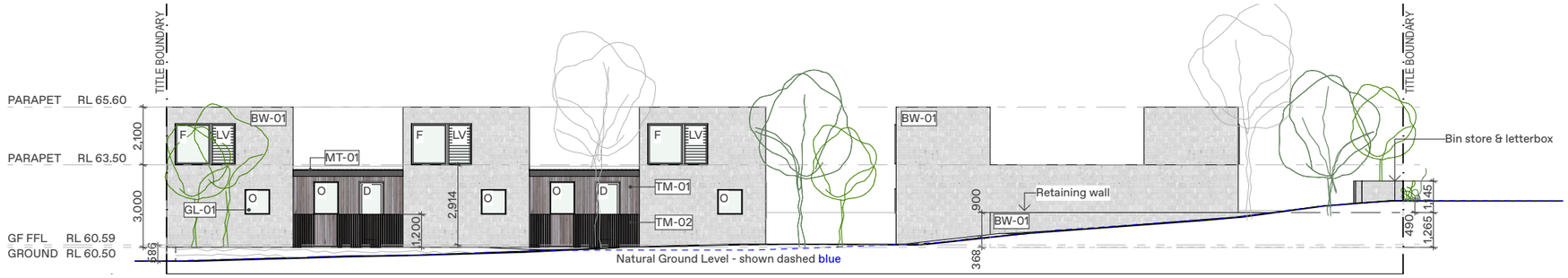
F	Window / Fixed Glazing
LV	Window / Louvres
O	Window / Operable
D	Door



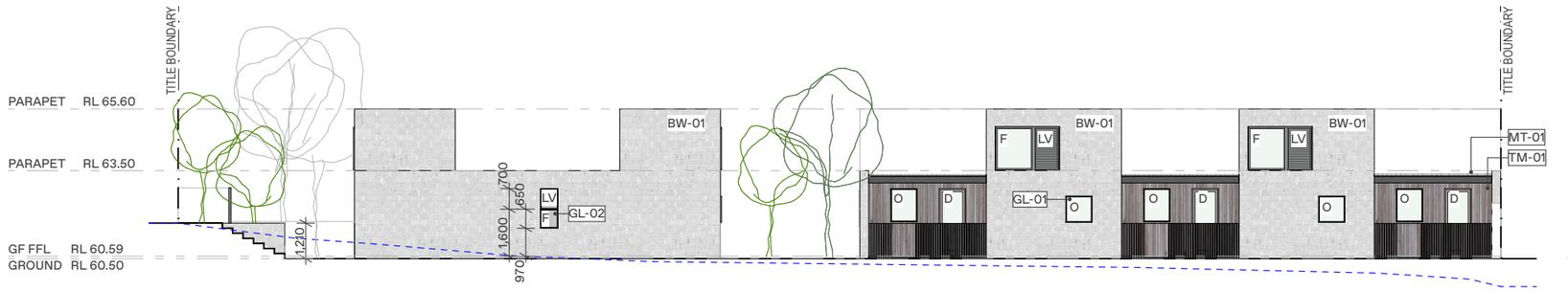
North Elevation



South Elevation



East Elevation



West Elevation

NIC BRUNSDON

UNITING GIRRAWHEEN
65 SALCOTT ROAD GIRRAWHEEN

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DRAWING TITLE
ELEVATIONS (1 of 2)

DRAWING # DA400
REV B

DRAWING ISSUE
DEVELOPMENT APPLICATION

PROJECT # 192_G

SCALE	1:200
PAGE	A3
DRAWN	JK
DATE	3/4/2024

Notes:

Trees are shown indicative only.
High level windows have no overlooking aspect, windows are >1600mm above FFL.

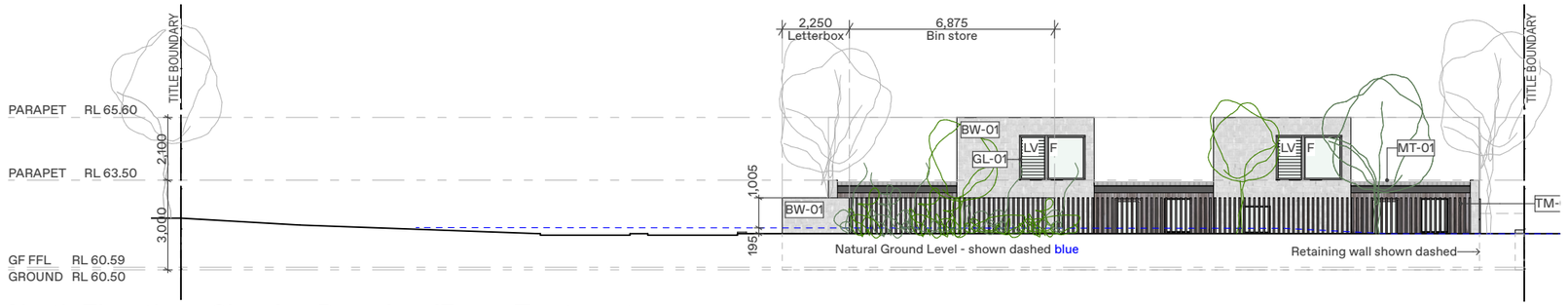
Legend:

Materials:

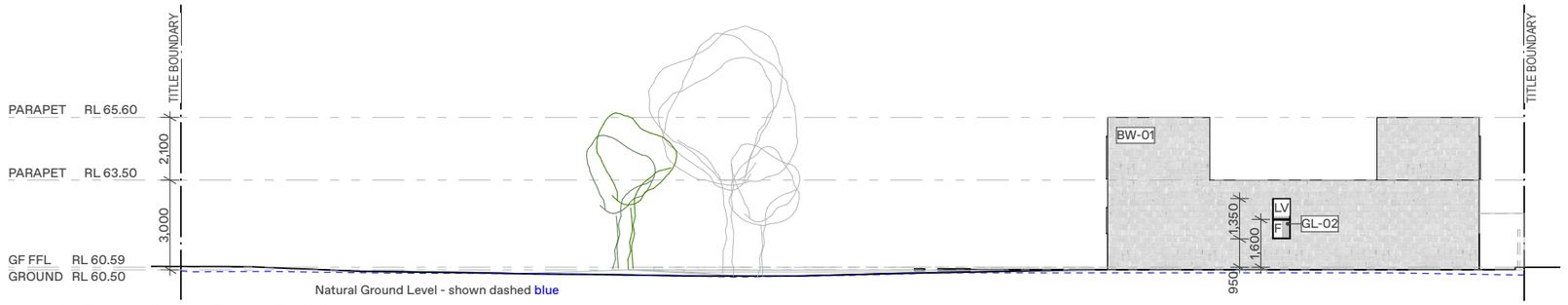
BW-01	Masonry Blockwork / Parchment or Grey TBC
TM-01	Timber Fence & Gate
TM-02	Timber Cladding
GL-01	Clear Glazing / Aluminium Frame
GL-02	Fluted/Obscure Glazing / Aluminium Frame
MT-01	Galvanised Roof Sheeting

Doors & Windows:

F	Window / Fixed Glazing
LV	Window / Louvres
O	Window / Operable
D	Door

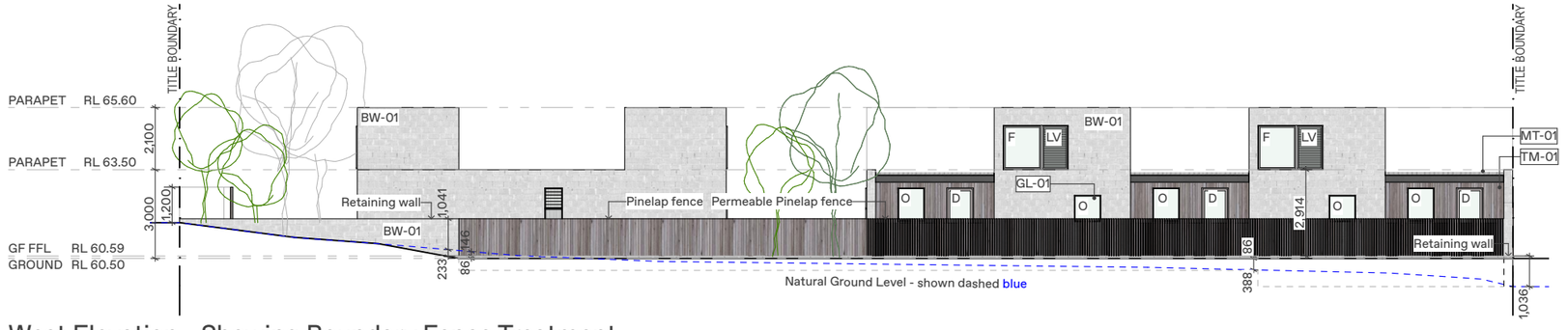


North Elevation - Showing Boundary/Fence Treatment



North Elevation - Rear Building

South Elevation - Front Building



West Elevation - Showing Boundary Fence Treatment

NIC BRUNSDON

UNITING GIRRAWHEEN
65 SALCOTT ROAD GIRRAWHEEN

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DRAWING TITLE
ELEVATIONS (2 of 2)

DRAWING # DA401
REV C

DRAWING ISSUE
DEVELOPMENT APPLICATION

PROJECT # 192_G

SCALE 1:200
PAGE A3
DRAWN JK
DATE 23/4/2024

Notes:

Planting areas shown indicatively.
Refer below for indicative species list:

Larger trees:
Eucalyptus todtiana
Eucalyptus marginata
Corymbia calophylla

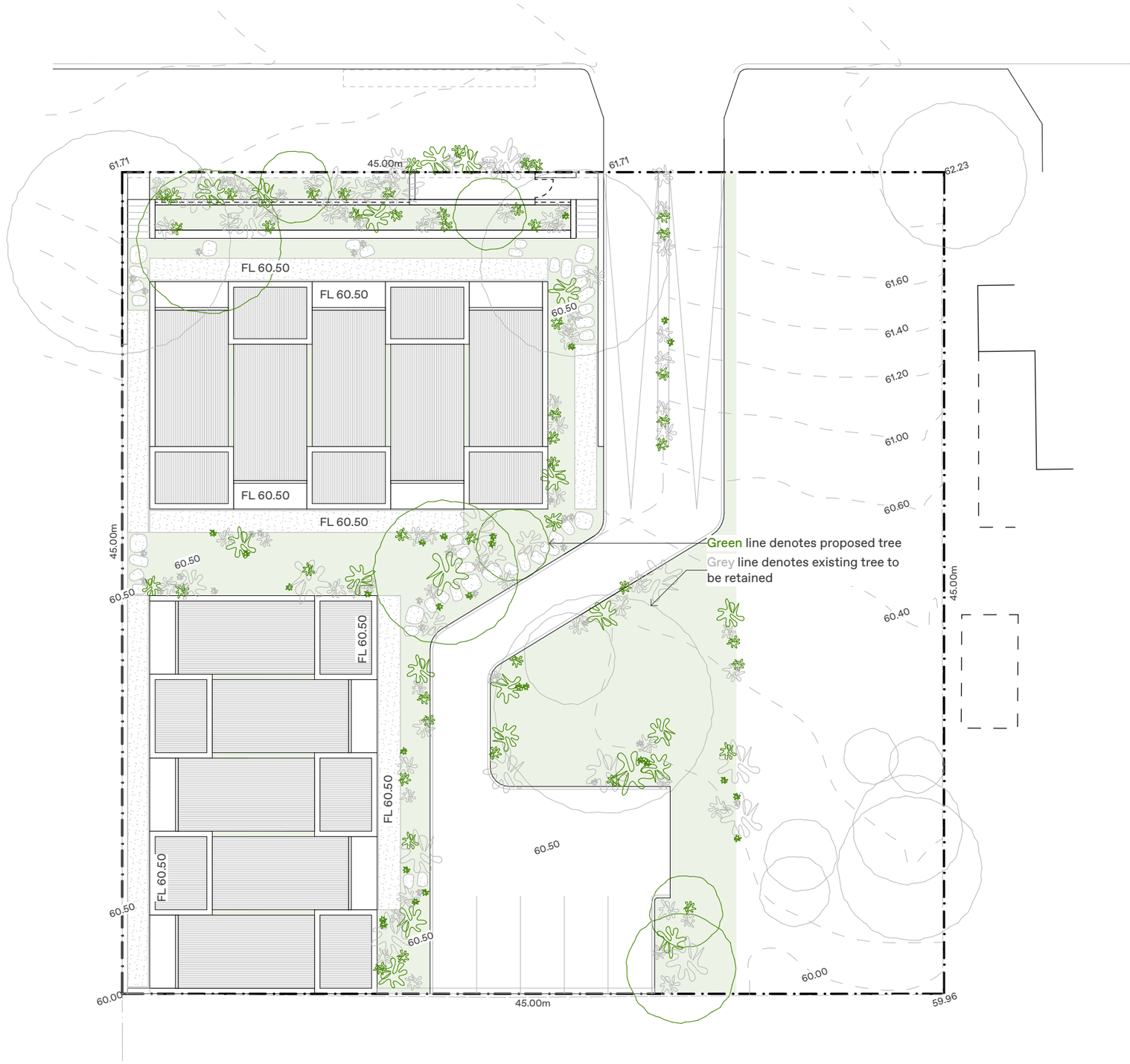
Medium trees:
Eucalyptus websteriana
Eucalyptus rhodantha
Eucalyptus synandra

Small trees:
Banksia grandis
Banksia menziesii
Banksia attenuata

Shrubs:
Verticordia densiflora
Banksia dallanneyi
Xanthorrhoea preissii
Hypocalymma robustum
Acacia iasiocarpa

Herbs:
Conostylis aculeata
Anigozanthos manglesii
Chrysocephalum apiculatum

Rushes & Grasses:
Juncus kraussii
Poa poliformis
Pennisetum basedowii



N

NIC BRUNSDON

UNITING GIRRAWHEEN
65 SALCOTT ROAD GIRRAWHEEN

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DRAWING TITLE
LANDSCAPE PLAN

DRAWING # DA600
REV C

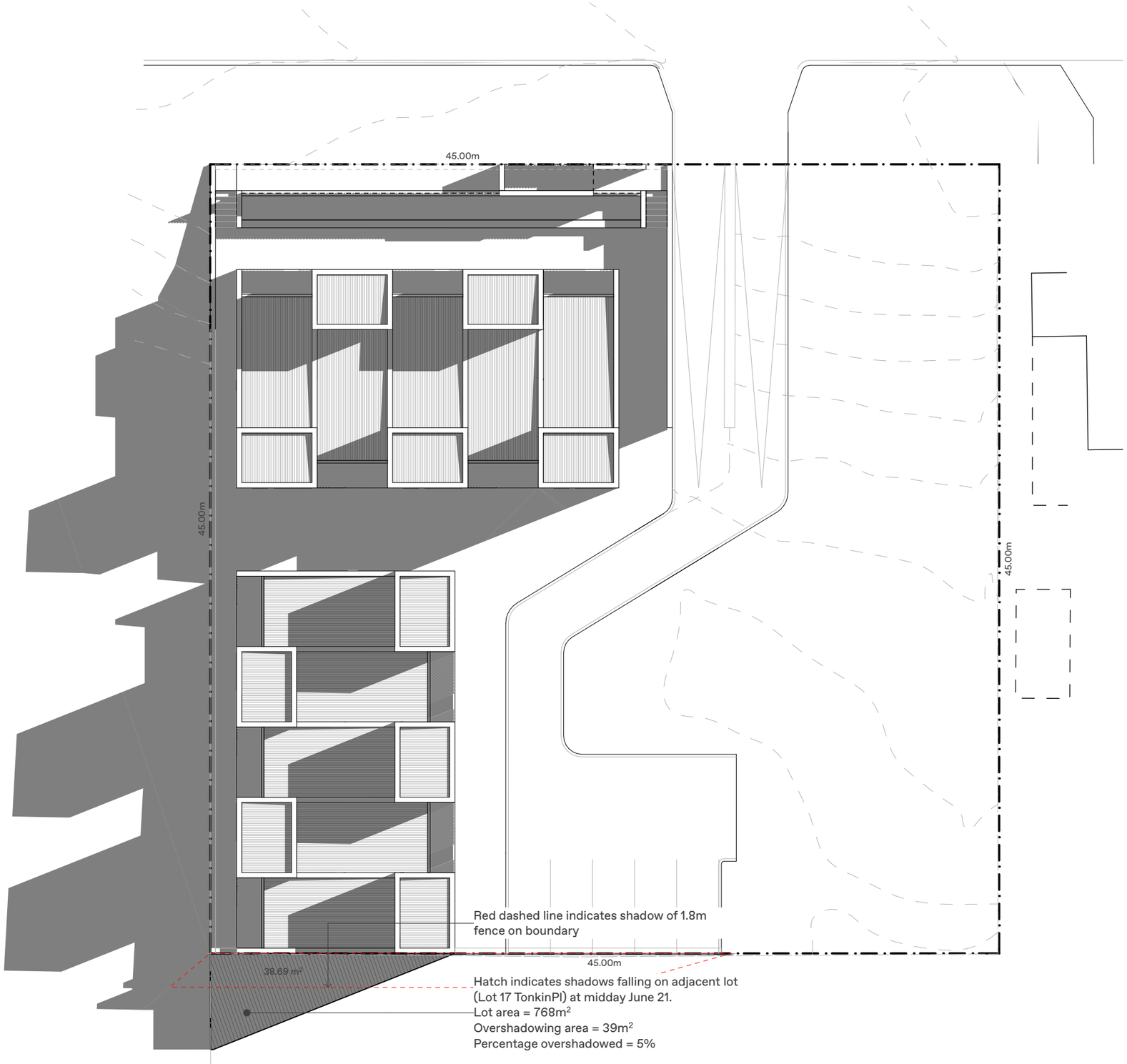
DRAWING ISSUE
DEVELOPMENT APPLICATION

PROJECT # 192_G

SCALE 1:250
PAGE A3
DRAWN JK
DATE 23/4/2024

Notes:

Shadows shown at midday 21 June.



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UNITING GIRRAWHEEN
65 SALCOTT ROAD GIRRAWHEEN

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DRAWING TITLE
OVERSHADOWING PLAN

DRAWING # DA601

REV B

DRAWING ISSUE
DEVELOPMENT APPLICATION

PROJECT # 192_G

SCALE	1:250
PAGE	A3
DRAWN	JK
DATE	5/4/2024

Aspirations Housing

Operations Management Plan

December 2023

1. Introduction

This Operations Management Plan provides logistical detail relating to the day-to-day operation of Uniting WA's proposed Aspirations Housing Service (**Service**), to be delivered out of 65 Salcott Road, Girrawheen (**Property**), including the following key components:

- The Service Model
- Target Cohort
- Staffing Arrangements
- Hours of Operation
- Safety and Security
- Property Management
- Uniting Contact Information

2. Background

Uniting WA (**Uniting**) is a leading Western Australian community services organisation. Uniting is part of the UnitingCare Australia network, the country's largest community service provider network, which employs over 50,000 staff, supported by more than 30,000 volunteers. Uniting is registered with the Department of Communities as a Tier 2 Community Housing Provider and manage housing assets in accordance with the Community Housing Regulatory Framework obligations.

Uniting has identified a gap in the housing continuum where people exiting Uniting's transitional housing facilities have limited opportunities to access permanent, safe, secure, affordable, and sustainable housing that facilitate their long-term independence. As a result, these individuals are at high risk of returning to homelessness and are more likely to become trapped in an ongoing cycle of disadvantage – at significant and economic cost to the individual, the Government and the broader community.

Uniting's Aspirations Housing project seeks to address this gap in the housing continuum, with provision of long-term supportive housing for people who face challenges maintaining traditional tenancies.

Uniting's Aspirations Housing project stands as a proactive response to bridging gaps in the housing continuum. This initiative is dedicated to providing long-term supportive housing solutions for individuals facing challenges in maintaining traditional tenancies. Recognising the diverse needs of its residents, Aspirations Housing goes beyond merely offering shelter, aiming to create a nurturing environment that fosters stability and empowerment. By addressing the specific hurdles faced by individuals in sustaining conventional housing arrangements, Uniting contributes to enhancing the overall well-being and resilience of the community. Through a commitment to long-term support, the Aspirations Housing project aligns with Uniting's mission to create inclusive and sustainable solutions that positively impact the lives of those in need.

3. The Service Model

The purpose of the Aspirations Housing Service (**Service**) is to provide long term, safe, secure, and stable accommodation for 10 adults (**residents**) who have experienced homelessness or are at risk of homelessness, with individualised supports to be provided by Uniting to ensure the residents can maintain their tenancies and live more independently. The Service is designed to support people exiting transitional housing facilities who have demonstrated their potential to live independently and sustain a long-term tenancy with access to minimal support. Aspirations Housing sits between Transitional Accommodation placements and Community and Public Housing (refer to **Figure 1** below).

The Service model is based on 'Housing First' principles, whereby people who have experienced homelessness or are at risk of homelessness are offered an affordable, appropriate, and safe home permanently. By integrating housing and support services, tenants are supported and helped to sustain their tenancies. The Service will offer efficient and coordinated support for people with complex needs and assists low-income households by preventing housing stress.

Uniting's flexible and tailored two-part Aspirations service structure combines a supportive landlord approach (the landlord being Uniting WA) with 'light touch' supports, which are flexible and tailored to the unique needs of each individual accessing the service. These supports are recovery and strengths focused to restore dignity and hope and could include assistance with sustaining the independent living skills acquired during their stay in transitional housing facilities, including budget management, support to attend appointments, gain access to learning and employment opportunities, and build social connections with other residents and the surrounding community.

The 'light touch' supports within Aspirations Housing are intentionally designed as a seamless extension of existing programs like Uniting's Homeless Accommodation Support Services (HASS), recognising that certain individuals may

require persistent assistance to maintain a tenancy and prevent a return to homelessness. The overarching goal is to offer stable accommodation for a duration sufficient for individuals to recover and achieve independence, with the anticipation that some residents will transition to fully independent living. While acknowledging that specific tenants may continue to benefit from ongoing Aspirations support, the service program remains adaptable. This flexibility enables residents to age in place, treating their Aspirations residence as a permanent home that caters to their evolving needs. By accommodating varying levels of support, the program seeks to strike a balance that empowers individuals to thrive independently while ensuring ongoing assistance for those who require it to sustain lasting stability.

It is intended the Service accepts referrals from other relevant services operated by Uniting WA and other community services organisations.

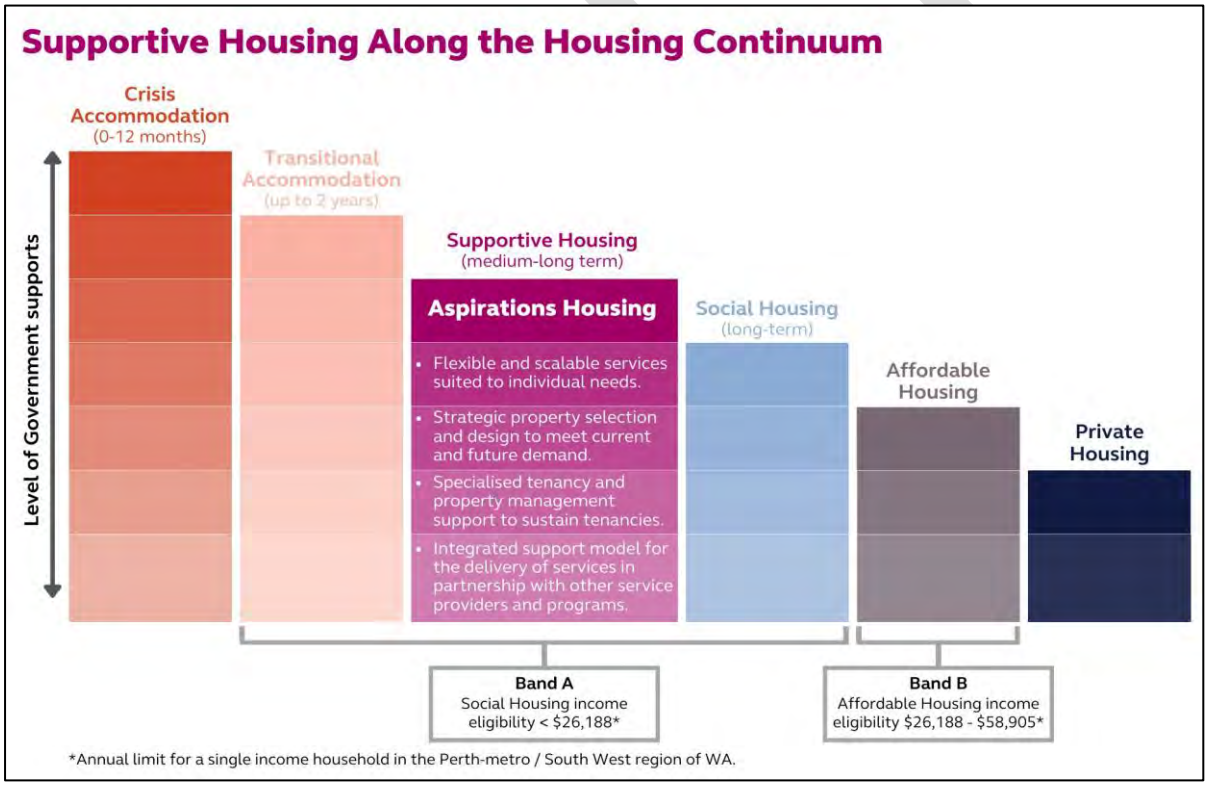

Figure 1: Supportive housing along the housing continuum with WA Government's income limits

4. Target Cohort

Aspirations Housing will support:

- Individuals over the age of 18 who have experienced homelessness or at risk of homelessness, and are exiting a transitional housing facility;
- Require support to maintain long term tenancies; and
- Eligible for Band A Social Housing and on a very low income.

5. Staffing Arrangements

The Aspirations Housing operational team includes the following roles:

Senior Manager is responsible for the implementation of Uniting's service strategies. The Senior Manager ensures the services delivered across the support service pathways, including those delivered by the Aspirations Housing Program, are of high quality, and align to contemporary best practice.

Operations Lead provide management support to both Uniting's Transitioning from homelessness and reintegration services. The Operations Lead provides clear vision and direction on service delivery, creates and manages a work plan that enables high performance, and defines and measures key performance outcomes in partnership with the team to improve service outcomes.

Case Workers serve as a crucial link between residents and the resources available to them. Beyond merely securing stable housing, the case worker's responsibilities extend to understanding the unique needs and challenges of each individual, fostering a trusting relationship, and collaboratively developing tailored plans which promote long-term, sustained success. This can include connecting residents to other community services, mental health resources, employment opportunities and educational programs. The Case Worker's ability to provide empathetic guidance, encouragement, and advocacy plays a pivotal role in empowering individuals to rebuild their lives. This 'light touch' approach ensures that residents receive the necessary support level that matches their current circumstances while fostering a sense of autonomy and self-sufficiency.

Tenant Support Worker provides a supportive landlord approach to tenancy management, ensuring the social impact is at the forefront of decision making while managing tenancy debt, damages, and neighbour complaints. The one point of contact for all housing related needs via the Tenant Support Worker ensures a holistic approach and helps foster meaningful relationships with tenants and services.

6. Hours of Operation

Case Workers will be rostered to visit each resident on site for up to three hours per week (per resident), between 9.00am and 5.00pm Monday to Friday.

On-call staff are available after hours, weekends and public holidays. The primary contacts for after hours are Uniting Senior Manager and Operations Lead (refer to contact details below).

7. Parking

Off-street parking is provided on-site for staff and visitors. Demand for parking remains very low, with residents unlikely to own a vehicle due to low-income status, being subject to Band A Social Housing income restrictions. Visitor numbers are also anticipated to be low based on the prevalence of social isolation of the people anticipated to benefit from this service.

8. Intake and Case Management

It is intended residents will be referred from Uniting's transitional housing programs and other service providers. Referrals are discussed with the Case Workers at the Aspirations Housing Property to ascertain if they are suitable. A comprehensive assessment is conducted by the Case Worker to ensure the person's individual needs, risks, and complexities are discussed.

Once the intake assessment has been completed, and the person is considered a good fit for the Aspirations Housing Property, the Case worker will work alongside the resident to transition them into the Property.

Case Management will utilise the 'Outcomes Star' framework, specifically the Tenancy Star, which serves as a comprehensive tool for case management within a housing support program, especially for individuals transitioning from homelessness. The Tenancy Star focuses specifically on the key aspects related to tenancy sustainment. It provides a structured framework to assess and measure an individual's progress in areas such as maintaining a safe and stable living environment, managing finances, building positive relationships with neighbours, and accessing community resources. In the context of case management, the Tenancy Star becomes an invaluable guide for both case workers and clients. Through regular assessments and goal-setting sessions, case workers can identify specific challenges clients may face in maintaining their tenancy and develop targeted interventions accordingly. The visual nature of the star chart makes it accessible and engaging for clients, fostering a collaborative and transparent relationship. By utilising the Tenancy Star in case management, Aspirations Housing can not only track the progress of individuals but also tailor interventions to address specific needs, thereby increasing the likelihood of sustained housing stability for those who have experienced homelessness.

An important focus of the Service is building the capacity of residents to secure and maintain independent and stable long term accommodation and build positive connections within the community.

During their residency, residents are expected to actively contribute to the upkeep of the property/gardens. Residents are also expected to allocate a percentage of their income toward rent. These expectations align with the assumption that individuals may have already honed such skills during previous stays in transitional housing, and these practices are further encouraged and sustained through their tenure at Aspirations Housing. The emphasis is on fostering a collaborative community where residents willingly engage in the maintenance of their living environment and contribute to the financial aspects of their housing, contributing to the overall well-being of the community.

Ensuring the safety and delivering high-quality services is crucial for the success of the program. Every resident is expected to sign and adhere to a Residential Tenancy Agreement underscoring the commitment to maintaining a secure and effective service delivery environment.

9. Safety and Security

Staff will utilise Uniting's security company's mobile service if there are issues or incidents relatively close to the property, noting that Uniting's staff and security are only able to assist with matters directly relating to the Aspirations Housing residents and property. The local authority and neighbours will be provided with Uniting's staff and security contact details if requested.

10. Incidents

Uniting investigates all serious incidences occurring at our properties, or as requested by external stakeholders. As per the *Uniting Practice Guideline to Incident Management, Reporting and Investigation*, Uniting shall:

- Investigate the incident
- Implement risk mitigation strategies to prevent recurrence
- Debrief staff and encourage the utilisation of Employee Assistance Program (EAP) services
- Communicate the outcomes of an investigation to an external stakeholder as necessary and within privacy requirements

11. Property and Facility Management

The Uniting housing team manages all maintenance tasks relating to the Property. Maintenance tasks include preventive, reactive and life-cycle maintenance, cyclical testing, and certification to Local Government and Australian Standards.

Uniting maintains records relating to maintenance tasks.

The Uniting housing team plays a pivotal role in overseeing the comprehensive spectrum of maintenance tasks associated with the property. This encompasses a proactive approach with preventive maintenance, addressing issues before they escalate, as well as reactive maintenance to promptly respond to unexpected challenges. Additionally, life-cycle maintenance is systematically managed, ensuring that all components and systems within the property are sustained over the long term. The team conducts cyclical testing and certification processes in alignment with both Local Government regulations and Australian Standards to uphold the highest safety and quality standards. In this meticulous approach, Uniting not only addresses immediate needs but also ensures the sustained functionality and compliance of the property. Furthermore, the team diligently maintains detailed records documenting all maintenance tasks, contributing to transparency, accountability, and a thorough historical perspective for future planning and decision-making processes.

12. Waste Management

Property waste management is via bin waste services offered by the local authority, with general waste and recycling bins to be collected weekly / fortnightly as per the scheduled waste collection services for the area.

All bins to be stored in the bin store area on the Property, which is located along the street front boundary to allow for accessible waste collection.

13. We are Uniting – About Us

Uniting WA provide community services including children, family and foster care services, NDIS disability, advocacy, and mental health services, as well as financial wellbeing, homelessness, and housing support.

The Uniting team supports people experiencing complex challenges throughout the Perth metro area and in the Great Southern.

You can find out more about us on our website – www.unitingwa.org.au

14. Key Contacts

Please contact us if you have any questions, or concerns arising during business hours, to the key contacts below:

Name	Position	Email / Mobile Phone
Emma White	Senior Manager, Transitioning from Homelessness	Email: emma.white@unitingwa.org.au Mobile: 0420 433 175
Danni Evans	Operations Lead, Transitioning from Homelessness	Email: danni.evans@unitingwa.org.au Mobile: 0427 615 025

15. Variations

This Operations Management Plan is scheduled for annual review by Uniting WA. Uniting WA reserves the right to vary or change this plan from time to time.

16. Authorisation

Approver's Signature	Date

17. Version Control

Version No.	Review Date	Reviewers	Comments
0	20.12.2023	Jennifer Snell, General Manager - Service & Quality Michael Chester, Co-CEO	Approved for DA submission. Recommend review prior to occupation.
1			
2			
3			

	Attachment 3 - Location Plan	Date: 30/04/2024	
		Printed by McQuillan, Rhiannon	
		Scale = 1:792	

Schedule of Submissions – Residential Buildings – 65 Salcott Road, Girrawheen

Submission	Position	Reference	Comments	Administrations Comments
1	Object	1.1	This proposed redevelopment appears to be a lengthy timeline. Firstly whilst being built where will everyone park? The impact on residents and road users in regard to Traffic volume, reminding Council, Salcott Road is getting more and more traffic during busy school drop off and pickup.	Administration is proposing a condition for a Construction Management Plan. This would include management of parking and storage of equipment as to mitigate any associated risk with regards to traffic volume and parking.
		1.2	Secondly, a total of 5 parking bays? When they are all filled where will there be any overflow parking? People will simply park where they can and I would expect problems will arise.	The City's *District Planning Scheme No. 2* outlines that there is a requirement for one parking bay per two people accommodated. The Residential Buildings are to accommodate a maximum of 10 persons, as such five parking bays is compliant with the City's requirements.
2	Object	2.1	On the plans, they are 10 small units, but only four allocated parking bays. Why is this? I am concerned that the other cars will be parking across from my residence. I don't want this to happen.	See comment ref. 1.2.
		2.2	Also, I am concerned about the dynamic of the people living in close proximity to each other. 10 dwellings in such a small space. I am concerned this will affect myself and other nearby residences. I am not wanting this plan to go ahead at al!!	The built form is generally consistent with the requirements of the *State Planning Policy 7.3 – Residential Design Codes.* It is also noted that the development is to remain in ownership by Uniting WA who will be managing the site and providing on-going to support to residents and handle any surrounding landowner concerns.

LG Ref: DA 2023/1397
DAP Ref: DAP/24/02635

Rhiannon McQuillan
City of Wanneroo
LOCKED BAG NO 1
WANNEROO WA 6946

8 March 2024

RE: APPLICANT RESPONSE TO ADVERTISING SUBMISSIONS
Lot 2 (No. 65) Salcott Road, Girrawheen
Proposed Residential Building

We refer to the summary of submissions received from the City of Wanneroo on 26 February 2024 in relation to the above-mentioned development application (DA), which was advertised to the public between 8 - 23 February 2024. The applicant's comments are provided in the table below.

Submitter	Position	Comments	Applicant Comments
1	Object	This proposed redevelopment appears to be a lengthy timeline. Firstly, whilst being built, where will everyone Park, the impact on residents & road users in regards to Traffic volume, reminding Council, Salcott Road is getting more and more Traffic during busy School drop off & pickup.	Should the development be approved, it is anticipated there will be a condition of approval requiring a Construction Management Plan to be prepared and approved by the City prior to construction, which will include traffic management provisions. It is noted the proposal is for a staged development, with the proposed Stage 1 development on the western portion of the lot and no development currently proposed on the eastern portion of the lot (where the existing car park is). This could be used for on-site parking during the construction phase if needed, which will mitigate traffic impacts on the surrounding area.
		Secondly, a total of 5 Parking bays? When they are all filled where will there be any overflow Parking? People will simply park where they can & I would expect problems will arise.	The proposed number of parking bays (4) is sufficient to meet the operational needs of the proposed Residential Building use, with demand for parking anticipated to be very low. The parking provided is for staff and visitors, with residents unlikely to own a vehicle (being on low income) and visitor numbers anticipated to be low. Based on this, it is not anticipated there will be any overflow parking required.

2	Object	On the plans, they are 10 small units, but only four allocated parking bays. Why is this? I am concerned that the other cars will be parking across from my residence. I don't want this to happen.	Refer to above response.
		Also, I'm concerned about the dynamics of the people living in close proximity to each other. 10 dwellings for such a small space. I am concerned this will affect myself and other nearby residences. I am not wanting this plan to go ahead at all!!	The proposed Residential Building is a supportive housing facility that will be operated by Uniting WA (Uniting). Uniting is a leading Westen Australian community service organisation and registered Tier 2 Community Housing Provider, who manages its housing assets in accordance with the Community Housing Regulatory Framework obligations. The Girrawheen facility will be managed by Uniting's Housing Services Team who manage over 300 social housing properties across Perth. Supportive housing is important in our communities because they offer a holistic approach to addressing housing instability and affordability. They provide stable housing, support services, and a pathway to improved wellbeing, social inclusion, and economic self-sufficiency for residents. Uniting's support service model for the Girrawheen facility will encompass a supportive landlord approach and individualised support services. Uniting will support the occupants to maintain their tenancy, engage with the community, and remain in safe, secure and stable housing. It is noted that Uniting has an existing supportive housing facility in Fremantle that accommodates eight adults, where the residents have developed positive relationships with neighbours and the community. Uniting has not received any complaints from neighbours or the community since operations commenced there in 2018.

Thank you for your consideration. Should you have any queries regarding the above, or require any further information, please do not hesitate to contact the undersigned.

Kind regards,

Ingrid van Dorssen
Project Manager – Property and Assets

P 1300 663 298 | **F** 1300 663 528 | **ABN** 75 467 729 203 | GPO Box B74, Perth WA 6838 | unitingwa.org.au

Design Review of the proposed Community Housing Facility at 65 Salcott Road, Girrawheen

The format of this design review report and recommendations follows the SPP7.0 ten principles of design.

Strengths of the proposal include:

- Clear statements on 'Project Grounding' and Guiding Design Principles for Transitional Housing and relevant aspirational design imagery for the architecture and landscape.
- A community housing facility under the umbrella of the Uniting Church's *Aspirations Housing* program for 'light touch' support for residents. This facility should be of benefit to society as a whole.
- Opportunity for low-income earning residents to live in compact accommodation with minimal maintenance and running costs.
- Location of the housing for residents to be within walking distance of local shops, a community centre, park and public transport stops.
- A north facing corner site with interfaces to the public realm of Salcott Road and Hainsworth Park.
- Continuity of the existing traditional streetscape with a landscaped front setback and housing facing the street at a lower level. Note that the site includes a 2m change in level from the north down to the south and that a characteristic of this street is that the ground floors of houses are lower than the adjacent street reserve and yet retain a presence to the street.
- A rational site design and strategy for built form that largely respects the context (although note the comments in *Principle 1: Context and Character*)
- Self-contained one-bedroom accommodation with individual private outdoor spaces as well as residents' access to three different types of outdoor communal spaces.
- Retention of trees on the site.
- Relative proximity of the relocated Salcott Road crossover to the existing location.
- Car bays located away from public view at the site's southern rear.
- Design intent to integrate the access of natural amenity (daylight, ventilation, winter sun).
- Palette of robust materials and subtle, neutral colours.

Comments on the proposal:

Principle 1. Context and Character

The Applicant's report states that the proposal is "designed to complement the residential context". The proposal is commended for responding in a largely positive manner to the public realm, as follows:

- The ten single storey units are grouped into two 5-unit terraced forms to face the public realm of the northern Salcott Road and the western Hainsworth Park.
- The streetscape includes a small, landscaped setback that is level with the verge and the frontage of the terrace (5 units) that is stepped down by approximately 1m.
- Each terrace frontage has a mix of habitable rooms, openings and front doors off private outdoor living areas.
- The plans alternate within each terrace to help articulate the built form and to provide acoustic and visual separation between the units' outdoor living areas.
- The alternate planning of the units enables active frontage to be provided on both sides of each building.
- Each unit includes a double height bedroom with openings to enable the access of natural amenity, and a lower height living area; this combination establishes a low impact physical presence next to the street and park.
- Minor relocation of the existing Salcott Road crossover.
- Retention of existing trees that are visible from the public realm.
- Car bays located away from public view at the site's southern rear.

It's noted that the proposal is only for the western portion of the site; the Applicant should advise on any masterplan that links the current proposal with the possible future development area to the east.

The following comments relate to the design-related impacts of the two variations sought to the provisions of the RD-Codes Volume 1:

The southern over height wall of 6.1m height (double height bedroom) is proposed to be built to the southern rear boundary, furthermore the ground level is proposed to be raised and retained to a height of 1.036m above natural ground level at this location.

It's important to fully understand the amenity impact of the proposed development's additional wall height and the greater than 0.5m siteworks, particularly on the neighbouring existing southern dwelling and its outdoor living area in the north-western corner of the lot.

The Applicant's site plan and sections should show the existing northernmost grouped dwelling on the neighbouring southern Lot 17 (12) Tonkin Place and demonstrate the overshadowing impact of the proposal on this existing dwelling for the equinoxes and solstices.

While the extent of overshadowing on the adjacent existing dwelling to the south is unknown, the Applicant, nevertheless, should consider the following suggestions to improve the response to context and character:

- Flipping the proposed southern terrace so the over height wall (double height bedroom) is relocated next to the existing dwelling's wall on the boundary.
- Setting back the proposed terrace from the southern boundary to lessen overshadow of the neighbour. A setback would also enable openings in the proposed unit's southern blank wall for cross ventilation of corner rooms and a landscaped interface with the existing residential to the south.
- Stepping down of the units in the proposed southern terrace, or elsewhere, to reduce the siteworks to 0.5m maximum and, subsequently, minimising the amenity impact on the adjacent southern lot and the western public Park.

Principle 2. Landscape Quality

The Applicant is commended for retaining existing trees on the lot and for their integration in the three different locations and types of communal open area. For example, the central space would be largely overshadowed by the northern terrace at winter solstice, whereas the northern and eastern open spaces offer alternatives for the residents to enjoy winter sun.

However, a suggestion is to provide an updated, detailed landscape plan by a qualified landscape professional that includes information on the following:

- Materiality, including any new retaining walls.
- Plant species selection to suit different micro-climates.
- Density of planting.
- Shared space design, including furniture (communal open spaces and internal streetscapes).
- Shade provided by additional new trees of the paved areas or a pergola structure over the car bays.
- Wheel safety stops for the car bays next to the southern boundary fence.
- Ensuring existing trees are protected during construction and have sufficient deep soil conditions to be viable long term.

The Applicant also should consider the design of the following two points on improving landscape quality in consultation with the City of Wanneroo:

- A new 1.2m height pine lap fence is proposed for installation on the western boundary that interfaces with the public Park. The fence height is appropriate to enable a visual connection and passive surveillance opportunities between both land uses.

The Applicant, however, should provide an elevation of the fence design and any new, visible retaining wall, together with a perspective of the western 'parkscape' to enable discussion with the City on the appropriateness of this dividing fence.

- Upgrade the landscaped street verge to compliment the design quality of the proposal, potentially with new street trees and water-wise plant species.

Principle 3. Built Form and Scale
The development comprises of two five-unit terraces of single and two-storey built form and the strategy for the site design is suited to this predominantly single storey residential context.

However, the future built form intent for the eastern side of the site is unknown, as is any cumulative impact on other design principles.

Principle 4. Functionality and Build Quality
The Applicant should consider the design of the following points to improve functionality and build quality:

- The communal bin store is located abutting the front northern boundary and, unfortunately this utility area is both highly prominent on the publicly visible street frontage and a potentially unwelcome odour source at a primary pedestrian entry to the site. The Applicant should relocate the bin store to a less visually unobtrusive area on the site and in a place that is centralised for access by all the residents.
- The Applicant should identify locations for all passive and mechanical services related to the dwellings (including meters, water heaters, any air conditioner compressor units and clothes drying areas), which should be in visually unobtrusive areas and with no adverse impact on the amenity of residents or neighbours.

Principle 5. Sustainability
The Applicant is commended for providing in-built passive and 'attached' sustainability items. However, the Applicant should consider the following points on sustainability:

- Locating the pv cells on the roof plan and clarifying the intended kW capacity.
- Rainwater capture, storage and re-use in landscape areas.
- Sheltered and secure bike bays.
- Use of Low Carbon Concrete, and 'green' asphalt.

Principle 6. Amenity
The Applicant is commended for integrating residential amenity in the built form in the following ways:

- Approximately 5m ceiling height for the bedroom and high level louvred openings for light and to naturally purge hot air in summer. However, whilst the double-height bedrooms may be of benefit in the summer, they could be cold and uninviting in winter as warmed air rises without means, such as fans, to vertically recirculate the air.
- Double sided units with openings for cross ventilation.
- The rationale for the alternating plans achieves a balance of outdoor living areas and living rooms to the north for warming winter sun, and for residents to have views and opportunities for passive surveillance of the street, public Park or internal communal open areas.

However, the Applicant should consider the following points to further improve amenity:

- Provide sections to demonstrate the units' internal design and ceiling heights, and how level changes are managed across the site.
- For the southernmost units, include additional landscape to create a soft green vista and screen views of the eastern car park.

- For the end units, add additional openings (to suit the aesthetic and with shade control where necessary) to external walls to enhance cross ventilation of rooms with two external walls, and improve opportunities for views and passive surveillance of the open spaces.

Principle 7. Legibility
The Applicant should consider the following points to improve legibility, with benefits also for amenity and safety, around the development:

- An unsatisfactory situation is that residents currently walk on a path in front of bedroom windows to access the front doors of units. A suggestion for the northern side of the northern terrace and the eastern side of the southern terrace, is to relocate the pedestrian path away from the building and bedroom windows, and instead add separate 'spur' paths directly to front doors and include landscaped front garden 'buffers' in front of bedrooms.
- Clarify how residents will access the two northern entry paths, given there is no footpath in the street verge.
- Clarify if the stepping stones will enable legible and safe access by people, particularly with disabilities.
- Clarify the wayfinding/signage strategy to deal with the fact that only every other unit is accessible from each path.

Principle 8. Safety
The Applicant is commended for providing residents with many opportunities for views and passive surveillance of the public realm (street and Park), as well as the communal open spaces on the site. The Applicant, however, should consider the following to further improve safety:

- Provision of a lighting plan for the safe and secure use of the dwelling entries, paths, communal open spaces, the entry road and car park.
- As per *Principle 7: Amenity*, locate openings (to suit the aesthetic) on the large blank end walls of the terraces to improve opportunities for views and passive surveillance around the site and context.
- The tight corners on the driveway should be tested with swept paths given the single-lane width.

Principle 9. Community
As noted in 'strengths', the proposed community housing facility by the Uniting Church should be a valuable asset to society as a whole.

The Applicant, however, should demonstrate the development is accessible throughout for people with disabilities, and whether any consideration has been given to adopting a *Liveable Housing* rating for flexibility of use.

Principle 10. Aesthetics
The applicant is commended for the selection of robust, cost-effective materials and soft, neutral colours.

Continued overleaf.

SUMMARY OF DESIGN RECOMMENDATIONS

The proposal has many strengths; however this design review suggests several areas for improvement or for further clarification as follows:

- Provision of advice on any masterplan for this proposal and possible future development on the eastern side of the site.
- Consider mitigating the negative impacts on the amenity of the southern neighbour and Park of the increased wall height on the southern boundary and increased site works.
- Provision of a professionally prepared landscape plan with associated details for all open spaces on the site and possibly the verge.
- Design details and elevation of the proposed western boundary fence and any retaining walls.
- Relocate the bin store from its prominent location on the street frontage.
- Locate building services and utilities in visually unobtrusive areas and with no adverse impact on the amenity of residents or neighbours.
- Further information required on sustainability initiatives.
- Sections showing the internal design of units and accommodation of level changes (and where reductions in site works should be possible).
- Landscape screening of the carpark from residents' view.
- Additional openings in blank end walls for ventilation, views and opportunities for passive surveillance.
- Several points on improving pedestrian legibility from the street to the two entries of the development, access to the front doors of unit without walking past bedroom windows, and accessibility for people with disabilities.
- Provision of a wayfinding/signage strategy for pedestrians accessibility to the front doors of units.
- Provision of a lighting plan.
- Clarify the safe movement of vehicles within the development.
- Consideration of a *Liveable Housing* rating for residents' flexibility of use.

Prepared by Munira Mackay
City of Wanneroo Design Review Panel member
12th February 2024

LG Ref: DA 2023/1397
DAP Ref: DAP/24/02635

City of Wanneroo
LOCKED BAG NO 1
WANNEROO WA 6946

Attention: Rhiannon McQuillan, Planner - Approval Services

9 April 2024

RE: APPLICANT RESPONSE TO DESIGN REVIEW COMMENTS

A response to the Design Review comments is provided in red boxes below.

Design Review of the proposed Community Housing Facility at 65 Salcott Road, Girrawheen

The format of this design review report and recommendations follows the SPP7.0 ten principles of design.

Strengths of the proposal include:

- Clear statements on 'Project Grounding' and Guiding Design Principles for Transitional Housing and relevant aspirational design imagery for the architecture and landscape.
- A community housing facility under the umbrella of the Uniting Church's *Aspirations Housing* program for 'light touch' support for residents. This facility should be of benefit to society as a whole.
- Opportunity for low-income earning residents to live in compact accommodation with minimal maintenance and running costs.
- Location of the housing for residents to be within walking distance of local shops, a community centre, park and public transport stops.
- A north facing corner site with interfaces to the public realm of Salcott Road and Hainsworth Park.
- Continuity of the existing traditional streetscape with a landscaped front setback and housing facing the street at a lower level. Note that the site includes a 2m change in level from the north down to the south and that a characteristic of this street is that the ground floors of houses are lower than the adjacent street reserve and yet retain a presence to the street.
- A rational site design and strategy for built form that largely respects the context (although note the comments in *Principle 1: Context and Character*)
- Self-contained one-bedroom accommodation with individual private outdoor spaces as well as residents' access to three different types of outdoor communal spaces.
- Retention of trees on the site.
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- Car bays located away from public view at the site's southern rear.
- Design intent to integrate the access of natural amenity (daylight, ventilation, winter sun).
- Palette of robust materials and subtle, neutral colours.

Comments on the proposal:

<u>Principle 1. Context and Character</u>

The Applicant's report states that the proposal is "designed to complement the residential context". The proposal is commended for responding in a largely positive manner to the public realm, as follows:

- The ten single storey units are grouped into two 5-unit terraced forms to face the public realm of the northern Salcott Road and the western Hainsworth Park.
- The streetscape includes a small, landscaped setback that is level with the verge and the frontage of the terrace (5 units) that is stepped down by approximately 1m.
- Each terrace frontage has a mix of habitable rooms, openings and front doors off private outdoor living areas.
- The plans alternate within each terrace to help articulate the built form and to provide acoustic and visual separation between the units' outdoor living areas.
- The alternate planning of the units enables active frontage to be provided on both sides of each building.
- Each unit includes a double height bedroom with openings to enable the access of natural amenity, and a lower height living area; this combination establishes a low impact physical presence next to the street and park.
- Minor relocation of the existing Salcott Road crossover.
- Retention of existing trees that are visible from the public realm.
- Car bays located away from public view at the site's southern rear.

It's noted that the proposal is only for the western portion of the site; the Applicant should advise on any masterplan that links the current proposal with the possible future development area to the east.

Applicant Response:
No change required in response to these comments – plans for the western portion of the site are presently unknown, however the location of access and size of the revised crossover is such that any additional development will be able to utilise the existing access point.

The following comments relate to the design-related impacts of the two variations sought to the provisions of the RD-Codes Volume 1:

The southern over height wall of 6.1m height (double height bedroom) is proposed to be built to the southern rear boundary, furthermore the ground level is proposed to be raised and retained to a height of 1.036m above natural ground level at this location.

It's important to fully understand the amenity impact of the proposed development's additional wall height and the greater than 0.5m siteworks, particularly on the neighbouring existing southern dwelling and its outdoor living area in the north-western corner of the lot.

The Applicant's site plan and sections should show the existing northernmost grouped dwelling on the neighbouring southern Lot 17 (12) Tonkin Place and demonstrate the overshadowing impact of the proposal on this existing dwelling for the equinoxes and solstices.

While the extent of overshadowing on the adjacent existing dwelling to the south is unknown, the Applicant, nevertheless, should consider the following suggestions to improve the response to context and character:

- Flipping the proposed southern terrace so the over height wall (double height bedroom) is relocated next to the existing dwelling's wall on the boundary.
- Setting back the proposed terrace from the southern boundary to lessen overshadow of the neighbour. A setback would also enable openings in the proposed unit's southern blank wall for cross ventilation of corner rooms and a landscaped interface with the existing residential to the south.
- Stepping down of the units in the proposed southern terrace, or elsewhere, to reduce the siteworks to 0.5m maximum and, subsequently, minimising the amenity impact on the adjacent southern lot and the western public Park.

Applicant Response:
In response to these comments, we have flipped the southernmost unit to ensure the over height portion of the boundary wall is not impacting upon the outdoor living area of the dwelling to the south. It is noted that we have a compliant overshadowing provision and as such a setback isn't considered necessary.

Principle 2. Landscape Quality

The Applicant is commended for retaining existing trees on the lot and for their integration in the three different locations and types of communal open area. For example, the central space would be largely overshadowed by the northern terrace at winter solstice, whereas the northern and eastern open spaces offer alternatives for the residents to enjoy winter sun.

However, a suggestion is to provide an updated, detailed landscape plan by a qualified landscape professional that includes information on the following:

- Materiality, including any new retaining walls.
- Plant species selection to suit different micro-climates.
- Density of planting.
- Shared space design, including furniture (communal open spaces and internal streetscapes).
- Shade provided by additional new trees of the paved areas or a pergola structure over the car bays.
- Wheel safety stops for the car bays next to the southern boundary fence.
- Ensuring existing trees are protected during construction and have sufficient deep soil conditions to be viable long term.

The Applicant also should consider the design of the following two points on improving landscape quality in consultation with the City of Wanneroo:

- A new 1.2m height pine lap fence is proposed for installation on the western boundary that interfaces with the public Park. The fence height is appropriate to enable a visual connection and passive surveillance opportunities between both land uses.

  The Applicant, however, should provide an elevation of the fence design and any new, visible retaining wall, together with a perspective of the western 'parkscape' to enable discussion with the City on the appropriateness of this dividing fence.

- Upgrade the landscaped street verge to compliment the design quality of the proposal, potentially with new street trees and water-wise plant species.

Applicant Response:
The revised development plans provide details of the proposed fence.

It is expected that a detailed landscaping plan will form a condition of approval and the wording of this condition can capture the verge area.

Principle 3. Built Form and Scale

The development comprises of two five-unit terraces of single and two-storey built form and the strategy for the site design is suited to this predominantly single storey residential context.

However, the future built form intent for the eastern side of the site is unknown, as is any cumulative impact on other design principles.

Applicant Response:
Additional development on the eastern portion of the site is not planned, nor is there an idea of what this will entail. However, the future developments integration with the current proposal and existing residential development to the east is able to be assessed as part of a subsequent application.

Principle 4. Functionality and Build Quality
The Applicant should consider the design of the following points to improve functionality and build quality:

- The communal bin store is located abutting the front northern boundary and, unfortunately this utility area is both highly prominent on the publicly visible street frontage and a potentially unwelcome odour source at a primary pedestrian entry to the site. The Applicant should relocate the bin store to a less visually unobtrusive area on the site and in a place that is centralised for access by all the residents.
- The Applicant should identify locations for all passive and mechanical services related to the dwellings (including meters, water heaters, any air conditioner compressor units and clothes drying areas), which should be in visually unobtrusive areas and with no adverse impact on the amenity of residents or neighbours.

Applicant Response:
No change –justification for current proposal provided in RFI response letter to the City dated 5 April 2024.

Principle 5. Sustainability
The Applicant is commended for providing in-built passive and 'attached' sustainability items. However, the Applicant should consider the following points on sustainability:

- Locating the pv cells on the roof plan and clarifying the intended kW capacity.
- Rainwater capture, storage and re-use in landscape areas.
- Sheltered and secure bike bays.
- Use of Low Carbon Concrete, and 'green' asphalt.

Applicant Response:
No change with regard to pv cells, rainwater capture and sheltered and secure bike racks purely as a result of the nature of housing being provided as being very low cost. The design of units is such that reliance on mechanical heating and cooling has been reduced as much as possible through the turret design.

Principle 6. Amenity
The Applicant is commended for integrating residential amenity in the built form in the following ways:

- Approximately 5m ceiling height for the bedroom and high level louvred openings for light and to naturally purge hot air in summer. However, whilst the double-height bedrooms may be of benefit in the summer, they could be cold and uninviting in winter as warmed air rises without means, such as fans, to vertically recirculate the air.
- Double sided units with openings for cross ventilation.
- The rationale for the alternating plans achieves a balance of outdoor living areas and living rooms to the north for warming winter sun, and for residents to have views and opportunities for passive surveillance of the street, public Park or internal communal open areas.

However, the Applicant should consider the following points to further improve amenity:

- Provide sections to demonstrate the units' internal design and ceiling heights, and how level changes are managed across the site.
- For the southernmost units, include additional landscape to create a soft green vista and screen views of the eastern car park.
- For the end units, add additional openings (to suit the aesthetic and with shade control where necessary) to external walls to enhance cross ventilation of rooms with two external walls, and improve opportunities for views and passive surveillance of the open spaces.

Applicant Response:
Amended DA plans includes windows on bathrooms with external walls. An additional landscaping buffer would compromise access and the ability to retain existing trees. It is considered that sufficient space is provided for landscaping and the parking and access area is not a dominant feature of the design.

Principle 7. Legibility
The Applicant should consider the following points to improve legibility, with benefits also for amenity and safety, around the development:

- An unsatisfactory situation is that residents currently walk on a path in front of bedroom windows to access the front doors of units. A suggestion for the northern side of the northern terrace and the eastern side of the southern terrace, is to relocate the pedestrian path away from the building and bedroom windows, and instead add separate 'spur' paths directly to front doors and include landscaped front garden 'buffers' in front of bedrooms.
- Clarify how residents will access the two northern entry paths, given there is no footpath in the street verge.
- Clarify if the stepping stones will enable legible and safe access by people, particularly with disabilities.
- Clarify the wayfinding/signage strategy to deal with the fact that only every other unit is accessible from each path.

Applicant Response:
The development is being proposed as a holistic 'Residential Building' development. It is not uncommon for reduced privacy in developments. Further blinds or similar will be available to achieve privacy if required by residents. Should the City consider it necessary a conditioned landscaping plan could specify a requirement to address the buffer to these bedrooms.

Regarding access to northern entry paths, if it isn't from the verge, there are internal connections from within the development to these paths. Further, the development is such that it will be fully accessible with the stepping stones to allow access for people with disabilities.

If necessary, a wayfinding/signage strategy can be conditioned to clarify access to each unit.

Principle 8. Safety
The Applicant is commended for providing residents with many opportunities for views and passive surveillance of the public realm (street and Park), as well as the communal open spaces on the site. The Applicant, however, should consider the following to further improve safety:

- Provision of a lighting plan for the safe and secure use of the dwelling entries, paths, communal open spaces, the entry road and car park.
- As per *Principle 7: Amenity*, locate openings (to suit the aesthetic) on the large blank end walls of the terraces to improve opportunities for views and passive surveillance around the site and context.
- The tight corners on the driveway should be tested with swept paths given the single-lane width.

Applicant Response:
A lighting plan can be conditioned if required.

The design through the amended plans is considered to provide sufficient opportunities for passive surveillance throughout the site with the flipped unit designs achieving surveillance in two directions and numerous pedestrian paths throughout.

Amended DA plans include additional windows on end terraces.

Principle 9. Community
As noted in 'strengths', the proposed community housing facility by the Uniting Church should be a valuable asset to society as a whole.

The Applicant, however, should demonstrate the development is accessible throughout for people with disabilities, and whether any consideration has been given to adopting a *Liveable Housing* rating for flexibility of use.

Applicant Response:
The design of the development is such that it will be fully accessible for people with disabilities. At this point in time a Liveable Housing rating is not being considered with the design intended to support a specific program within Uniting WA.

Principle 10. Aesthetics
The applicant is commended for the selection of robust, cost-effective materials and soft, neutral colours.

SUMMARY OF DESIGN RECOMMENDATIONS
The proposal has many strengths; however this design review suggests several areas for improvement or for further clarification as follows:

- Provision of advice on any masterplan for this proposal and possible future development on the eastern side of the site.
- Consider mitigating the negative impacts on the amenity of the southern neighbour and Park of the increased wall height on the southern boundary and increased site works.
- Provision of a professionally prepared landscape plan with associated details for all open spaces on the site and possibly the verge.
- Design details and elevation of the proposed western boundary fence and any retaining walls.
- Relocate the bin store from its prominent location on the street frontage.
- Locate building services and utilities in visually unobtrusive areas and with no adverse impact on the amenity of residents or neighbours.
- Further information required on sustainability initiatives.
- Sections showing the internal design of units and accommodation of level changes (and where reductions in site works should be possible).
- Landscape screening of the carpark from residents' view.
- Additional openings in blank end walls for ventilation, views and opportunities for passive surveillance.

- Several points on improving pedestrian legibility from the street to the two entries of the development, access to the front doors of unit without walking past bedroom windows, and accessibility for people with disabilities.
- Provision of a wayfinding/signage strategy for pedestrians accessibility to the front doors of units.
- Provision of a lighting plan.
- Clarify the safe movement of vehicles within the development.
- Consideration of a *Liveable Housing* rating for residents' flexibility of use.

Operational Waste Management Plan

For: 10-bed Residential Building
Lot 2 (65) Salcott Road, Girrahween

24 April 2024

Version control

Version	Date	Revisions by	Comments
Rev 0	05/04/2024	Ingrid van Dorssen	Draft OWMP - Issued for DA
Rev 1	23/04/2024	Ingrid van Dorssen	Updated to address City's RFI comments

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	Bin Store Location	4
	Bin Store Capacity	4
	Bin Store Design	4
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1. Introduction

This Operational Waste Management Plan pertains to the following:

Address:	Lot 2 (65) Salcott Road, Girrawheen
Development:	10-bed Residential Building
Occupancy:	Maximum occupancy = 10 Adults
Landowner:	Uniting Church in Australia Property Trust (WA)
Property Manager:	Uniting WA

This Operational Waste Management Plan is to address the operational phases of the development in relation to the management of waste at Uniting WA's housing facility located at 65 Salcott Road, Girrawheen. This waste management plan has been prepared in accordance with the WALGA 'Multiple Dwelling Waste Management Plan Guidelines' (Guidelines). Once approved by the City of Wanneroo, waste collection and disposal is to be undertaken in accordance with this Operational Waste Management Plan, subject to any additional conditions of planning approval.

2. Waste and Recyclables Capacity

Pursuant to the waste generation rates provided in Appendix 1 of the WALGA Guidelines, an estimation of the domestic waste that will be generated by the development is provided in the tables below.

Table 1: Waste Generation Rates

Land Use	Bedroom No.	General Waste	Recycling	Organic waste
Residential Building	10 x 1-bedroom	80L/week x 10	40L/fortnight x 10	40L/fortnight x 10
Total Waste Generation		**800L/week**	**400L/fortnight**	**400L/fortnight**

Table 2: Other Waste Requirements

Waste Type	Yes / No
Bulk Household Waste If yes, detail collection arrangements: Residents/ property manager to utilise the City's bulk waste verge collection once per year.	Yes
Bulk Garden Organics If yes, detail collection arrangements: Residents / property manager to utilise the City's green waste verge collection once per year.	Yes
Liquid or hazardous waste generated on-site?	No
Medical waste products controlled by the Environmental Protection (Controlled Waste) Regulations 2004 generated on-site?	No
Will processing, retail and/or wholesale of animal products occur on-site?	No

3. Project Description

The development comprises a 10-bed Residential Building that will accommodate up to 10 residents at any one time. The property will generate residential type waste only.

Waste generation rates of 80L/week for general waste, 40L/fortnight for recycling, and 40L/fortnight for organic waste were informed by the WALGA Guidelines.

Based on the current City of Wanneroo waste services and the waste generation rates of **Table 1** above, the development will provide 4 x 240L General Waste bins, 2 x 240L Recycling bins and 2 x Garden Organics bins (total 8 no. bins).

Bin Store Location

- Development provides one (1) bin store area located at the front of the property, and a bin pad area on the adjoining verge, allowing for easy access and on-street collection.
- The shared bin store is conveniently located for disposal of waste by the residents/tenants and Uniting staff, and visitors and contractors when needed.

Waste Collection

- The City of Wanneroo offer a 'three bin' waste collection service for general waste, recyclables and organic garden waste.
- Bins to be collected by Council waste services (on-street collection). General waste bins to be collected weekly, the recycling bins fortnightly, and the garden organic bins fortnightly (on alternative weeks), as per the City's waste services calendar.
- A bin pad is provided on the verge of Salcott Road adjacent to the bin store area to accommodate 6 x 240L bins for on-street waste collection, as required.
- Residents and staff will be responsible for putting the bins on the verge each week for collection.

Bin Store Capacity

The bin store is sufficient size to accommodate the 4 x 240L general waste bins, 2 x 240L recycling bins, 2 x 240L garden organics bins (total 8 no. 240L bins), as shown on **Figure 2** below. There is also adequate space around the bins to allow access and manoeuvring of the bins for collection.

Bin Store Design

The shared bin store has been designed to allow for ease of use and access by residents/tenants and Uniting support staff, and visitors and contractors when required.

The bin store area is to be enclosed and screened from view of the street, with walls not less than 1.2 metres in height and landscaping along street frontage. The bin store has an access point of 1 metre in width for residents/tenants to access the area and is fitted with a self-closing gate.

Refer to **Figures 1, 2 & 3** below, depicting the location, capacity and screening of the bin store area.

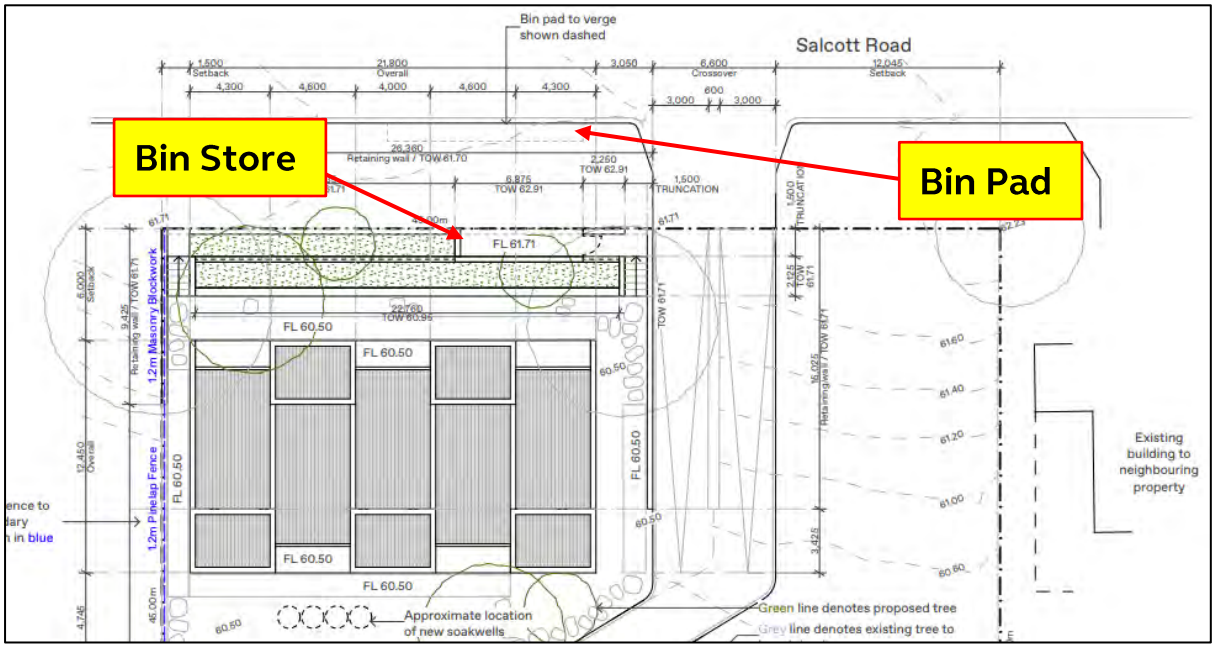


Figure 1: Bin store & bin pad location, as shown on Site Plan (Drawing No. DA002 Rev C)

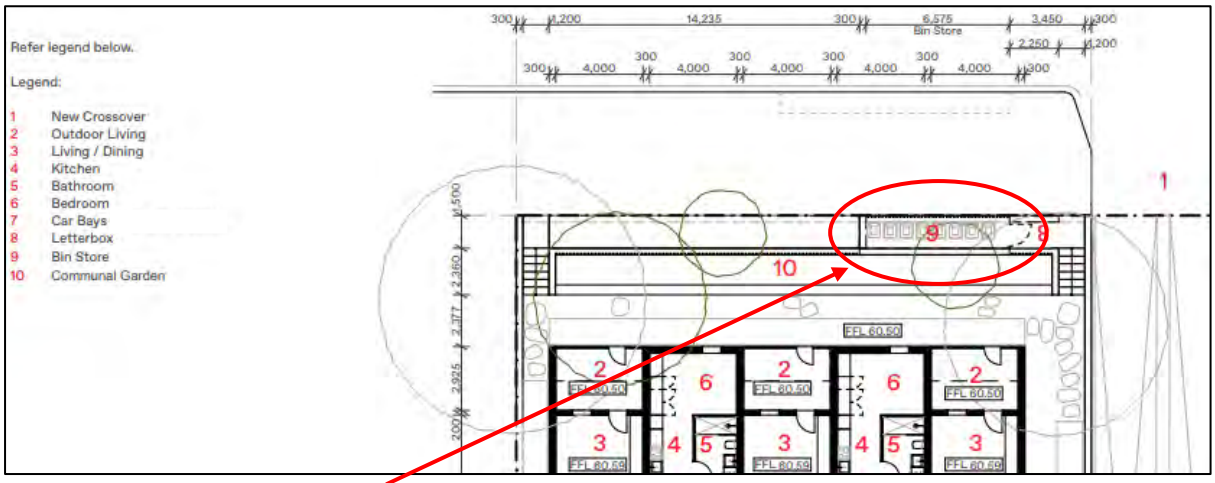


Figure 2: Bin store capacity (8 no. bins), as shown on Floor Plan (Drawing No. DA100 Rev C)

Figure 3: Bin store fencing & screening, as shown on North Elevation (Drawing No. DA401 Rev C)

Notes:

Planting areas shown indicatively.
Refer below for indicative species list:

Larger trees:
Eucalyptus todtiana
Eucalyptus marginata
Corymbia calophylla

Medium trees:
Eucalyptus websteriana
Eucalyptus rhodantha
Eucalyptus synandra

Small trees:
Banksia grandis
Banksia menziesii
Banksia attenuata

Shrubs:
Verticordia densiflora
Banksia dallanneyi
Xanthorrhoea preissii
Hypocalymma robustum
Acacia iasiocarpa

Herbs:
Conostylis aculeata
Anigozanthos manglesii
Chrysocephalum apiculatum

Rushes & Grasses:
Juncus kraussii
Poa poliformis
Pennisetum basedowii

NIC BRUNSDON

UNITING GIRRAWHEEN
65 SALCOTT ROAD GIRRAWHEEN

DISCLAIMER

- WRITTEN DIMENSIONS TAKE PRECEDENCE OVER SCALED DIMENSIONS.
- ANY CHANGES MADE SHALL BE DOCUMENTED AND FORWARDED TO THIS OFFICE FOR APPROVAL.
- VERIFY ALL DIMENSIONS ON SITE AND NOTIFY THIS OFFICE IMMEDIATELY OF ANY DISCREPANCIES.
- SHOP DRAWINGS MUST BE SUBMITTED TO THIS OFFICE FOR APPROVAL PRIOR TO MANUFACTURE
- CONTRACTOR TO ENSURE THAT DRAWING IS CURRENT ISSUE BEFORE COMMENCEMENT OF WORK

DRAWING TITLE
LANDSCAPE PLAN

DRAWING # DA600
REV B

DRAWING ISSUE
DEVELOPMENT APPLICATION

PROJECT # 192_G

SCALE 1:250
PAGE A3
DRAWN JK
DATE 3/4/2024

10 PRINCIPLES DESIGN REPORT

65 Salcott Road
Girrawheen

Prepared for
City of Wanneroo
Council Briefing Session

Project Number: 192
4 December, 2023

NIC BRUNSDON

Acknowledgment

The Project Team acknowledges the Traditional Custodians of the land and pays respect to the Elders, past, present and future.

We honour Australian Aboriginal and Torres Strait Islander peoples' primary cultural and spiritual relationship to place and their rich contribution to our society.

To that end, all our work seeks to uphold that we care for Country, it will care for us.

Contents & Register

INTRODUCTION

Project Team
Project Overview

SPP 7 DESIGN OF THE BUILT ENVIRONMENT

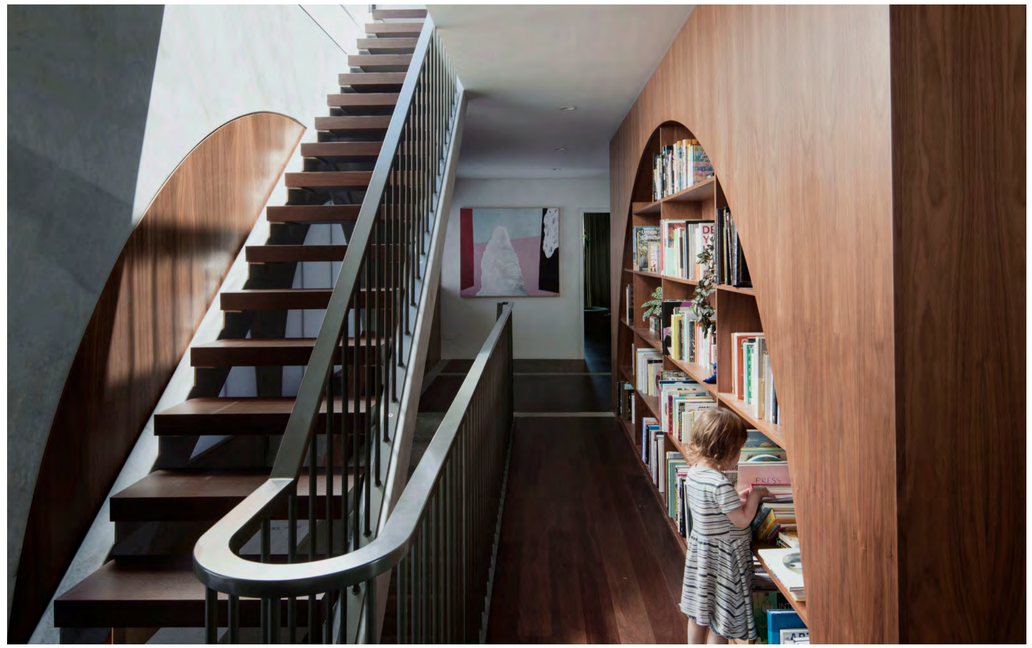
1 Context & Character
2 Landscape Quality
3 Built Form & Scale
4 Functionality & Build Quality
5 Sustainability
6 Amenity
7 Legibility
8 Safety
9 Community
10 Aesthetics

Project Team

Uniting

Uniting WA is a provider of Person-Centred Supportive Accommodation services which includes the provision of tenancy management, property management and the delivery of wrap around support services for tenants. The delivery of support services are funded through various WA State Government Departments.

Uniting WA supports people experiencing complex challenges brought on by intergenerational trauma or situational crisis, including people who may be experiencing domestic violence, financial hardship or homelessness, mental illness or disability and people reintegrating into the community.



NIC BRUNSDON

Nic Brunsdon is recognised as one of Australia's leading architects. In 2015 Nic was the sole winner of the Australian Institute of Architects Emerging Architect Award, firstly for Western Australia and then nationally. His studio works throughout Australia and South-East Asia regions through its offices in Perth, Melbourne, and Denpasar.

The studio's work has recently received recognition at the World Architecture Festival, Dezeen Awards, Houses Awards, INDE awards, and Australian Institute of Architects Awards programs, most notably winning both the public vote and master jury awards at the prestigious Dezeen Awards for the world's best hospitality project.

Project Team

DYNAMIC PLANNING AND DEVELOPMENTS

Founded by Director, Neil Teo, in 2007, Dynamic Planning's core focus is promoting and achieving performance-based outcomes to ensure the interests of our clients' projects are optimised, managed and delivered with efficiency and experience.

Dynamic Planning provides you with customised town planning and project coordination services with a strong focus on innovation, professionalism, effectiveness and vision into every project, be it small, medium or large.

Project Grounding

FILLING THE GAP IN SUPPORTED HOUSING

A housing gap has been identified when a participant exits Uniting's supported accommodation programs and is unable to secure a lease agreement in the private market.

Our model seeks to provide sustainable accommodation to alleviate the pressure placed on participants leaving Uniting's supported accommodation services and ending up on the Public Housing wait list.

TRANSITIONAL ACCOMMODATION BOTTLENECK

Upon graduating from either of Uniting's two specific Transitional Accommodation services participants are required to move into Social housing or market rentals at which point the support services provided by Uniting also ceases.

This model introduces flexibility into Uniting's stock when considering short term accommodation and allows Uniting to continue to support individuals while they explore and secure longer term housing.

'LIGHT TOUCH' SUPPORT

Our model will deliver medium to long term independent housing with 'light touch' drop in support, a familiar point of contact with Uniting team members, aimed at reducing the likelihood of re-offending or returning to homelessness.

Guiding Principles (Transitional Housing)

+ Provides support and sustainable accommodation
+ Medium to long-term housing facility
+ 'Light touch' support program with Uniting members
+ Introduce flexibility to existing operational constraints
+ Individuals re-entering the community
+ Promote positive mental health with build materiality and colours
+ Passive security surveillance by design
+ Robust finishes, easy care, easy clean
+ Environmental sustainability strategies
+ Natural light and air ventilation
+ Communal and intimate landscape areas
+ Spaces that encourage and facilitate social connection
+ Parking for staff only
+ Long term lease agreement with church

Planning Considerations

+ Proposed land use - 'Residential Building'

A building or portion of building, together with rooms and outbuildings separate from such building but incidental thereto; such building being used or intended, adapted or designed to be used for the purpose of human habitation:

+ Temporarily by two or more persons; or
+ Permanently by seven or more persons, who do not comprise a single family, but does not include a hospital or sanatorium, a prison, a hotel, a motel or a residential school.

+ Operation of the proposed development will be governed by a overarching Operational Management Plan, conditioned as part of the planning approval.

+ State Planning Policy 7.3 - Residential Design Codes (Volume 1) - Primary Development Controls.

(Project Overview)

PROJECT OVERVIEW

ADDRESS	65 SALCOTT ROAD, GIRRAWHEEN
LOCAL COUNCIL	CITY OF WANNEROO
SITE AREA	2025m²

SITE AREA

2025m²

SITE COVERAGE

543m²

SITE COVERAGE

27%

PRINCIPLE 1
CONTEXT & CHARACTER

Responds to and enhances the unique characteristics of a local area, contributing to a sense of place

Local Context

The site is situated at 65 Salcott Road in the suburb of Girrawheen. It is a suburban site, within short walking distance from shops, a community centre and bus stops that link the suburb to key amenities. The site is within the City of Wanneroo, a locality that is investing in creating a network of walkable pathways and environments that support access to services and facilities.

- B Bus Stop
- 1 Shopping Centre / 1.2km
- 2 Community Centre / 450m
- 3 Small Food Shops / 400m
- 4 Community School / 500m
- 5 Hainsworth Avenue
- Footpaths

N

Site Conditions

1. Existing crossover
2. Street context / looking East
3. Street context / looking West
4. Street context / reserve trees
5. Street context / neighbouring park
6. Site / existing building

Site Conditions

1. Significant existing tree
2. Well established reserve tree
3. Existing dwelling
4. Hainsworth Park
5. Existing car park

N

Site Response

1 Face the sun and address the street. Prioritise living spaces with access to natural light.

2 Reduce presence of cars on site, prioritise pedestrian movement.

3 Retain existing trees if possible, create green buffer to soften streetscape interface.

4 Stretch green across site, deliver a variety of usable garden spaces and maximise deep soil opportunities.

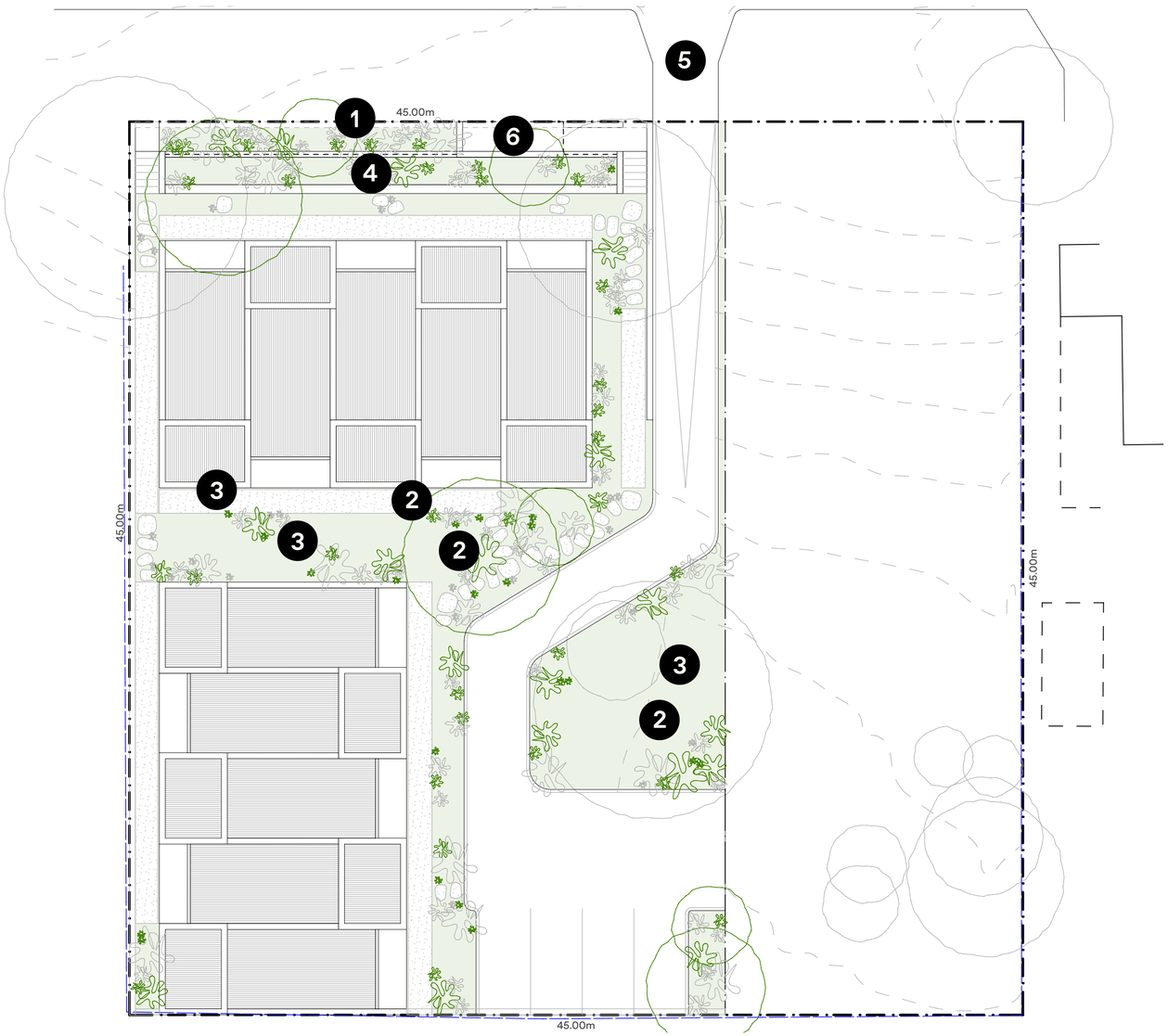
5 Prioritise cross ventilation for comfortable living and reduction in energy bills.

PRINCIPLE 2
LANDSCAPE QUALITY

Operates as an integrated and sustainable system, within a broader ecological context

Landscape Plan

1. Green buffer to soften streetscape interface
2. Deep soil planting opportunity
3. Shared outdoor space
4. Shared outdoor space / productive garden
5. Vehicle crossover - planting to soften hardscape edges, permeable ground treatment to car bays
6. Bin store - planting to add further screening & green buffer



Indicative Planting Palette

Streetscape & pathways

A palette connecting the road reserve with streetcape planting extending into pathways to dwelling. Connecting the site to the neighbourhood whilst contributing to the native biodiversity.

Eucalyptus rhodantha
Rose mallee

Eucalyptus websteriana
Webster's mallee

Conastylis candicans
Cotton heads

Myoporum parvifolia
Creeping boobialla

Lomandra Tanika

Banksia petiolaris

Anigozanthos "Big Red'

Communal garden

A robust mix of shrubs that open and close view lines and a deepening palette of natives.

Lomantra wingarra

Correa alba

Hardenbergia meema
Meema

Eucalyptus Kruseana

Banksia Menziesii Dwarf

Ficus pumila
Climbing fig

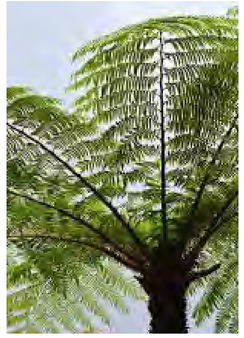
Banksia Nivea
Honeypot banksia

Shaded garden

A darker palette of shade loving plants with interesting foliage and contrasting forms.

Dichondra silver falls

Alpinia caerulea

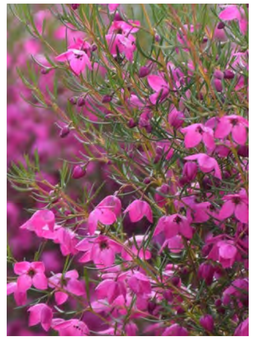


Cytathea Australis
Australian tree fern

Pteridium esculentum
Kangaroo Vine

Austral bracken
Bracken

Liriope emerald cascsade
Weeping grass

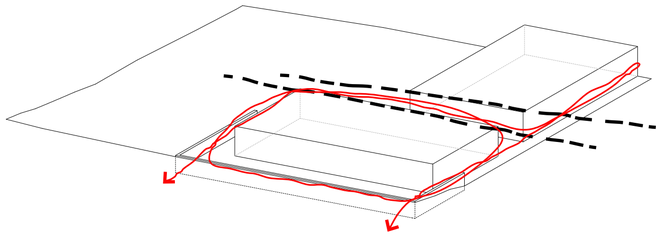


Boronia heterophylla
Magenta stars

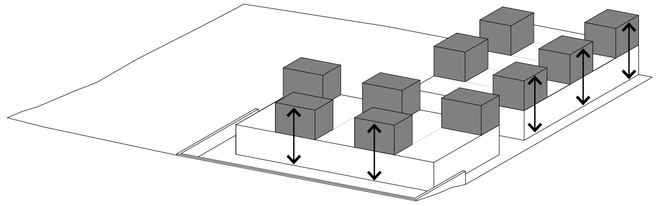
PRINCIPLE 3
BUILT FORM & SCALE

Shapes, massing and height that is appropriate to the setting, and negotiates existing and future context

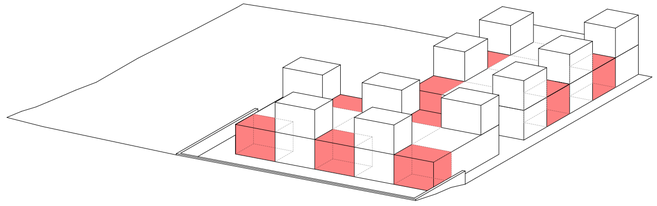
Built Form Strategy



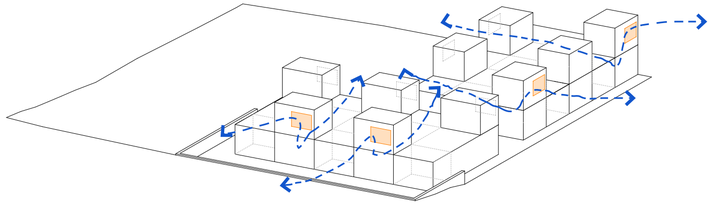
Push retaining wall to northern boundary to maximise usable green space & create better amenity. Split mass for better permeability, access and circulation.



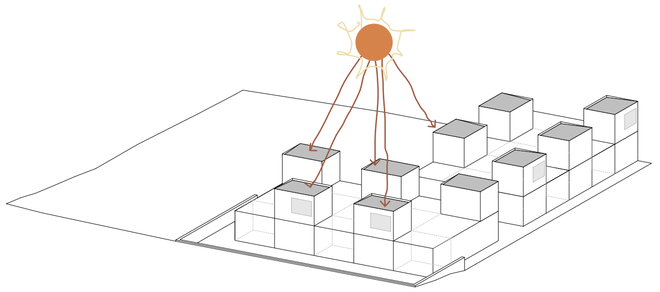
Add volume / elevated ceiling spaces internally to mitigate heat gain.



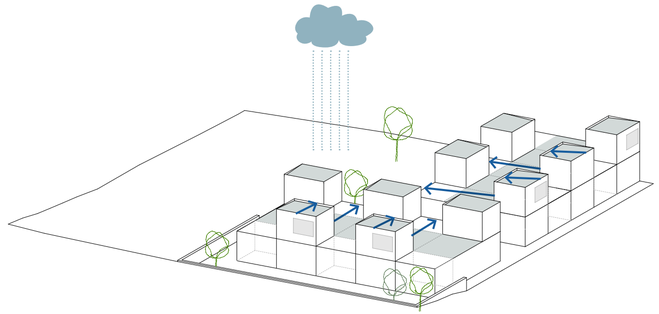
Subtract volume to create private outdoor spaces.



Add high level openings to allow good cross ventilation.



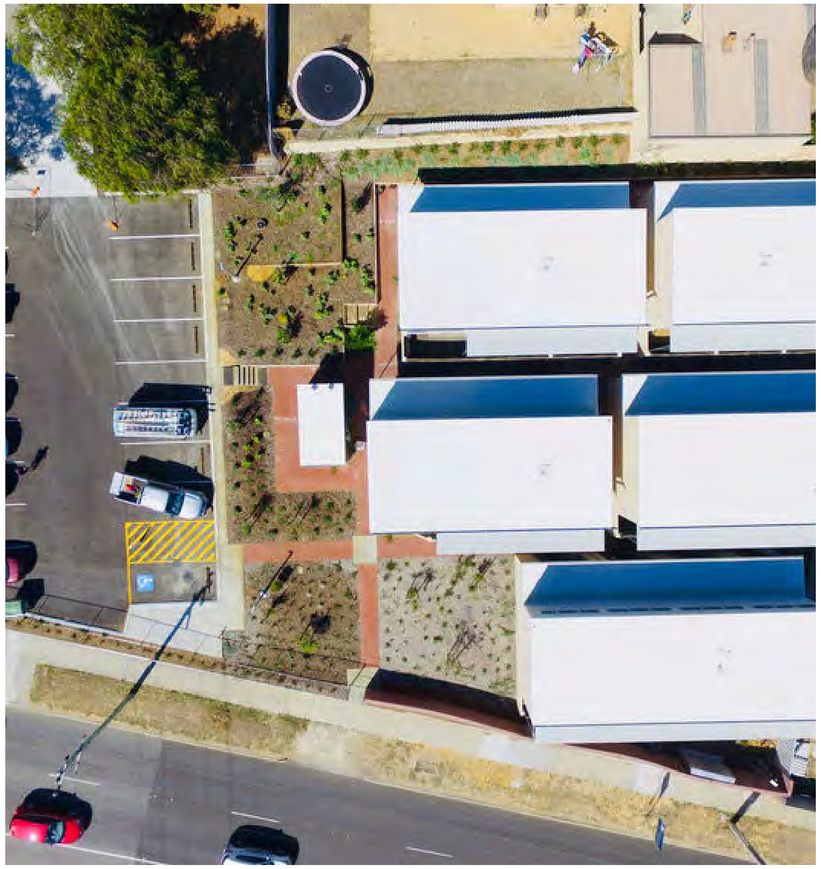
Solar array on roof, solar collection for on-site use or feed back to grid if in excess.



Rainwater to be harvested and re-used on site.

Built Form Exemplars

South Street Community Housing / BERNARD SEEBER

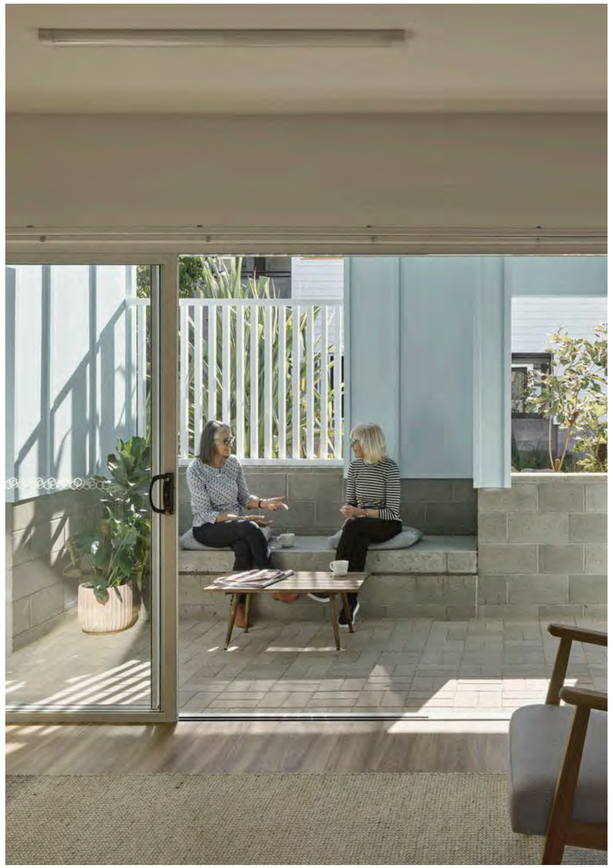


Built Form Exemplars

Women's Housing Project / STUDIO BRIGHT

Built Form Exemplars

Anne Street Garden Villas / ANNE O'GORMAN



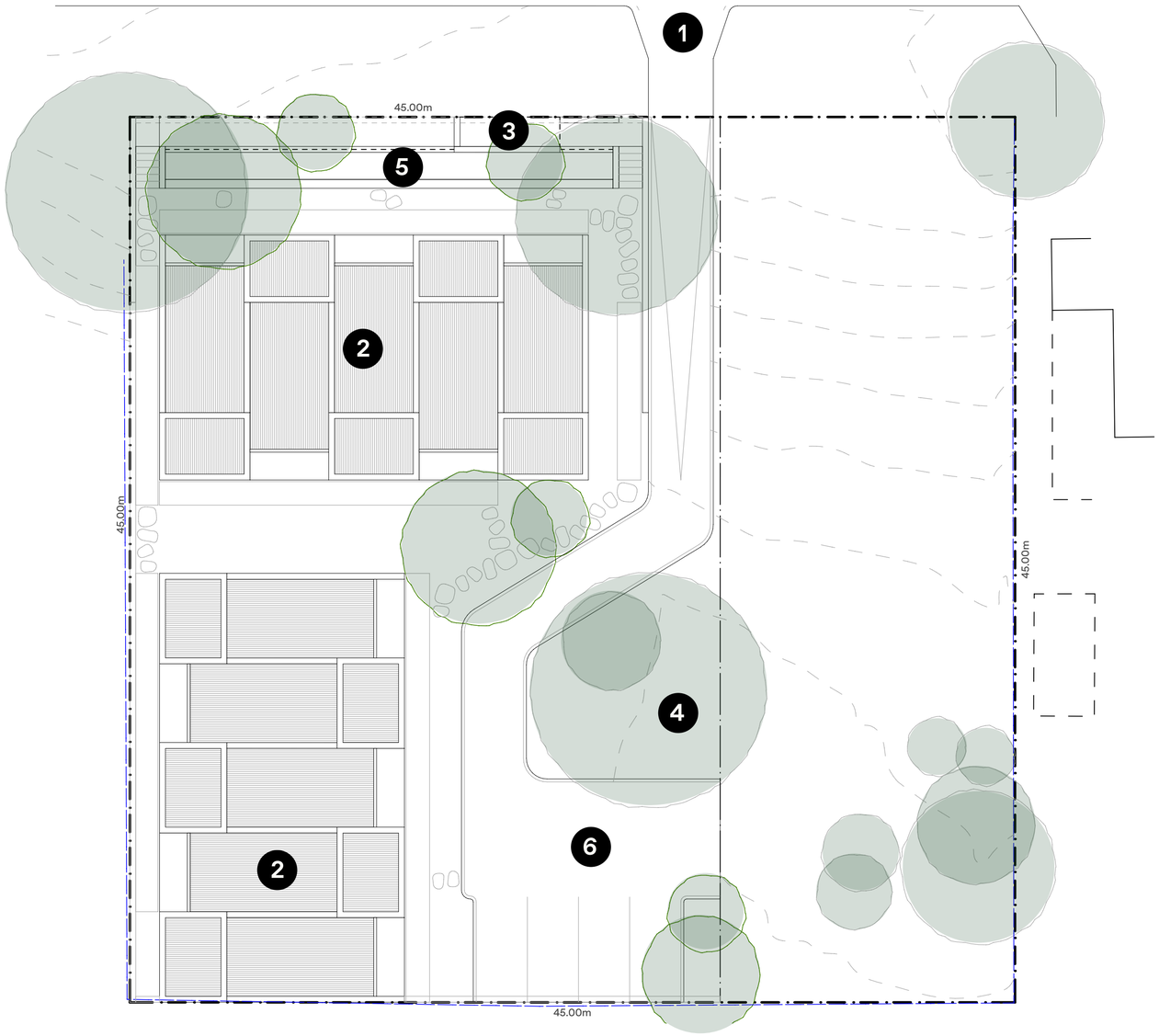
Built Form Exemplars

Oolite Arts, Miami / BAROZZI VEIGA

Built Form Mapping

1. New vehicle crossover
2. New build
3. Bin store
4. Shared outdoor space / communal BBQ facility
5. Productive garden
6. Car parking (4 bays)

Existing & proposed trees



Built Form Materiality

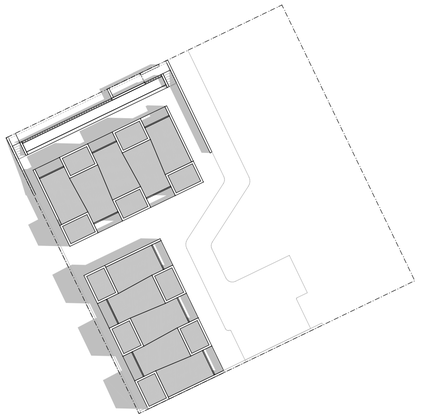
SIMPLE MATERIAL PALETTE

MASONRY BLOCKWORK / LIGHT TONE

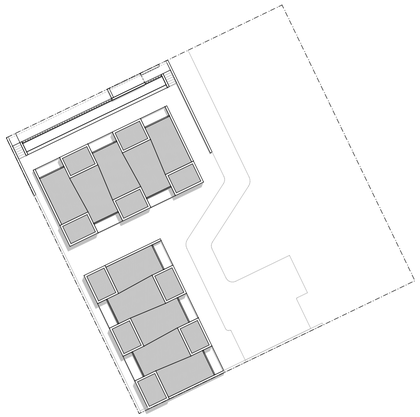
VISUALLY PERMEABLE TIMBER SCREENING

METAL ROOFING / LIGHT TONE

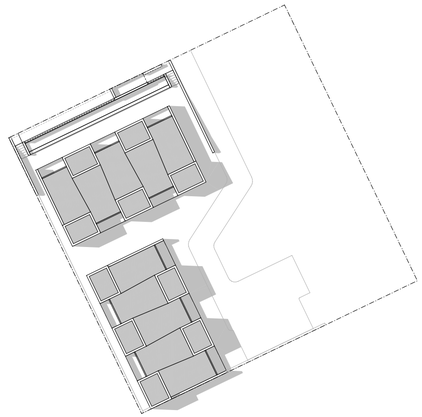
Shadow Study



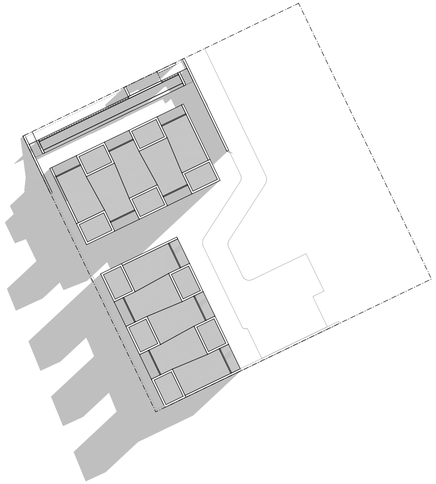
Summer solstice - 9am



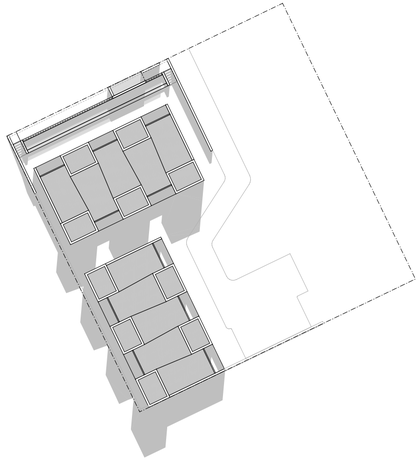
Summer solstice - 12 noon



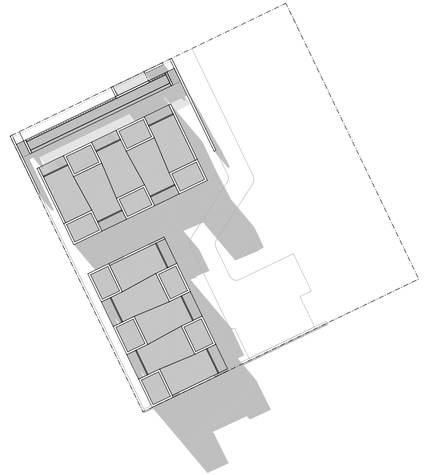
Summer solstice - 3pm



Winter solstice - 9am



Winter solstice - 12 noon



Winter solstice - 3pm

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PRINCIPLE 4
FUNCTIONALITY & BUILD QUALITY

Meets the needs of users while efficiently and effectively balancing functional requirements

Functionality Plan

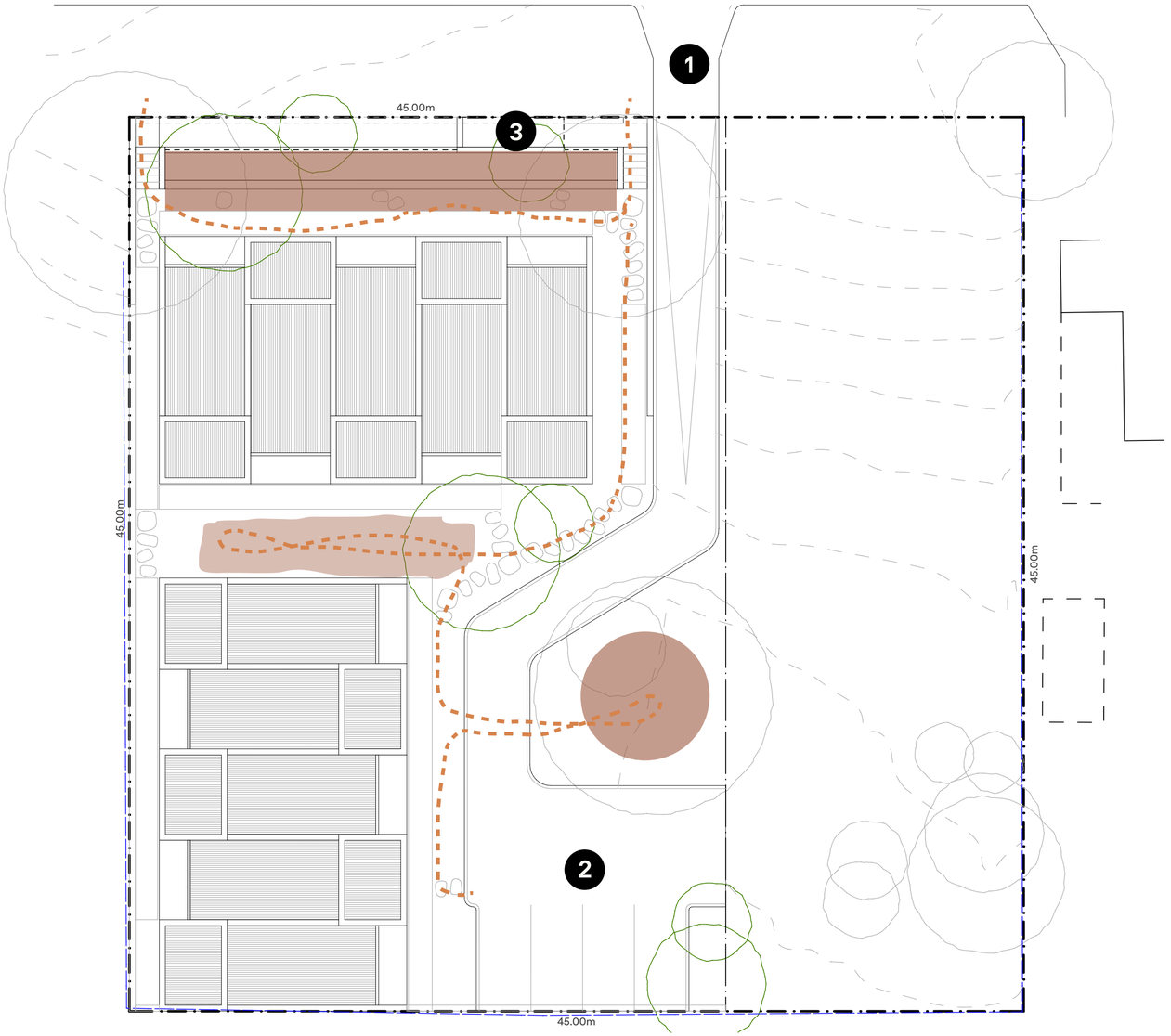
Functionality Principles:

+ Well connected, flexible and adaptable communal outdoor spaces to maximise utilisation and accommodate future user requirements.
+ Durable materials, finishes and elements, easy to maintain.
+ Service accommodated in an integrated and considered manner.

1. Vehicle crossover
2. Car parking (4 bays)
3. Bin store

Communal outdoor spaces

Circulation between communal spaces



PRINCIPLE 5
SUSTAINABILITY

Optimises sustainability to deliver positive environmental, social and economic outcomes

Sustainability

PERIMETER GREENING

Retaining existing mature trees where possible.

Maximise deep root planting opportunities across the site.

Landscaping around built form.

Soften arrival and integrate building within broader context.

WATER-WISE PLANTING

Minimum 60% indigenous flora species.

Water-wise and drought-resistant planting.

Permeable ground treatment to minimise run-off.

WATER EFFICIENCY

Efficient tapware and appliance specifications.

Rainwater collected & used on site where possible.

NO GAS

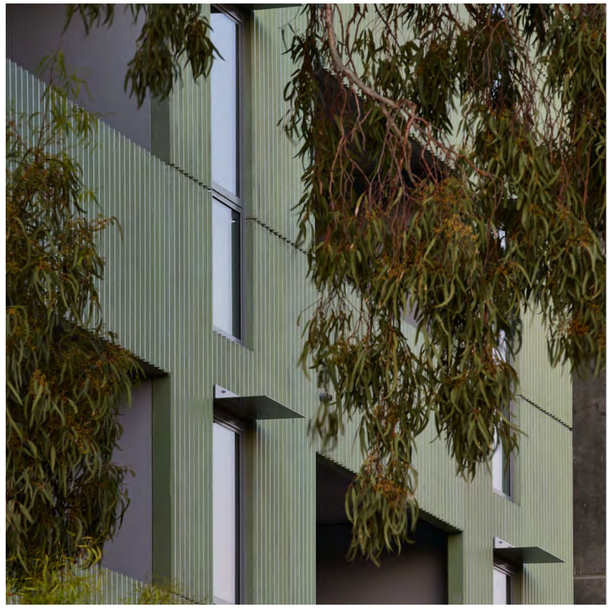
All electric operations to minimise greenhouse gas operations where possible.

Sustainability

SOLAR

Solar Canopy / Array on Rooftop to maximise solar gain.

CONSTRUCTION



Do more with less.

Efficient construction framework.

Repetition & Modularity.

RECYCLE & REUSE

Waste reduction and recycling.

Salvage and reuse material where possible.

90% construction waste diverted from landfill

MATERIALITY

Sustainable, low carbon and low VOC material selection.

Robust Materiality.

PRINCIPLE 6
AMENITY

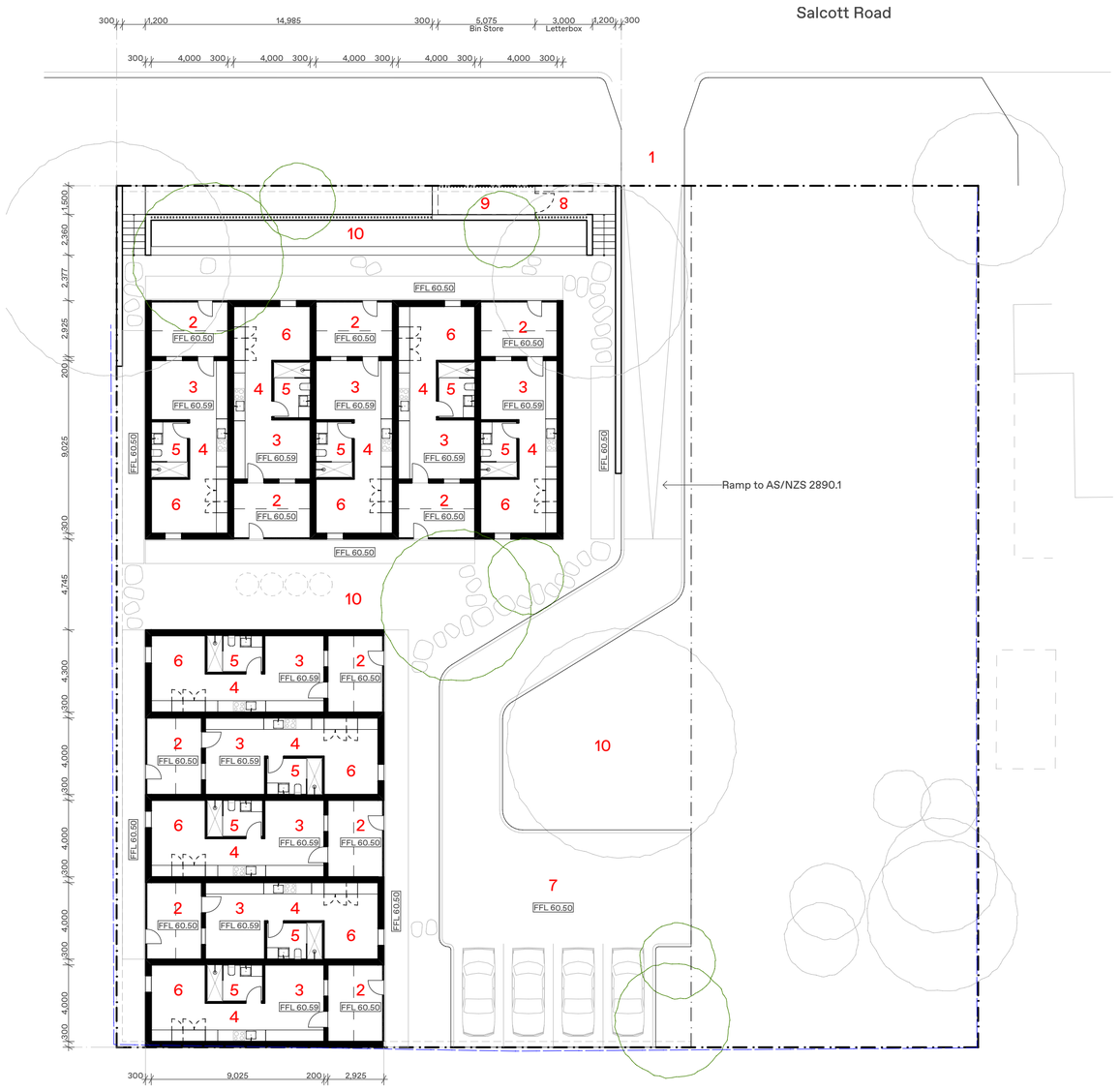
Contributes to comfortable and productive environments through internal and external amenity

Amenity

Amenity Principles:

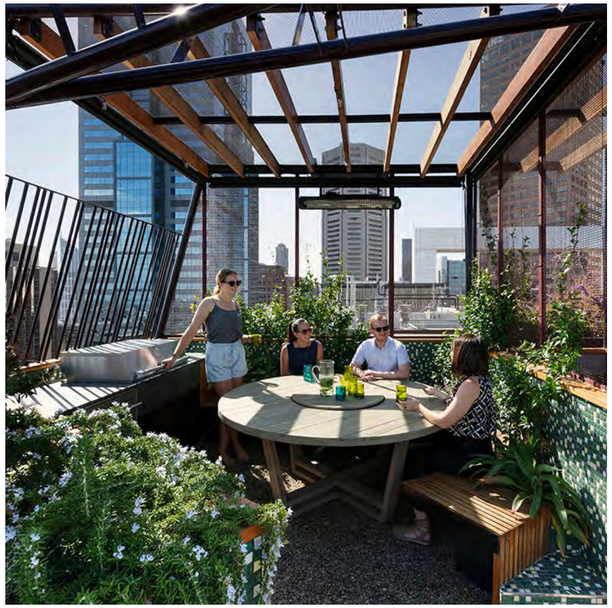
+ Well-designed external spaces providing welcoming & comfortable environments that are universally accessible and effectively shaded.
+ Mitigate negative impacts on surrounding buildings and places including overshadowing, overlooking, glare & noise.
+ Internal rooms and spaces that are adequately sized, comfortable and easy to use and furnish, with good levels of daylight, natural ventilation and outlook.
+ Internal rooms to be delivered with appropriate levels of acoustic protection, visual privacy and ease of access for all.

1 New Crossover
2 Outdoor Living
3 Living / Dining
4 Kitchen
5 Bathroom
6 Bedroom
7 Car Bays (4) & turn-around
8 Letterbox
9 Bin Store
10 Communal Garden



Amenity

OUTDOOR GATHERING SPACES



Well designed external spaces that are inviting, comfortable and universally accessible.

HARD & SOFT LANDSCAPING

Optimise external amenity for occupants, visitors and neighbours.

PRODUCTIVE GARDEN

A productive & healthy environment, responding to the diversity of the local community and its culture.

Activities that contribute to the vitality of the place.

PRIVATE & COMMUNAL BALANCE

Appropriate levels of acoustic protection and visual privacy.

PRINCIPLE 7
LEGIBILITY

Contains clear connections and memorable elements to help people find their way around

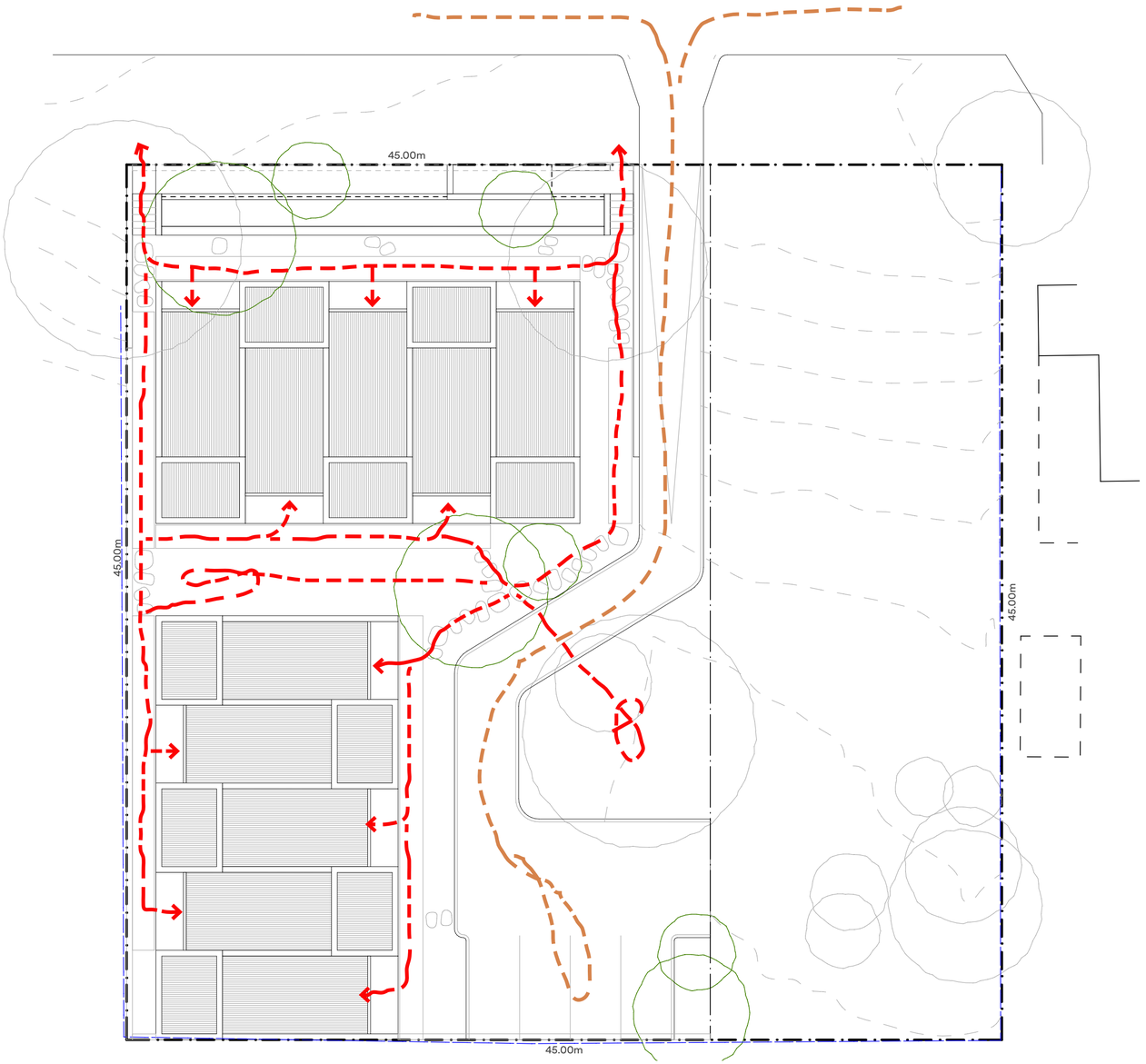
Legibility

Legibility Principles:

+ Ease of movement across site with priority given to pedestrian movement over vehicular movement.
+ Built form split into two 'masses' to allow effective access and circulation as well as permeability through building mass.
+ Legible building entrance points and clear distinction between public and private spaces.

Vehicular arrival / exit

Pedestrian circulation



PRINCIPLE 8
SAFETY

Optimises safety and security, minimising the risk of personal harm and supporting safe behaviour and use

Safety Principles

VISUAL & ACOUSTIC PRIVACY

Green buffer planting to provide additional visual and acoustic privacy.

LIGHTING & SIGHTLINES

Well-lit, secure access points.

Maximising opportunities for passive surveillance of public and communal areas.

WAYFINDING & SIGNAGE

Clearly defined relationship between public and communal areas.

Clear wayfinding and identifiable entry points.

PHYSICAL & IMPLIED BARRIERS

Integrated landscape to assist pedestrian movement across site.

Vehicle crossover / car parking safely integrated to minimise negative impacts on pedestrian amenity.

PRINCIPLE 9
COMMUNITY

Responds to community needs as well as the wider social context, supporting diversity and social interaction

Key Metrics

CONTEXTUALLY RESPECTFUL

Medium to long-term housing facility with spaces that facilitate and encourage social connection.

Scale of building appropriate to neighbouring context.

A VIBRANT ENVIRONMENT

Provides 'light touch' support & sustainable accommodation for individuals while they explore and secure long term housing.

Create a vibrant environment that is complementary to street & community.

AGILE & ADAPTIVE

Design that is flexible and able to adapt and serve changing social housing needs into the future.

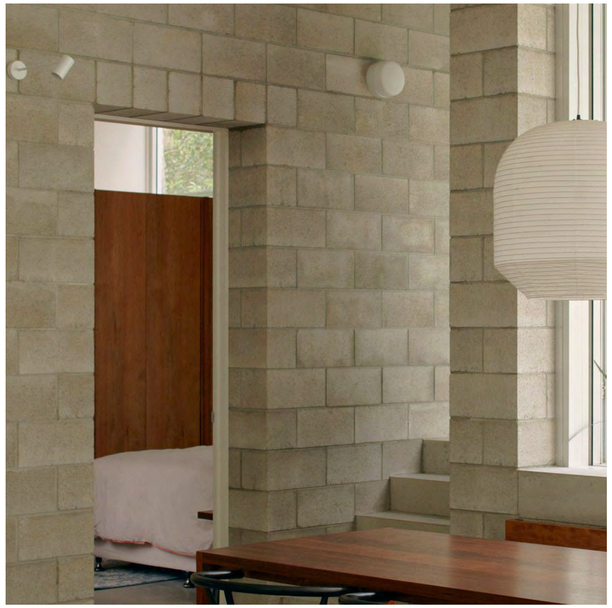
PRINCIPLE 10
AESTHETICS

Creates attractive and inviting spaces and places that engage the senses

Aesthetics (Material Reference)

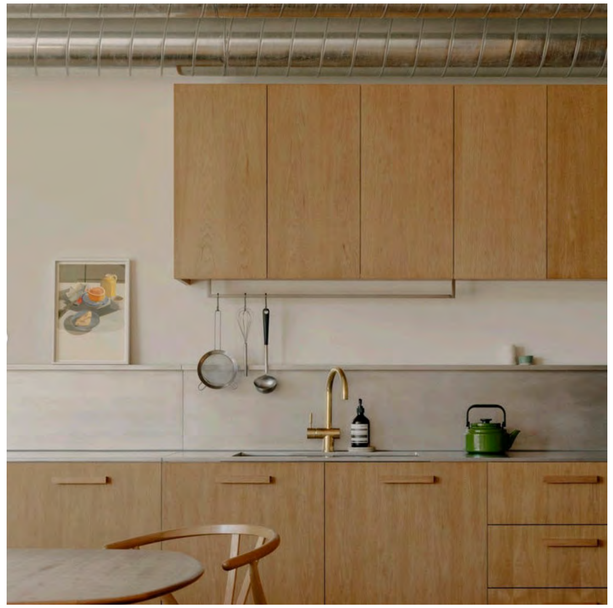
ROBUST MATERIALS

Materials easily transition from outside to inside



SIMPLE INTERIORS

Minimal, healthy interior spaces



ENDURING LANDSCAPE

Uncomplicated, engaging, endemic

3D Representation (Streetscape)

3D Representation (Salcott Interface)

3D Representation (Northern Garden)

3D Representation (Northern Garden)

3D Representation (Communal Outdoor)

3D Representation (Aerial)

Let’s make something wonderful together.

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t/a NIC BRUNSDON

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Fremantle WA
Australia 6160

Certified
B
Corporation
This company meets the highest standards of social and environmental impact

NIC BRUNSDON

PLANNING REPORT

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DYNAMIC PLANNING AND DEVELOPMENTS

1.0 Introduction

Dynamic Planning and Developments acts on behalf of Uniting WA, the proponent of Lot 2 (No. 65) Salcott Road, Girrawheen (herein referred to as the 'subject site').

This planning report has been prepared in support of an Application for Planning Approval for a proposed 'Residential Building' at the subject site. The planning report contains the following pertinent details of the proposal relevant to the assessment of the proposed application:

- Details of the proposal;
- Detailed assessment of the proposal against the relevant planning provisions applicable under the City of Wanneroo District Planning Scheme No. 2 and any relevant Local Planning Policies; and
- Detailed justification of any variations sought.

In addition to this planning report, the following documentation has been provided in order to assist the City of Wanneroo in determining the proposed application:

- Relevant development plans (Appendix 1).
- Operational Management Plan (Appendix 2).
- State Planning Policy 7.0 – Design of the Built Environment Assessment (Appendix 3).

It will be demonstrated in subsequent sections of this submission that the proposed development is entirely appropriate for approval.

2.0 Site Details

2.1 Legal Description

The subject site is legally described as:

Lot	Plan	Volume	Folio	Street Address
2	D051386	1459	463	65 Salcott Road, Girrawheen

The area of the subject site is 2,025m².

A copy of the Certificate of Title pertinent to the subject site is provided as part of the application package.

2.2 Locational and Land Use Context

2.2.1 Regional and Local Context

The subject site is located within the City of Wanneroo municipal area within the suburb of Girrawheen. The subject site has frontage onto Salcott Road and is in close proximity to Beach Road which ultimately provides connections to the wider Perth Metropolitan Area. The block currently operates as a Uniting Church with an associated car park, both of which will be demolished for this development.

The subject site adjoins a park on the western boundary and to the south and east is existing single house residential development.

Figures 1 and 2 depict the subject site in its regional and local context, respectively.

DYNAMIC PLANNING AND DEVELOPMENTS

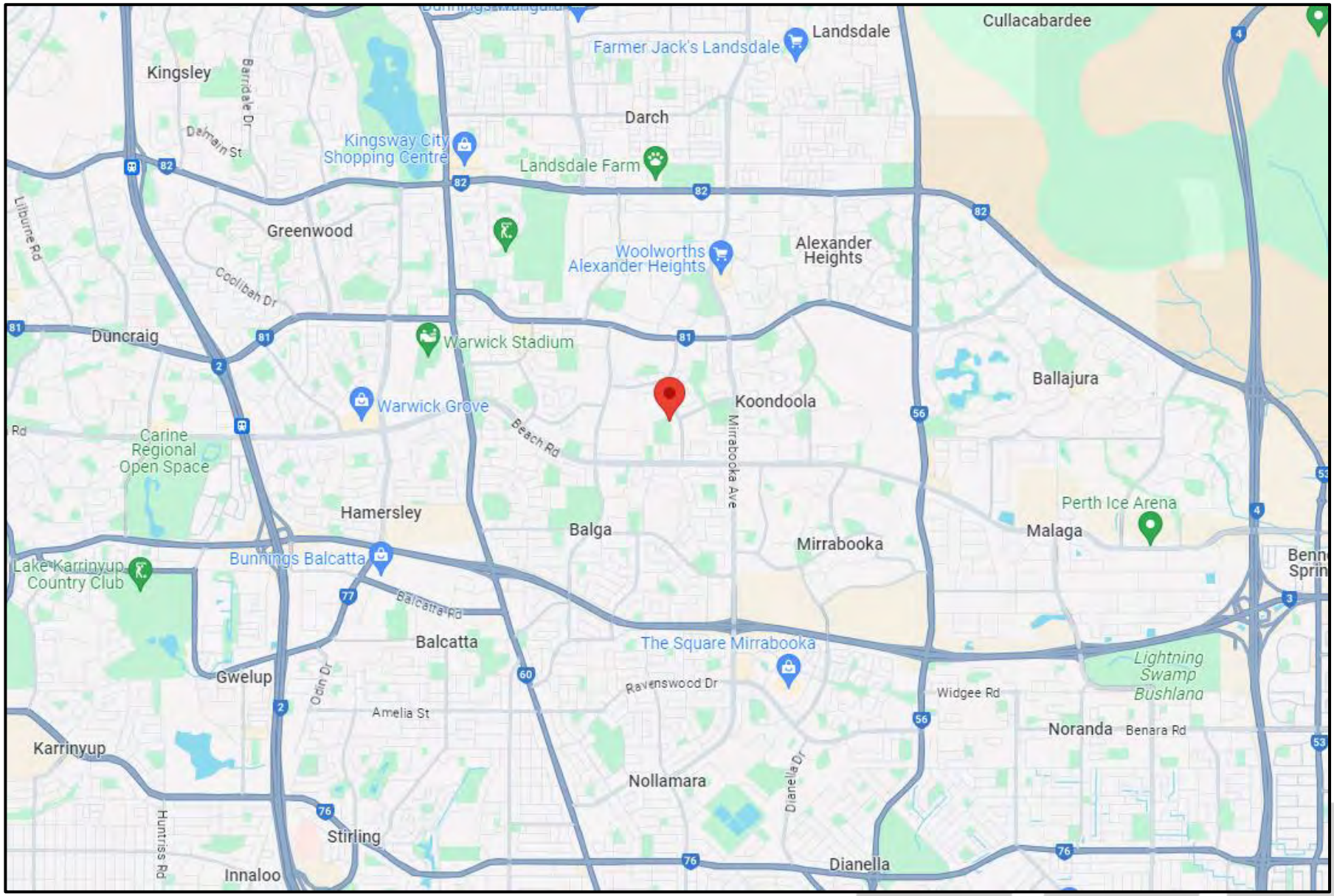


Figure 1 – Regional Context

DYNAMIC PLANNING AND DEVELOPMENTS

Figure 2 – Local Context

DYNAMIC PLANNING AND DEVELOPMENTS

3.0 Planning Framework

3.1 Metropolitan Region Scheme

The subject site is zoned 'Urban' under the provisions of the Metropolitan Region Scheme (MRS).

For reasons outlined further in this report, the proposed development is considered to be consistent with the 'Urban' MRS zoning applicable to the subject site.

3.2 City of Wanneroo District Planning Scheme No. 2

The subject site is zoned 'Residential' under the provisions of DPS No. 2 with an applicable density coding of R20/40. The objectives of the 'Residential' zone are as follows:

a) *To provide for a range of housing and a choice of residential densities to meet the needs of the community.*
b) *To facilitate and encourage high quality design, built form and streetscapes throughout residential areas.*
c) *To provide for a range of non-residential uses, which are compatible with and complementary residential development.*

Land use permissibility in the 'Residential' zone is determined having regard to Table 1 in DPS No. 2. An assessment against the zone objectives, land use permissibility and other relevant scheme provisions has been provided in Section 5 of this report.

Figure 3 depicts the subject site as it sits within DPS 2.

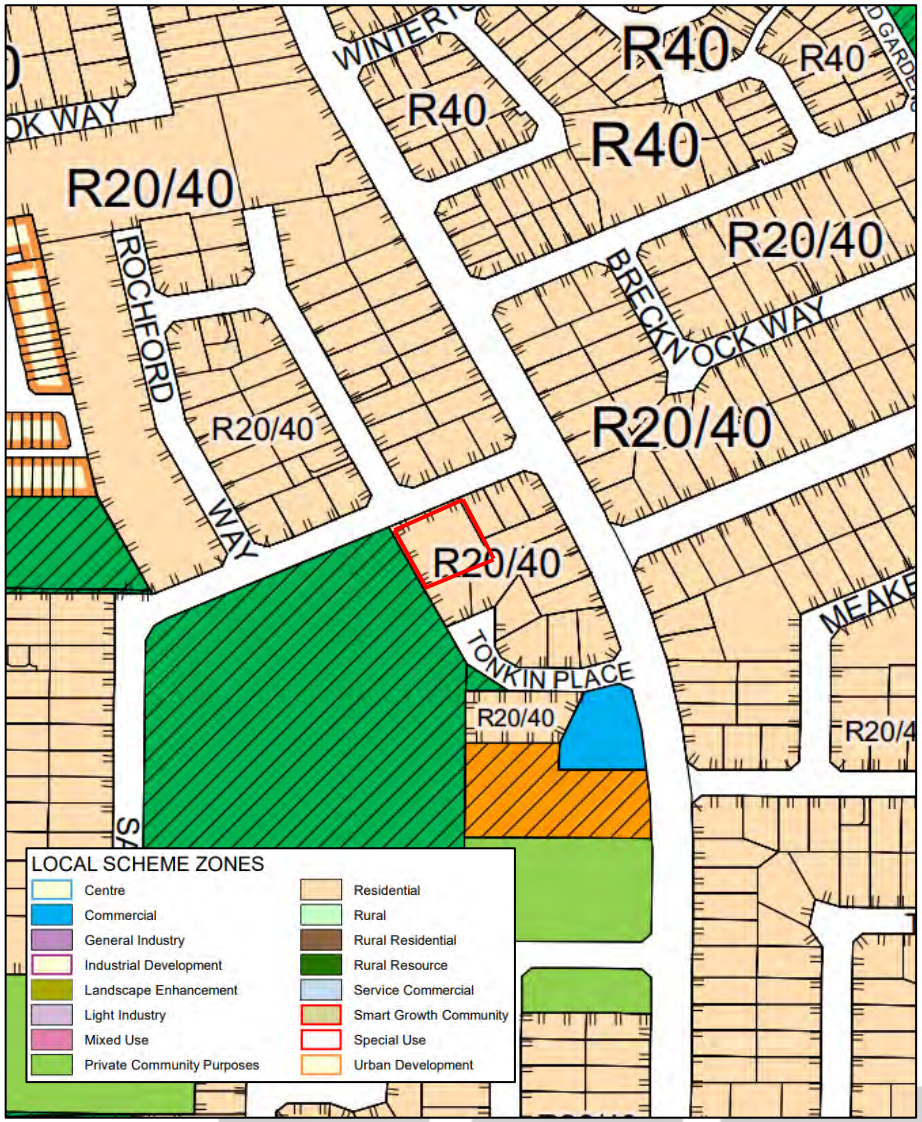


Figure 3 – Planning Scheme Extract

DYNAMIC PLANNING AND DEVELOPMENTS

4.0 Proposal Details

Uniting WA proposes to develop a community housing facility on Lot 2 (65) Salcott Road Girrawheen, with 'light touch' support delivered to the residents by Uniting WA. The innovative design by Nic Brunsdon Architects will deliver a purpose-built, dignified, safe and sustainable housing facility in an established residential area, with self-contained accommodation and communal outdoor spaces designed to improve the health and wellbeing of residents.

The proposed development seeks approval for a 'Residential Building' at the subject site in order to support the Uniting WA Aspirations Housing program which seeks to provide long term, safe and secure supportive accommodation to individuals over the age of 18 who have come from Uniting's transitional housing programs via a referral pathway, and require ongoing support to maintain a tenancy.

A summary of the development and operational details has been provided below.

4.1 Development Details

- The development will be single storey-built form with a portion of the development having ceiling heights commensurate with a two-storey building in order to improve access to natural light and ventilation.
- There will be two separate built form components and a significant amount of open space, communal amenities, and landscaping.
- There will be provision for only four car bays to service staff as residents are unlikely to own a vehicle and visitor numbers are anticipated to be low.
- The development will incorporate a mix of masonry blockwork, timber gladding and glazing with aluminium framing.
- A communal bin store will be provided with staff and/or residents available to transport bins to the verge for collection each week.
- The proposed development will retain approximately 680sqm of the site on the eastern boundary that will be the subject of future development. At present the development intent for this land is unknown.

4.2 Operational Details

- The development will accommodate ten (10) residents with each able to access light touch support from Uniting WA staff that will allow them to live more independently, build social connections and have access to employment, training, and learning opportunities.
- Key staff will visit each resident at the site for up to 3 hours per week between 9am and 5pm Monday to Friday. On call staff will be available after hours, weekends and public holidays.
- Uniting WA will maintain property and tenancy management for the life of the development.
- The development will operate and function in accordance with a comprehensive Operational Management Plan which is included in in Appendix 2.

5.0 Assessment

The statutory provisions applicable to the subject site require assessment of the proposal to be undertaken against the requirements noted in the following documents:

- City of Wanneroo District Planning Scheme No. 2.
- State Planning Policy 7.0 – Design of the Built Environment.
- State Planning Policy 7.3 – Residential Design Codes [Volume 1] (SPP7.3).

The below sections will address the relevant land use permissibility, planning considerations and development requirements outlined in the abovementioned statutory planning documents.

5.1 Land Use Permissibility

The proposed development seeks approval for a 'Residential Building' at the subject site. The 'Residential Building' land use definition is defined in State Planning Policy 7.3 – Residential Design Codes (Volume 1) as:

Residential building – A building or portion of a building, together with rooms and outbuildings separate from such building but incidental thereto; such building being used or intended, adapted or designed to be used for the purpose of human habitation:

- *temporarily by two or more persons; or*
- *permanently by seven or more persons, who do not comprise a single family, but does not include a hospital or sanatorium, a prison, a hotel, a motel or a residential school.*

In examining the nature of the Aspirations Housing development defined in Section 4 above, it is evident that the 'Residential Building' land use definition is most appropriate as:

- The development will accommodate seven or more persons on a permanent basis who do not comprise a single family.
- The nature of the Proposed Development is a facility (being managed by Uniting WA, subject to an Operational Management Plan), rather than discrete dwellings.
- Uniting WA will maintain management of the facility as a registered Tier 2 Community Housing Provider and in accordance with the Community Housing Regulatory Framework obligations.
- The facility will have communal outdoor living spaces and the Residents will be required to contribute to the maintenance of the property and its gardens.
- The Residents will have access to 24/7 on-call support services and will have regular, weekly visits from case workers.

In accordance with the 'Residential' zoning, the 'Residential Building' land use is a 'Discretionary (D)' land use meaning approval is possible subject to compliance with the relevant development requirements.

The development is also considered to provide housing choice to vulnerable members of the community who are in desperate need of support in high quality, safe, affordable and sustainable housing that will enable their long term independence. The facility has been specifically designed to meet the needs of the people who live there and be complimentary to the surrounding residential context. With this in mind, the proposed development is considered to meet the objectives of the 'Residential' zone.

5.2 State Planning Policy 7.0 – Design of the Built Environment

As part of designing the proposed development State Planning Policy 7.0 – Design of the Built Environment (SPP7.0) was a critical consideration. It was important that through the design process a high quality built form outcome was produced that remained low cost and affordable given the demographic it was being designed for.

How the development addresses SPP7.0 is outlined in a design presentation prepared by Nic Brunsdon Architects which is included in Appendix 3 of this report.

5.3 Development Requirements

The proposed development requires consideration and assessment against the requirements outlined in the below mentioned documents:

- State Planning Policy 7.3 – Residential Design Codes [Volume 1] (SPP7.3).
- City of Wanneroo District Planning Scheme No. 2.

State Planning Policy 7.3 – Residential Design Codes [Volume 1]

It is commented that as the proposed development seeks approval for a 'Residential Building' not all elements of SPP7.3 warrant consideration. In this regard the below table provides a summary of the developments compliance with the relevant deemed to comply provisions. It is commented that assessment against the R40 density coding has been applied as it is considered the subject site would meet the requirements of Clause 4.2(4) of DPS No. 2.

Part 5.1 – Context	R-Codes
5.1.2 Street Setback	✓
5.1.3 Lot Boundary Setback	DP
5.1.4 Open Space	✓
5.1.6 Building Height	✓

Part 5.2 – Streetscape	R-Codes
5.2.3 Street Surveillance	✓
5.2.4 Street Walls and Fences	✓
5.2.5 Sight Lines	✓

Part 5.3 – Site Planning and Design	R-Codes
5.3.2 Landscaping	✓
5.3.4 Design of Car Parking Spaces	✓
5.3.5 Vehicular Access	✓
5.3.7 Site Works	DP
5.3.9 Stormwater Management	✓

Part 5.4 – Building Design	R-Codes
5.4.1 Visual Privacy	✓
5.4.2 Solar Access for Adjoining Sites	✓
5.4.4 External Fixtures	✓

Evidently the proposed development complies with most of the relevant deemed to comply provisions with the exception of the below:

- The proposed southern boundary wall is 6.1m high in lieu of the allowed 3.5m.
- Greater than 0.5m of site works is proposed to the southern, eastern and western boundaries.

With regard to the above, an assessment of the proposed developments compliance with the relevant design principles is warranted.

Clause 5.1.3 **–** Lot Boundary Setbacks
P3.2 Buildings built up to boundaries (other than the street boundary) where this:

- *Makes more effective use of space for enhanced privacy on adjoining properties.*
- *Does not compromise the design principle contain in Clause 5.1.1 P3.1.*
- *Does not have any adverse impact on the amenity of the adjoining property.*

The proposed development is considered to meet the abovementioned design principle as:

1. The proposed boundary wall, despite being over height will not have any undue impacts on the adjoining property as they also have an abutting boundary wall on the shared boundary. In this regard there will be no building bulk or scale impacts that result.
2. The proposed boundary wall will assist in achieving additional communal open space and landscaping within the development which will improve the amenity of the eventual occupants of the proposed development.
3. The over height aspect of the boundary wall will only extend for some 3m which is a very limited section of the shared boundary, further reducing the impact.

Clause 5.3.7 **–** Site Works
P7.1 Development that considers and respondence to the natural features of the site and requires minimal excavation/fill.

P7.2 Where excavation/fill is necessary, all finished levels respecting the natural ground level at the lot boundary of the site and as viewed from the street.

7.3 Retaining walls that result in land which can be effectively used for the benefit of residents and do not detrimentally affect adjoining properties and are designed, engineered and landscaped having due regard to Clauses 5.3.7 and 5.4.1.

The proposed development is considered to meet the abovementioned design principles as:

1. The retaining and site works across the development effectively manages the topography to limit the extent of retaining whilst maintaining functional finished floor levels.
2. The natural ground level at street level is being maintained and any retaining in the primary street setback area is being stepped to ensure it is able to accommodate an area of landscaping and use of the retaining as a seating area.
3. The use of retaining ensures larger communal open space and living areas that will be functional and desirable for residents to interact with. These retaining walls are provided without detriment to any adjoining properties.

City of Wanneroo District Planning Scheme No. 2 (DPS No. 2)

The only relevant development requirement in DPS No. 2 relates to car parking and a provision of 1 space per person accommodated. As the proposed development will accommodate 10 persons, a total of 5 bays are required. Whilst the development only provides four (4) bays, this provision of parking is considered sufficient as the residents will not have cars and the bays will only be used by staff, with no more than two to three staff on site at any one time.

The above will be enforced through an Operational Management Plan (Appendix 2) which will become a condition of planning approval should the City resolve to approve the application.

6.0 Conclusion

Based on the contents of this planning report, it is clear that the project proposal is appropriate for approval as it delivers a supportive community housing product to vulnerable members of the community in desperate need of safe, affordable and stable accommodation. The design of the proposed development is of a high quality and achieves a number of sustainable design outcomes to minimise running costs. The proposed development is also largely compliant with the applicable planning framework with any variations appropriately justified. Further, the development and support program will be delivered by a reputable not for profit organisation that has considerable and demonstrated experience in this space. With the above in mind, the proposed development warrants approval

LG Ref: DA 2023/1397
DAP Ref: DAP/24/02635

City of Wanneroo
LOCKED BAG NO 1
WANNEROO WA 6946

Attention: Rhiannon McQuillan, Planner - Approval Services

5 April 2024

RE: APPLICANT RESPONSE TO CITY'S REQUEST FOR FURTHER INFORMATION
Lot 2 (No. 65) Salcott Road, Girrawheen
Proposed Residential Building

We refer to the request for further information (RFI) received from the City of Wanneroo on 15 March 2024 in relation to development application DA 2023/1397 (DAP/24/02635), comprising the City's officer assessment comments, Design Review Panel (DRP) comments and internal referral comments.

A written response from the applicant is provided in the table below, with additional information provided as the following attachments:

1. Attachment 1: Amended Set of Development Plans
2. Attachment 2: Operational Waste Management Plan
3. Attachment 3: Response to DRP Comments (provided under separate cover)

Introduction

Uniting WA is seeking approval for a proposed Residential Building land use and development at 65 Salcott Road, Girrawheen, comprising a 10-bedroom supportive community housing facility and associated car parking, access and landscaping on the western portion of the site. The property is zoned Residential R20/R40 under the City's Local Planning Scheme No. 2.

The RFI received on 15 March 2024 provides an assessment of the proposal against Part C of the Residential Design Codes – Volume 1 (R-Codes, deferred version to be gazetted 10 April 2024). The R-Codes do not contain any provisions specific to a Residential Building land use and therefore, their statutory application to the proposed development is limited. Notwithstanding, it is accepted that these provisions are able to provide a useful

benchmark with regard the proposals impact on adjoining residential development. A response to the City's RFI comments is provided in the table below.

	City's Assessment Comments	Applicant Response
R-Codes		
1.	In accordance with cl. 1.1 – Private Open Space, there is a requirement for ground floor dwellings to provide a minimum of 15m^2 of private outdoor living area, with a minimum dimension of 3m. The City is of the opinion that it is appropriate to provide each residence with the minimum required private open space and this is to be amended accordingly.	**Written Response / Justification:** Firstly, the proposal is for a Residential Building with self-contained accommodation and private and communal open space areas, not individual dwellings and as such a requirement for dedicated private open space shouldn't be applicable. However, each self-contained accommodation unit has access to a small private courtyard with an area of 11.7m^2 and dimensions of 4m x 2.925m, as well as a communal garden with shared amenities. In the first instance it is considered most appropriate to assess the proposal against the 'Studio/1 bedroom' requirements for Private Open Space under the R-Codes, not the 'Ground floor dwelling' requirements, given the proposal comprises 1-bedroom self-contained accommodation units which are studio-like, being compact in size and having open floor plans with separate single bedroom and bathroom. The proposed private open space area is consistent with the 'deemed to comply' minimum area and dimension requirements for a Studio/1 bedroom dwelling under the R-Codes, being 8m^2 and 2m, and is therefore considered acceptable. In addition, the proposal meets the design principles for Private Open Space under the R-Codes, providing quality communal open space that is specifically designed and intended to be a shared space for residents, one that encourages use and provides opportunity for social interaction, with seating and quality landscaping, and being located centrally to be easily accessible and equitable for residents. Based on the above, the proposed private open space areas are considered acceptable.
2.	Cl 2.1 outlines that each dwelling is to have one room that is the designated primary living space which can accommodate a dimension of at least 3.8m x 3.8m. At present the provided dimensions are 3m x 3.9m within the designated primary living space.	**Written Response / Justification:** Again, we reiterate that the proposal is for a 'Residential Building' development with rooms, not individual separate dwellings and as such the applicability of this clause is questioned. Despite this, the proposed primary living space has dimensions of 3m x 3.9m in lieu of the minimum 3.8m x 3.8m requirement, which equates to a minor variation of 0.8m to one room dimension. The self-contained living spaces will be occupied by only 1 person and have been designed to meet the needs of the sole occupant, and provide a high amenity, functional and flexible living environment. The architecturally designed units include many features which enhance the sense of space for residents, such as

		the open floor plans, the elevated ceiling/turret feature that increases access to sunlight and natural ventilation, as well as the primary living spaces with major openings connecting to private outdoor space. Importantly, the proposal meets the design principles under Cl 2.1 of the R-Codes, with the primary living space being proportionate to the size and intended number of occupants; having a physical and visual relationship with the adjoining private open space area; incorporating environmental design principles that provide good natural ventilation and daylighting; and being functional, with ability to flexible accommodate furniture. Based on the above, the size of the proposed primary living space is considered acceptable.
3.	Cl 2.1 requires a minimal internal floor area of 37m^2 for studio dwellings. At present the internal floor area is 35.1m^2, the City is of the opinion that it is appropriate to provide each residence with the minimum required internal floor area and this is to be amended accordingly.	**Written Response / Justification:** Again, we reiterate that the proposal is for a 'Residential Building' development with rooms, not individual separate dwellings and as such the applicability of this clause is questioned. However, the proposed self-contained accommodation units have a floor area of 36.1m^2 in lieu of the 37m^2 area requirement for Studio dwellings under the R-Codes, which equates to a 0.9m^2 size variation. The proposed minor variation is considered acceptable given the proposal is for a Residential Building with self-contained accommodation units and private and communal outdoor spaces (not individual dwellings), and the accommodation units is designed to meet the needs of the sole occupant who will live there. As addressed under point 2 above, the proposal meets the design principles for Dwelling Size and Layout under the R-Codes, being proportionate to the size and intended number of occupants; incorporates environmental design principles that provide good natural ventilation and daylighting; and provides functional, high amenity spaces.
4.	Cl. 2.2 outlines that bathrooms located on external walls (excluding boundary walls) are to have a minimum of one openable window for natural ventilation. At present, the relevant bathrooms do not provide an opening.	**Amended Plans:** Refer to **Attachment 1**, Amended DA plans showing openable (louvered) windows on the external walls of two bathrooms, as requested.
5.	Solar Access – it is noted that large openable windows have been provided in the upper portion of the wall within the bedroom. Is there scope to relocate the windows located on the south/west side to the north/eastern side to increase solar access into the bedrooms and dwellings overall.	**Written Response / Justification:** The following response was provided by the Project Architect, in support of the current proposal: *These design elements should be considered more as thermal chimneys; an architectural element to assist warm air up and out of the internal spaces. We have prioritised a southern location where possible to reduce solar gain and heat load internally. The aim here*

		is to reduce energy bills and reliance on mechanical heating and cooling. The proposal also meets the design principles for Solar Access and Natural Ventilation under the R-Codes, with the development being oriented and designed to optimise winter solar gain whilst limiting summer sunlight into the bedrooms and primary living space where possible, as well optimising natural ventilation to habitable rooms.
6.	Waste Management – a. A waste management plan is to be provided which references with WALGA waste management guidelines to outline the number of bins required to facilitate the number of residents.	**Additional Information:** Refer **Attachment 2**, Operational Waste Management Plan.
	b. The City does not support a bin store located within the primary street setback area. Bin stores are to be behind the primary street setback and screened from view from the communal areas, the street and public open space.	**Written Response / Justification:** The bin store has been positioned in the front setback area of the site as the most convenient location for residents and waste collection, and in response to the site context. Mainly the site's topography which limits the options for locating the bin store behind the primary street setback area, except where it would be far less convenient for residents. Residents would have to pull the bins up the sloping driveway on collection days, which would be difficult and inconvenient. Relocating the bins behind the front setback area would also have a negative impact on the communal outdoor areas on site. Importantly, the bin store is fully enclosed and screened from public view by way of fencing and landscaping. The front fencing is to comply with front boundary fencing requirements, being not less than 1.2m high. Landscaping is provided along the front of the bin store area to provide further screening and improve the amenity of the development when viewed from the street. It is also intended the enclosed bin store will be screened entirely by landscaping once the plants are established, with creepers and medium size plants to be planted along the front to screen the bin store and provide an attractive frontage to the development. In addition, the proposed bin store area complies with the Cl.2.4 deemed-to-comply provisions of the R-Codes for waste management, as well as the design principles, and can therefore be considered acceptable. Refer to **Figures 1 & 2** below showing bin store screening. Refer to **Attachment 1** Amended DA Plans, and **Attachment 2**, Waste Management Plan, for more details.

		 **Figure 1: Bin Store Screening, as shown on North Elevation - Front boundary fence and bin store screening, as seen from public realm.**  **Figure 2: Bin Store Screening, as shown on Landscape Plan**
	c. A bin pad is to be demonstrated to facilitate the number of bins required, as per the waste management plan.	**Additional Information:** Refer **Attachment 2**, Operational Waste Management Plan showing the bin pad and bin store has capacity to accommodate the required number of bins.
7.	All service utilities and functional utilities are to be demonstrated on the plans, this includes air-con units, clothes drying and hot water systems.	**Written Response / Justification:** We would respectfully request this be condition of planning approval, as more appropriately dealt with through the detailed design phase of development. The following response was provided by the Project Architect, to explain how it is intended the service and functional utilities will be accommodated in the development (for information): *The air-con unit condensers would be accommodated on the roof in discrete locations, hot water units can be accommodated internally in a cupboard (perhaps in the kitchen), and pull-up clothes drying can be accommodated in the private outdoor spaces.*
8.	Cl. 3.4 – Lot Boundary Setbacks – the City does not support boundary walls above 3.5m in height from the natural ground level (including proposed retaining walls). The rear boundary presents a boundary wall of up to 6m in height. It should also be noted that this boundary wall causes overshadowing to the entirety of	**Amended Plans & Justification:** Refer **Attachment 1**, Amended DA Plans showing a modified building and southern boundary wall, with floor plans re-oriented and the turret element being moved to the east, to lessen the impact of the lot boundary wall on the southern neighbour's private outdoor space area. An Overshadowing Plan is also provided for information. It is important to note that the proposal complies with the deemed-to-comply requirements for overshadowing under the R-Codes, given we are only overshadowing the

	the rear adjoining lots outdoor living area. a. The City requires the boundary wall to be a maximum of 3.5m in height, or alternatively provide a compliant lot boundary setback to mitigate this issue. The City will only support an over height boundary wall that abuts the existing boundary wall to the southern lot, and does not result in significant overshadowing into the southern lots outdoor living area.	southern neighbours' property by approximately 5% of site area, where up to 25% is permitted for land coded R25 and lower, and up to 35% is permitted for land coded R30 to R40 (subject site has density code of R20/R40). It is acknowledged that this might increase should the development to the south be the subject of a strata subdivision reducing the size of the lot impacted. It is also noted that the proposed rear boundary wall abuts an existing boundary wall on the southern property, providing an appropriate transition between sites, which will have minimal impact on the neighbour overall, with no overlooking or loss of privacy, and is compliant with the overshadowing requirements. The proposed building being built up to the lot boundary makes the most effective use of space for private and communal garden areas, whereby if the building was setback from the rear boundary, it could have a significant impact on the size, amenity and functionality of the outdoor spaces, especially given the topography of the site limits site configuration options. Given the proposal is generally compliant with the lot boundary setback requirements, and complies with the overshadowing requirements overall, the proposal is considered acceptable.
	b. In addition, to support this, please provide an overshadowing plan to clearly demonstrate how the wall will impact overshadowing to the adjoining and showing the adjoining lots existing boundary wall.	**Additional Information / Amended Plans:** Refer **Attachment 1**, Amended DA Plans including an Overshadowing plan.
9.	All windows to the primary street (not including the windows at the upper level) are to be major openings with a minimum of 1m^2.	**Written Response / Justification:** The following response was provided by the Project Architect, in support of the current proposal: *All openings to primary street are over 1m^2 with the exception of the windows at eye level into bedrooms, which are currently 900mmx900mm and approximately 0.8m^2 (which equates to a 0.2m^2 size variation). The minor variation is considered acceptable given they are major openings to a bedroom and designed to protect the privacy of residents, and the abundance of daylight which will come through the high level window/thermal chimney. These bedroom windows are also below street level and screened entirely by landscaping so won't contribute to passive surveillance of the street.*
10.	Cl 3.7 – Access – The wall adjoining the driveway appears to be a maximum of 0.8m in height within 1.5m of where the	**Amended Plans:** Refer **Attachment 1**, Amended DA Plans showing requested modification.

	wall adjoins the driveway. The provided driveway is to be setback a minimum of 1.5m from the wall or the maximum wall height is to be reduced to 0.75m within 1.5m.	
DPS2		
11.	As previously noted, the City received objections regarding the number of parking bays. As per the City's District Planning Scheme No. 2 (DPS2) there is a requirement for 1 bay per 2 persons accommodated, as such there is a requirement for 5 bays on site. The City is of the view that 5 bays would be the appropriate amount of parking given there is scope for both United workers to attend and visitors (such as family members) to be attending the residential building at any one time. 5 bays would ensure this could function appropriately to accommodate all persons who could be attending the residents.	**Amended Plans:** Refer **Attachment 1**, Amended DA Plans showing 5 car bays on site (additional 1 bay provided as requested).
12.	The lot is located within a split coded area. As per DPS2, there is a requirement for the subject lot to have a maximum of one consolidated vehicular access point for each street frontage of the lot, with reciprocal access rights. Given the portion of the subject lot to the east is indicated as an indicative separate area of the lot but there is no indication of what this will include, the City is of the view that the crossover should facilitate this requirement at the development application stage. The crossover is to be increased to 6 metres in width, including 3 metres on each side of the indicative boundary line.	**Amended Plans:** Refer **Attachment 1**, Amended DA Plans showing a 6m wide crossover and driveway designed for two-way access.
Plans		
13.	The site plan is to be updated to demonstrate all retaining proposed on the subject lot, noting that this does not appear to show all required elevation.	**Additional Information / Amended Plans:** Refer **Attachment 1**, Amended DA Plans with elevations showing the retaining levels.

	An example of this that the car park appears to be 0.5m higher than the adjoining portion of land however no retaining has been indicated.	
14.	Elevations are to be provided to demonstrate the internal elevations (the rear of the northern building and in front of the internal building behind the retaining walls to allow to City to see the full building elevation) and an additional elevation to the western side to show the fencing which you will be putting in place abutting the adjoining public open space.	**Additional Information / Amended Plans:** Refer **Attachment 1**, Amended DA Plans with the requested additional elevations.
DRP		
15.	The application was referred to an individual design review panel member for comments, as attached. Please provide commentary on the amendments made or justification for each recommendation provided by the panel member.	**Additional Information / Written Response:** Refer **Attachment 3**, Applicant Response to DRP comments (to be provided under separate cover).
Internal Comments		
16.	Engineering Comments a. A 3.3m crossover and driveway width is not support by Engineering. The applicant is to provide a 6m width. b. The proposed crossover/driveway is to be designed for two way access.	**Amended Plans:** Refer **Attachment 1**, Amended DA Plans showing 6m wide crossover and driveway designed for two-way access.
17.	Landscaping Comments a. A landscaping plan is to be provided to indicate the species and densities of each plant.	**Amended Plans / Written Response:** Refer **Attachment 1**, Amended DA Plans with updated Landscaping Plan showing the indicative landscaping and plant species and number of trees… and level of detail considered suitable for DA approval phase. Should a more detailed landscaping plan be required, we would respectfully request this be addressed as a condition of planning approval.
18.	Health Comments a. An operational waste management plan is to	**Additional Information:** Refer **Attachment 2**, Operational Waste Management Plan.

	be provided (noted above).	
	b. Applicant is to demonstrate the location of the washing machine, noting that as per the *Health Act (Laundries and Bathrooms) Regulations* the washing of clothes is prohibited in kitchens.	**Amended Plans:** Refer **Attachment 1**, Amended DA Plans showing the location of washing machines in the bathrooms.

Whilst the R-Codes technically do not apply to a Residential Building use, it has been demonstrated above that the proposal meets the relevant design principles of the R-Codes and can therefore be considered acceptable; and warrants approval accordingly.

Thank you for your consideration. Should you have any queries, or require any further information in support of the proposal, please do not hesitate to contact the undersigned.

Kind regards,

Ingrid van Dorssen
Project Manager – Property and Assets

PART C – CITY OF KWINANA

1. Declarations of Due Consideration

Any member who is not familiar with the substance of any report or other information provided for consideration at the DAP meeting must declare that fact before the meeting considers the matter.

2. Disclosure of Interests

3. Form 1 DAP Applications

3.1 Lot 541 (2) Ovens View, Mandogalup – Child Care Centre – DAP/24/02656

4. Form 2 DAP Applications

Nil.

5. Section 31 SAT Reconsiderations

Nil.

Lot 541 (2) OVENS VIEW, MANDOGALUP - CHILD CARE CENTRE

Form 1 – Responsible Authority Report
(Regulation 12)

DAP Name:	Metro Outer
Local Government Area:	City of Kwinana
Applicant:	Apex Planning
Owner:	Greta White PTY LTD JJ White Pty Ltd Qube Mandogalup Development Pty Ltd
Value of Development:	$2.1 million
Responsible Authority:	City of Kwinana
Authorising Officer:	Sara Sylvester
LG Reference:	DA10844
DAP File No:	DAP/24/02656
Application Received Date:	20 February 2024
Report Due Date:	22 May 2024
Application Statutory Process Timeframe:	90 Days
Attachment(s):	1. Location Plan 2. Development Plans 3. Schedule of Submissions 4. Transport Impact Statement 5. Environmental Noise Assessment

Responsible Authority Recommendation

That the Metro Outer Development Assessment Panel resolves to:

1. **Approve** DAP Application reference DAP/24/02656 and accompanying plans (Site Plan SK010-1000, Ground Floor Plan SK010-1001, Overshadowing Diagram SK010-1002, Landscaping Plan SK010-1003, Elevation Plans SK010-2000 & SK010-2001, Section SK010-3000, Perspectives SK010-4000) in accordance with Clause 68 of Schedule 2 (Deemed Provisions) of the *Planning and Development (Local Planning Schemes) Regulations 2015*, and the provisions of the City of Kwinana Local Planning Scheme No. 2, subject to the following conditions:

Conditions

1. Pursuant to clause 26 of the Metropolitan Region Scheme, this approval is deemed to be an approval under clause 24(1) of the Metropolitan Region Scheme.

2. This decision constitutes planning approval only and is valid for a period of four (4) years from the date of approval. If the subject development is not

substantially commenced within the specified period, the approval shall lapse and be of no further effect.

3. The Child Care Centre is limited to a maximum of 96 children on site at any one time. Operating hours for the Child Care Centre are limited to between 6:30am to 6:30pm, Monday to Friday inclusive.

4. The requirements of the City of Kwinana Local Planning Policy No.5 - Development Contribution towards Public Art (LPP5) must be met through one of the following options:

   a) prior to a building permit being issued, the owner/applicant must submit a Public Art Report in accordance with LPP5 to the City of Kwinana for approval, which must detail the provision of Public Art onsite to a minimum value as specified in LPP5. The approved Public Art must be installed on the site prior to the occupation or use of the development; or

   b) Prior to the commencement of works, the owner/applicant must provide a financial contribution of a minimum value as specified in LPP5 to the City of Kwinana in lieu of installing Public Art on the site;

   to the satisfaction of the City of Kwinana.

5. Prior to a building permit being issued, a Parking Management Plan (PMP) demonstrating staff levels during the development peak hours in accordance with Table 1 of the Transport Impact Assessment (TIS) prepared by Transcore (Rev.5, dated 8 February 2024), must be prepared and submitted to the City of Kwinana for approval. The approved PMP must be implemented in the design, construction and ongoing operation of the development at all times to the satisfaction of the City of Kwinana. Any building or design requirements are to be shown as part of the building permit application.

6. The recommendations contained in the Environmental Noise Assessment prepared by Lloyd George Acoustics (Rev.A, dated 14 February 2024) must be implemented in the design, construction and ongoing operation of the development at all times, including but not limited to:

   a) no outdoor children's play prior to 7am;
   b) fencing and retaining walls constructed and maintained to the minimum specifications; and,
   c) mechanical plant to be selected, located, screened and/or operated to comply with specified noise levels;

   to the satisfaction of the City of Kwinana. Any building or design requirements are to be shown as part of the building permit application.

7. Prior to a building permit being issued, a Waste Management Plan (WMP) demonstrating the following requirements must be prepared and submitted to the City of Kwinana for approval:
   a) bin store must be adequately enclosed and screened from view of the road and neighbouring properties;
   b) waste collection must occur onsite; and,
   c) waste collection must occur outside of the Child Care Centre operating hours, and between 7am to 7pm, Monday to Saturday inclusive.

The approved WMP must be implemented in the design, construction, and ongoing operation of the development at all times to the satisfaction of the City of Kwinana. Any building or design requirements are to be shown as part of the building permit application.

8. Prior to a building permit being issued, a detailed Landscape Management Plan must be prepared by a suitably qualified person and approved by the City of Kwinana, and must include details of the following:
   a) the location, number, size and species of new trees, shrubs and/or other vegetation to be planted onsite; and,
   b) details of hard and soft landscaping as well as shade trees and structures for the outdoor play area(s).

   Any building or design requirements are to be shown as part of the building permit application. The approved Landscape Management Plan must be implemented prior to the occupation of the development, and maintained thereafter, to the satisfaction of the City of Kwinana. Any species that fails to establish within the first three (3) growing seasons following implementation must be replaced in consultation with the City.

12. Prior to a building permit being issued, a detailed Drainage and Stormwater Management Plan is required to be submitted to the City of Kwinana for approval. The detailed Drainage and Stormwater Management Plan shall demonstrate the on-site retention of stormwater drainage and be implemented to the satisfaction of the City of Kwinana.

13. Prior to the use or occupation of the development, suitable arrangements being made with the City of Kwinana for the installation of:

    a. yellow ‘no stopping’ line-marking within Ovens View abutting the subject lot between the approved crossover and intersection of Quatermaine Boulevard; and,
    b. signage to limit on-street parking to 15 minutes during peak hours for the two (2) on-street parking bays on Tasman Crescent abutting the lot, and four (4) on-street parking bays on Ovens View to the east of site;

    at the full cost of the landowner and to the satisfaction of, or as otherwise agreed with, the City of Kwinana.

14. A minimum of twenty (22) vehicle parking bays and one (1) reversing bay must be clearly line-marked on the ground, sealed and drained in accordance with the approved plans. The design of vehicle parking and access must comply with AS2890.1 (as amended). Accessible parking bays must comply with AS2890.6 (as amended).

15. The reversing bay must be kept clear at all times and installed with a bollard or wheel stop designed to prevent parking and maintain the functionality of the reversing bay, to the satisfaction of the City of Kwinana.

16. The vehicle crossover must be located, designed and maintained in accordance with the specifications of the City of Kwinana.

17. Prior to occupation or use of the development an Emergency Evacuation Plan (EEP) must be prepared by a suitably qualified person in accordance with the

Guidelines for Planning in Bushfire Prone Areas (as amended). The approved EEP must be implemented on the site at all times. The landowner must ensure the EEP is reviewed on an annual basis to ensure it remains valid and relevant.

18. Boundary walls and fences must be treated with anti-graffiti resistant coating to the satisfaction of the City of Kwinana. The landowner must maintain the premises, including boundary walls and fences, in a state of good repair and free from unsightly matter including graffiti at all times, to the satisfaction of the City of Kwinana.

19. External lighting must comply with the requirements of AS4282 - Control of Obtrusive Effects of Outdoor Lighting (as amended).

20. The site must be connected to a suitable water supply and sewerage service in accordance with the requirements of the Water Corporation, to the satisfaction of the City of Kwinana.

21. Stormwater drainage from roofed and paved areas must be contained and disposed of onsite at all times, to the satisfaction of the City of Kwinana.

22. The landowner must implement dust control measures for the duration of site works to the satisfaction of the City of Kwinana.

Advice Notes

1. The owner/applicant is advised to submit an application to the City of Kwinana for approval to construct or alter a food business, an application for registration of food business and an application for child care approval with associated fees and documents at the lodgement of building permit application.

2. The owner/applicant is advised that the development is to comply with the *Food Act 2008, Food Regulations 2009, Education and Care Services National Law (WA) Act 2012, Education and Care Services National Regulations 2012, Health (Miscellaneous Provisions) Act 1911*, *Environmental Protection Act 1986* and *Environmental Protection (Noise) Regulations 1997.*

3. If an applicant or owner is aggrieved by this determination, there is a right of review by the State Administrative Tribunal in accordance with the Planning and Development Act 2005 Part 14. An application must be made within 28 days of the determination.

4. The applicant is advised that this conditional development approval is not a building permit giving authority to commence construction. Prior to any building work commencing on site, a building permit must be issued and penalties apply for failing to adhere to this requirement.

5. Where an approval has so lapsed, no development shall be carried out without further approval having first been sought and obtained, unless the applicant has applied and obtained Development Assessment Panel approval to extend the approval term under regulation 17(1)(a) or local government approval under regulation 17A of the *Planning and Development (Development Assessment Panels) Regulations 2011*.

Details: outline of development application

Region Scheme	Metropolitan Region Scheme
Region Scheme - Zone/Reserve	Urban
Local Planning Scheme	Local Planning Scheme No. 2
Local Planning Scheme - Zone/Reserve	Development
Structure Plan/Precinct Plan	Mandogalup West Local Structure Plan
Structure Plan/Precinct Plan - Land Use Designation	Residential
Use Class and permissibility:	Child Care Centre (SA)
Lot Size:	2047m^2
Existing Land Use:	Vacant Land
State Heritage Register	No
Local Heritage	☒ N/A ☐ Heritage List ☐ Heritage Area
Design Review	☐ N/A ☐ Local Design Review Panel ☐ State Design Review Panel ☒ Other
Bushfire Prone Area	Yes
Swan River Trust Area	No

Proposal:

The application seeks approval for a new 645m^2 single-storey 'Child-Care Centre' on Lot 541 (2) Ovens View, Mandogalup, as shown on the development plans (Attachment 2).

Key details of the proposal are as follows:

- 'Child-Care Centre' operating Monday to Friday, 6:30am to 6:30pm;
- Up to 96 children and 19 full-time staff are expected onsite at any one time;
- Four additional part-time staff (three 'float' staff + one cook) will attend the site as needed, typically outside peak hours;
- Estimated 675m^2 outdoor play area located within a total 683m^2 landscaped area fronting Ovens View and Quartermaine Boulevard;
- Masonry and infill fencing to Ovens View and Quartermaine Boulevard, with solid Colorbond fencing to Tasman Crescent; and,
- 22 onsite parking bays (inclusive of disabled bay), with access via a new crossover on Ovens View.

Background:

The subject lot is located in the Mandogalup West Local Structure Plan (LSP) area. The site is a 2,047m^2 vacant lot located within the Apsley Estate, located at the corner

of Quartermaine Boulevard and Ovens View, and bound by Tasman Crescent to the east (see Location Plan in Attachment 1).

The southern boundary of the site abuts three residential lots currently under construction. A 1.63ha public open space (POS) is located directly opposite the site to the north, with other partially constructed residential lots surrounding the site in all other directions.

Quartermaine Boulevard is a key north/south distributor road that runs through Apsley Estate and contains a shared use path. A pedestrian path is located along the street boundaries of the site. Two street parking bays are located in Tasman Crescent abutting the site, and four more street bays are located to the east along Ovens View.

Legislation and Policy:

Legislation
Planning and Development Act 2005
Metropolitan Region Scheme (MRS)
Planning and Development (Development Assessment Panels) Regulations 2011
Planning and Development (Local Planning Schemes) Regulations 2015
City of Kwinana Local Planning Scheme No.2 (LPS2)

State Government Policies
State Planning Policy 3.7 - Planning in Bushfire Prone Areas (SPP3.7)
State Planning Policy 7.0 - Design of the Built Environment (SPP 7.0)
Draft Development Control Policy 4.3 - Planning for high-pressure gas pipelines
Planning Bulletin 72/2009 Child Care Centres

Structure Plans/Activity Centre Plans
Mandogalup West Local Structure Plan (LSP)
Apsley Stage 11 Local Development Plan (LDP)

Local Policies
Local Planning Policy No.5 - Development Contribution towards Public Art (LPP5)

Consultation:

Public Consultation

The application was advertised to the public for 14 days (concluding on 27 March 2024) by the following means:

- letters to all residential landowners within 200m radius of the site; and,
- notice published on the City's website.

A total of thirteen (13) submissions were received, of which two (2) were objections to the proposal. The remaining eleven (11) submissions made comments and/or were supportive of the proposal. A Schedule of Submissions is provided in Attachment 3.

The key issues raised in the submissions and the assessing officer's comments are summarised below and detailed in the 'Planning Assessment' section of this report:

Issue Raised	Officer Comments
Potential for increased traffic congestion on surrounding roads.	**Noted** – potential traffic impacts from the development are discussed in the 'Planning Assessment' section of this report.
Potential for parking to overflow onto street / verge.	**Noted** – potential off-site parking impacts from the development are discussed in the 'Planning Assessment' section of this report.
Potential for noise to detract from residential amenity.	**Noted** – potential noise impacts from the development are discussed in the 'Planning Assessment' section of this report.
Potential traffic/safety risk in a bushfire emergency due to single road connection to Apsley Estate.	**Noted** – development response to bushfire risk is discussed in the 'Planning Assessment' section of this report.

Referrals/consultation with Government/Service Agencies

The application was referred to the Australian Gas Infrastructure Group (AGIG), who is the pipeline operator of the Dampier to Bunbury Natural Gas Pipeline (DBNGP). The application was referred because the development site is located within the policy trigger distance as per Draft Development Control Policy 4.3 - Planning for high-pressure gas pipelines. AGIG made no comment on the proposal.

The application was not referred to any other public authorities for comment.

Design Review Panel Advice

As per State Planning Policy 7.0 - Design of the Built Environment (SPP7.0), the City engaged an independent architecture consultant, in lieu of a Design Review Panel, to undertake a design review of the proposed development. The design review advice is discussed in the 'Planning Assessment' section of this report.

Planning Assessment:

Land Use and Permissibility

The subject lot is zoned 'Development' in the City's Local Planning Scheme No.2 (LPS2) and designated 'Residential (R30-R60)' under the Mandogalup West Local Structure Plan (LSP).

The development is considered to fall within the use class of 'Child Care Centre' as defined in LPS2. A Child Care Centre is an 'SA' use in the Residential zone, which means the City may exercise its discretionary powers to approve the use after a period of public consultation.

The application was advertised to surrounding landowners and the issues raised in the public submissions have been considered with regard to all relevant requirements of LPS2 and state and local planning policies as listed under the 'Legislation and Policy' section of this report. These and other key considerations are discussed below and form the recommendation to approve this application.

Built Form and Design

Local Development Plan (LDP)

The Apsley Stage 11 LDP sets out built form and development controls intended to apply to the potential residential development of the site as a Grouped Dwelling.

The proposal is generally consistent with the built form controls set out in the LDP insofar as these are applicable to the Child Care Centre, including that the development is orientated toward Quartermaine Boulevard and Ovens View, and vehicular access is restricted to Ovens View.

Design Review

The City engaged an independent architecture consultant, in lieu of a Design Review Panel, to undertake a design review against the below 10 Design Principles set out in State Planning Policy 7.0 - Design of the Built Environment (SPP 7.0):

1. Context and Character
2. Landscape Quality
3. Built Form and Scale
4. Functionality and Build Quality
5. Sustainability
6. Amenity
7. Legibility
8. Safety
9. Community
10. Aesthetics

The design review found that the development is generally of a high-quality built form and scale and will be an important, valued community asset. The single storey built form and scale is well arranged on the site and appropriate within its context.

However, key recommendations were made with respect to ‘Context and Character’, ‘Landscape quality’, ‘Functionality and build quality’, ‘Safety’, and ‘Aesthetics’ to clarify and improve the development design.

The applicant has addressed the key recommendations of the design review and has submitted amended plans to the satisfaction of the City (Attachment 2). The revised plans depict additional design details, including finishes schedule, location of mechanical plant, and a building section plan.

Landscaping detailed design is yet to be formalised. Should the application be supported, it is recommended that a detailed landscape plan be submitted and implemented as a condition of approval.

Traffic, Access and Parking

Impact of Traffic on Local Roads

One objection received from a nearby property on Tasman Crescent raised concerns about the impact of increased traffic volumes on road congestion and safety. Another

submission received from a property on Quartermaine Boulevard suggested the use of safety measures to slow traffic around the development site.

The applicant has submitted a Traffic Impact Statement (TIS) prepared by Transcore (dated February 2024) to support the application. The TIS (Attachment 4) estimates that the proposed Child Care Centre could generate approximately 336 vehicle trips per day, which includes up to 84 trips during the AM peak hour (8am to 9am) and 68 trips during the PM peak hour (4pm to 5pm).

The TIS estimates that most of this daily traffic (85%) will arrive/leave via the north on Quartermaine Boulevard. Remaining traffic will be via the south on Quartermaine Boulevard (10%), with minimal traffic estimated via the east on Ovens View (5%).

Quartermaine Boulevard is a key distributor road that is expected to carry higher traffic volumes. The City accepts that the local road network can accommodate the estimated additional traffic generated by the proposal, noting that the estimated traffic will still be below the critical threshold of 100vph per lane (or 10% of capacity).

In terms of traffic safety, the City is satisfied that the moderate traffic volume generated by the development is unlikely to increase the risk of collisions to unacceptable levels. It is not considered that there is any further need for traffic calming devices within the local road network.

Parking Requirements

Submissions from nearby properties raised concerns about the potential for the development to cause overflow parking and congestion on surrounding roads.

The application proposes 22 onsite parking bays, including one disabled bay. The applicant's TIS estimates that up to 13 bays will be used by staff in the development's peak hour, leaving 8 standard bays (ie. non-disabled bays) available for drop-off/pick-up. The TIS contends that this is adequate to meet the estimated peak parking demand for the development, based on the following assumptions:

- Although up to 19 staff are estimated onsite at capacity, only 13 staff will be rostered during the peak drop-off/pick-up hours;
- The AM peak hour will be the busiest period, with up to 48 vehicles estimated to use the carpark during the hour; and,
- Average drop-off/pick-up takes 10 minutes. This means that 8 bays can each accommodate a turnover of 6 vehicles per hour, which is enough to service 48 vehicles in the AM peak hour (8 bays x 6 vehicles each).

The City accepts the assumptions in the TIS relating to average pick-up/drop-off time and estimated vehicles in the peak hour. However, the City takes a more conservative approach to assumptions relating to staff numbers, noting that minimum staff ratios will be based on the number and age of children onsite at any given time.

In lieu of any specific parking rate for a Child Care Centre in LPS2, the City typically assumes a worst-case scenario whereby the maximum 19 staff could be parked onsite in the peak hour. In this scenario, only 2 standard bays would be available for drop-off/pick-up, resulting in an onsite parking shortfall of 6 bays.

In order to minimise potential overflow parking problems due to limited onsite parking, it is recommended that staff start times are staggered during the peak hours of the development, in accordance with the staff schedule contained in Table 1 of the TIS.

Use of Public Parking Bays

The TIS notes that there are an additional six public parking bays available within walking distance of the site, resulting in a total of 28 bays being potentially available to the development. These are two public bays on Tasman Crescent directly abutting the site and four bays on Ovens View approximately 50m to the east.

The City does not consider public parking bays to be equivalent to onsite parking bays in terms of accessibility and convenience. The public bays are intended for use by visitors to the public open space (POS) and surrounding residential area, and so it cannot be guaranteed 'as of right' that the bays will always be available to service the Child Care Centre.

Also, the City assumes that off-site parking bays will have a slightly longer 15-minute usage time for drop-off/pick-up, which means that the six bays can each accommodate a turnover of four vehicles per hour, or a total of 24 vehicles (6 bays x 4 vehicles each).

Notwithstanding, the City accepts that there may be some instances of overflow parking during peak hours. Even with measures in place to limit staff parking onsite, parents may still choose to use the nearby public parking bays for pick-up/drop-off.

While there is a general presumption against the use of off-site parking for new developments, the City accepts that in this case there are sufficient other public parking options located along the northern boundary of the POS (over 30 bays). As such, potential instances of overflow parking in the public bays on Ovens View would not significantly disadvantage residents.

However, in order to encourage turnover of these six public bays and minimise the potential for congestion in and around the development, it is recommended that the proponent install signs to time limit the bays to 15 minutes during peak hours only.

It is also recommended that 'no stopping' line-marking is installed on the section of Ovens View abutting the site to prevent street parking in proximity to the intersection.

<u>Noise Impacts on Surrounding Properties</u>

The subject site abuts three residential lots on its southern boundary and is surrounded by Residential zoned land within the Apsley Estate. It is noted that a public open space (POS) is located directly opposite the site to the north (see Attachment 1).

Two (2) submissions received from nearby properties concerned the potential for noise from the development to detract from the residential amenity of the area. One of the submissions was made by the owner of No.125 Quartermaine Boulevard located abutting the site's southern boundary and requested that the area along this boundary be a "no play zone."

The applicant has responded to the noise concerns by outlining how the development has been carefully designed to sensitively respond to nearby properties.

Noise from the development is required to comply with the *Environmental Protection*

(Noise) Regulations 1997. The applicant has submitted an Environmental Noise Assessment (ENA) prepared by Lloyd George Acoustics (dated 14 February 2024) to model predicted noise levels at the surrounding noise sensitive residential properties.

The ENA (Attachment 5) indicates that noise generated by the development – including children's play, car parking and mechanical services – can comply with the *Regulations* at nearby properties, including No.125 Quartermaine Boulevard, through the implementation of noise mitigation measures. Such noise mitigation includes no outdoor play before 7am, and acoustic fencing along the site's southern boundary and the Quartermaine Boulevard and Ovens View street boundaries.

The City is satisfied that the ENA demonstrates that noise generated by the development can be mitigated to comply with the *Regulations*. The plans comply with the recommended fencing specifications and the mechanical plant recommendations can be satisfied at building permit stage when the plant equipment has been selected.

Should the application be supported, it is recommended that the noise mitigation measures set out in the submitted ENA be implemented as a condition of approval. Where it is proposed to install plant or equipment with different noise emissions to that recommended in the ENA, an updated detailed noise assessment will be required.

State Planning Policy 3.7 - Planning in Bushfire Prone Areas

One objection to the proposal cited bushfire safety concerns, noting that there is only one constructed public road entry/exit to Apsley Estate via Rowley Road to the north.

The development is partially located within a Bushfire Prone Area and is required to address the bushfire protection criteria as per the 'Guidelines for Planning in Bushfire Prone Areas', which includes the requirement for two separate public access routes to/from the development site.

It is noted that the development has only one public road access via Quartermaine Boulevard, which connects to Rowley Road and the wider road network in the north. Currently, Quartermaine Boulevard is a no-through road to the south, and Ovens View is a no-through road to the east; both of which are outside of the applicant's control.

Notwithstanding, Ovens View is connected via an emergency access easement to Hoffman Road in the south. This provides the development site with two separate public access routes in two different directions, which meets the bushfire protection criteria of the Guidelines. The applicant has also submitted a basic Bushfire Attack Level (BAL) Assessment to demonstrate that the site achieves a BAL-LOW rating.

The Child Care Centre is a vulnerable land use. Should the application be approved, a condition is recommended for an Emergency Evacuation Plan to be prepared and implemented for the development in accordance with the Guidelines.

Waste Management

The application proposes an enclosed bin storage area in the south-eastern corner of the building, with onsite waste collection to be undertaken by a private contractor. Swept path diagrams are included in the applicant's Transport Impact Statement (TIS) (Appendix 4), which demonstrate that a waste truck and other occasional service/delivery vehicles can enter and exit the carpark in forward gear. It is proposed

that waste collection and other services are undertaken outside of the operating hours of the Centre so that the entire carpark area is available for vehicle manoeuvring.

The City supports proposed waste collection and other service activities outside of the development operating hours, provided that these activities are restricted to between 7am to 7pm as prescribed by the *Environmental Protection (Noise) Regulations 1997*, to minimise noise disturbance to adjoining neighbours.

Should the application be supported, it is recommended that these requirements be imposed as a condition of approval.

Local Planning Policy No. 5 - Development Contribution towards Public Art (LPP5)

The application is subject to LPP5 because the proposed development is valued at $2.1 million. The Policy requires a Public Art contribution be provided for new developments valued over $2 million, which can be fulfilled through either the provision of Public Art onsite or a cash-in-lieu contribution.

Should the application be supported, the provision of Public Art in accordance with LPP5 is recommended as a condition of approval.

Conclusion:

The proposed development will deliver critically needed early learning services for the growing community of Apsley Estate, at a highly accessible corner site and will build upon community facilities in the locality. Furthermore, the majority of the submissions received through from the advertising (9) are in full support and eagerness for the development.

On balance, it is considered that the proposed development is appropriately located with compatible uses, including and generally of a high-quality built form and scale appropriate within its residential context.

The City has considered the proposed Child Care Centre development and conclude that the application can be supported subject to conditions.

LOCATION PLAN
SCALE: 1 : 500

PRELIMINARY

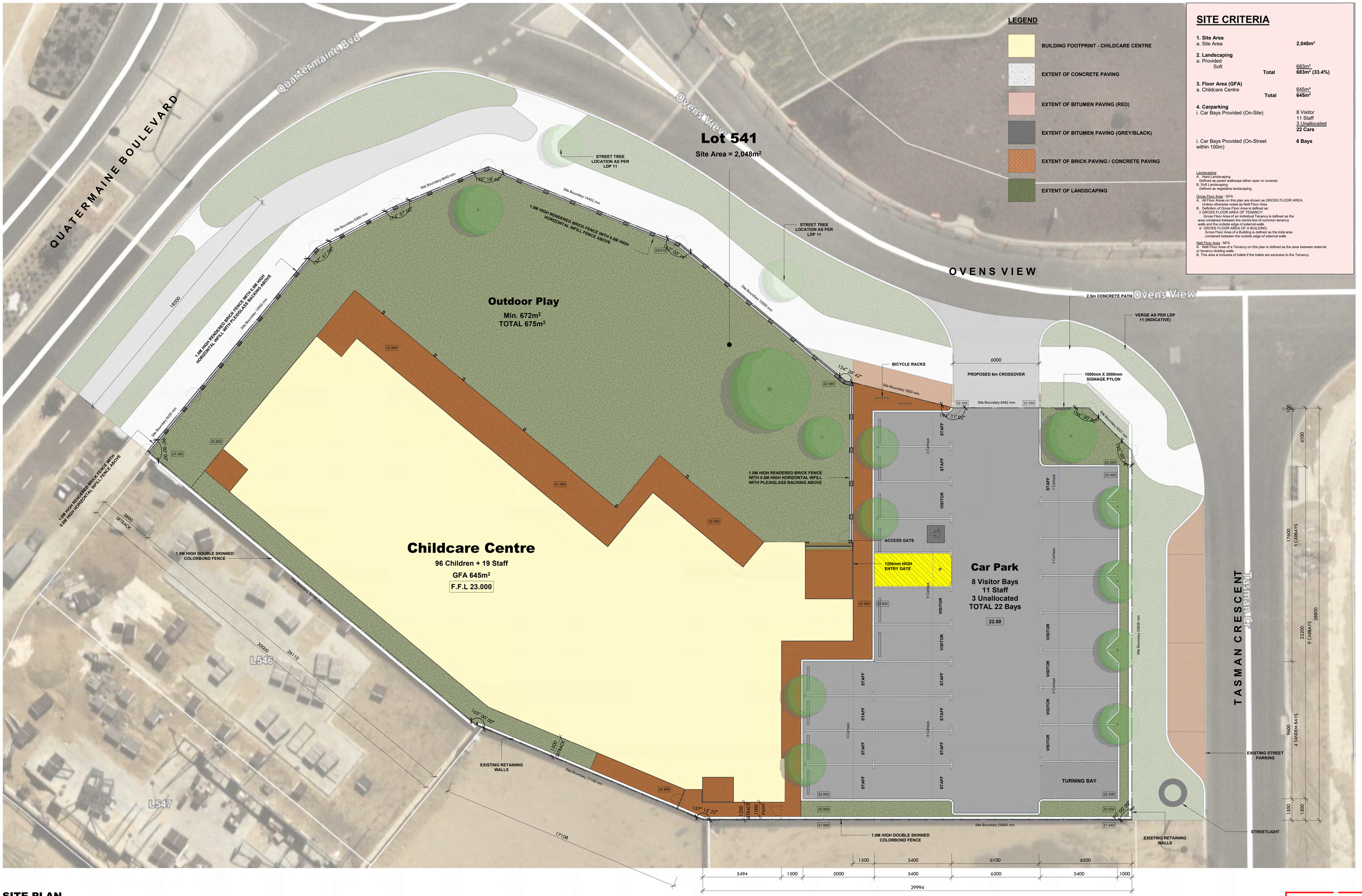
meyer shircore architects

PROPOSED CHILDCARE DEVELOPMENT

LOCATION : LOT 541 BOULEVARD RD, APSLEY
FOR : QUBE PROPERTY

DATE: MAY 2024
REVISION: SK010
SHEET: 0
PROJECT NUMBER 8923

Suite 2, Ground Floor 437 Roberts Road, Subiaco WA 6008
PO Box 1294 Subiaco WA 6904
t: 08 9381 8511 e: msa@meyershircore.com.au



LEGEND

- BUILDING FOOTPRINT - CHILDCARE CENTRE
- EXTENT OF CONCRETE PAVING
- EXTENT OF BITUMEN PAVING (RED)
- EXTENT OF BITUMEN PAVING (GREY/BLACK)
- EXTENT OF BRICK PAVING / CONCRETE PAVING
- EXTENT OF LANDSCAPING

SITE CRITERIA

1. Site Area
a. Site Area — **2,048m²**

2. Landscaping
a. Provided
Soft — 683m²
Total — 683m² (33.4%)

3. Floor Area (GFA)
a. Childcare Centre — 645m²
Total — 645m²

4. Carparking
i. Car Bays Provided (On-Site) — 8 Visitor, 11 Staff, 3 Unallocated, **22 Cars**

i. Car Bays Provided (On-Street within 100m) — **6 Bays**

Landscaping
A. Hard Landscaping
Defined as paved walkways either open or covered.
B. Soft Landscaping
Defined as vegetative landscaping.

Gross Floor Area : GFA
A. All Floor Areas on this plan are shown as GROSS FLOOR AREA.
Unless otherwise noted as Nett Floor Area
B. Definition of Gross Floor Area is defined as:
i/ GROSS FLOOR AREA OF TENANCY:
Gross Floor Area of an individual Tenancy is defined as the area contained between the centre line of common tenancy walls and the outside edge of external walls.
ii/ GROSS FLOOR AREA OF A BUILDING:
Gross Floor Area of a Building is defined as the total area contained between the outside edge of external walls

Nett Floor Area : NFA
A. Nett Floor Area of a Tenancy on this plan is defined as the area between external or tenancy dividing walls.
B. This area is inclusive of toilets if the toilets are exclusive to the Tenancy.

SITE PLAN
SCALE: 1 : 100

PRELIMINARY

meyer shircore architects

PROPOSED CHILDCARE DEVELOPMENT

LOCATION : LOT 541 BOULEVARD RD, APSLEY
FOR : QUBE PROPERTY

DATE: MAY 2024
REVISION: SK010
SHEET: 1000
PROJECT NUMBER 8923

Suite 2, Ground Floor 437 Roberts Road, Subiaco WA 6008
PO Box 1294 Subiaco WA 6904
t: 08 9381 8511 e: msa@meyershircore.com.au

GROUND FLOOR PLAN

SCALE: 1 : 100

PRELIMINARY

meyer shircore architects

PROPOSED CHILDCARE DEVELOPMENT

LOCATION : LOT 541 BOULEVARD RD, APSLEY

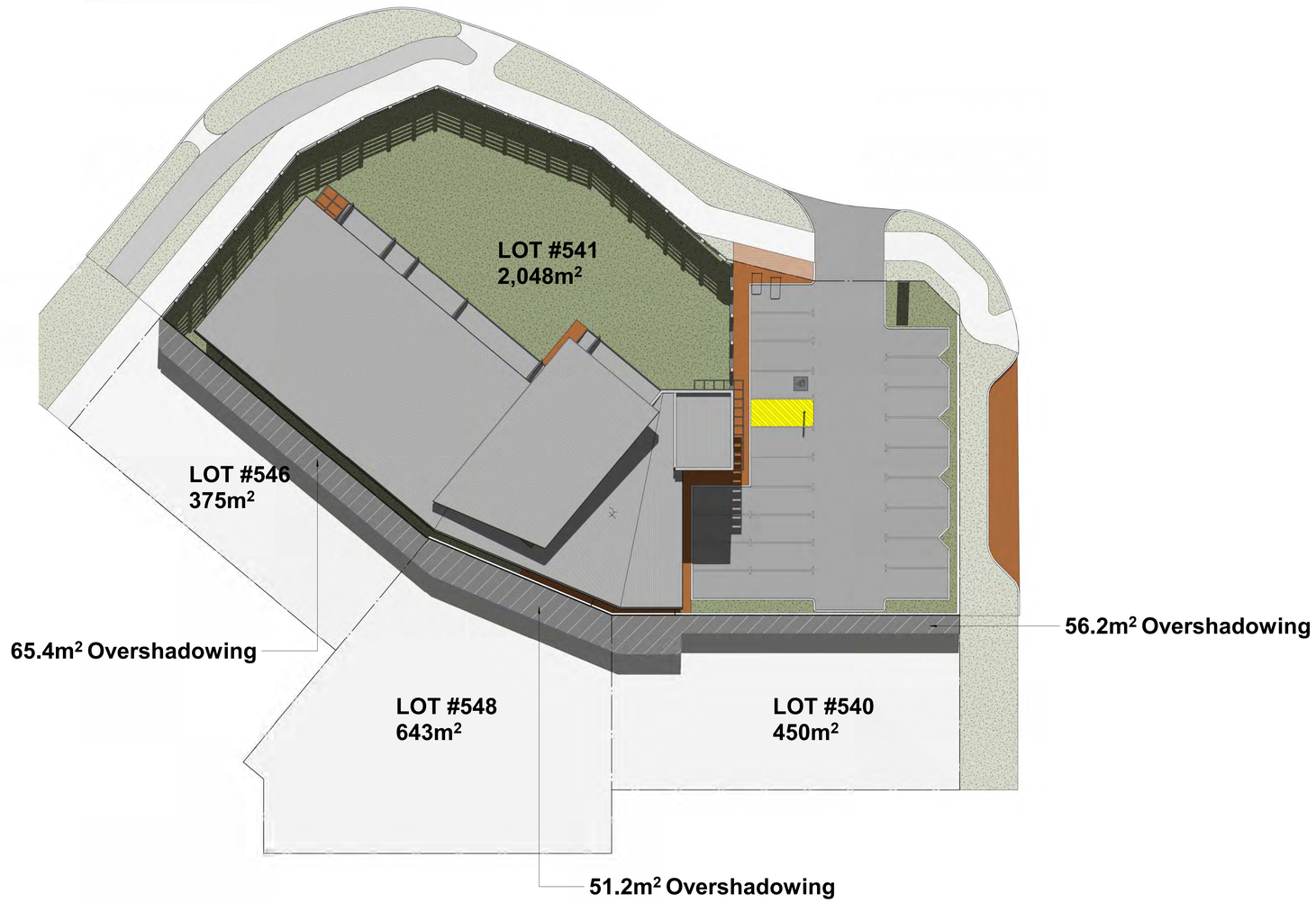
FOR : QUBE PROPERTY

0 1 2 3 4 5 10

DATE:	MAY 2024	PROJECT NUMBER
REVISION:	SK010	8923
SHEET:	1001	
SCALE:	1 : 100 @B1	

Suite 2, Ground Floor 437 Roberts Road, Subiaco WA 6008
PO Box 1294 Subiaco WA 6904
t: 08 9381 8511 e: msa@meyershircore.com.au

OVERSHADOWING CALCULATIONS			
LOT #	LOT AREA	OVERSHADOWING AREA	OVERSHADOWING %
LOT 546	375m²	65.4m²	17.4%
LOT 548	643m²	51.2m²	8%
LOT 540	450m²	56.2m²	12.5%



OVERSHADOWING DIAGRAM

SCALE: 1 : 200

DIAGRAM IS BASED ON WINTER SOLSTICE.

PRELIMINARY

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PROPOSED CHILDCARE DEVELOPMENT

LOCATION : LOT 541 BOULEVARD RD, APSLEY

FOR : QUBE PROPERTY

0 1 2 3 4 5 10

DATE: MAY 2024
REVISION: SK010
SHEET: 1002
SCALE: As indicated@B1

PROJECT NUMBER
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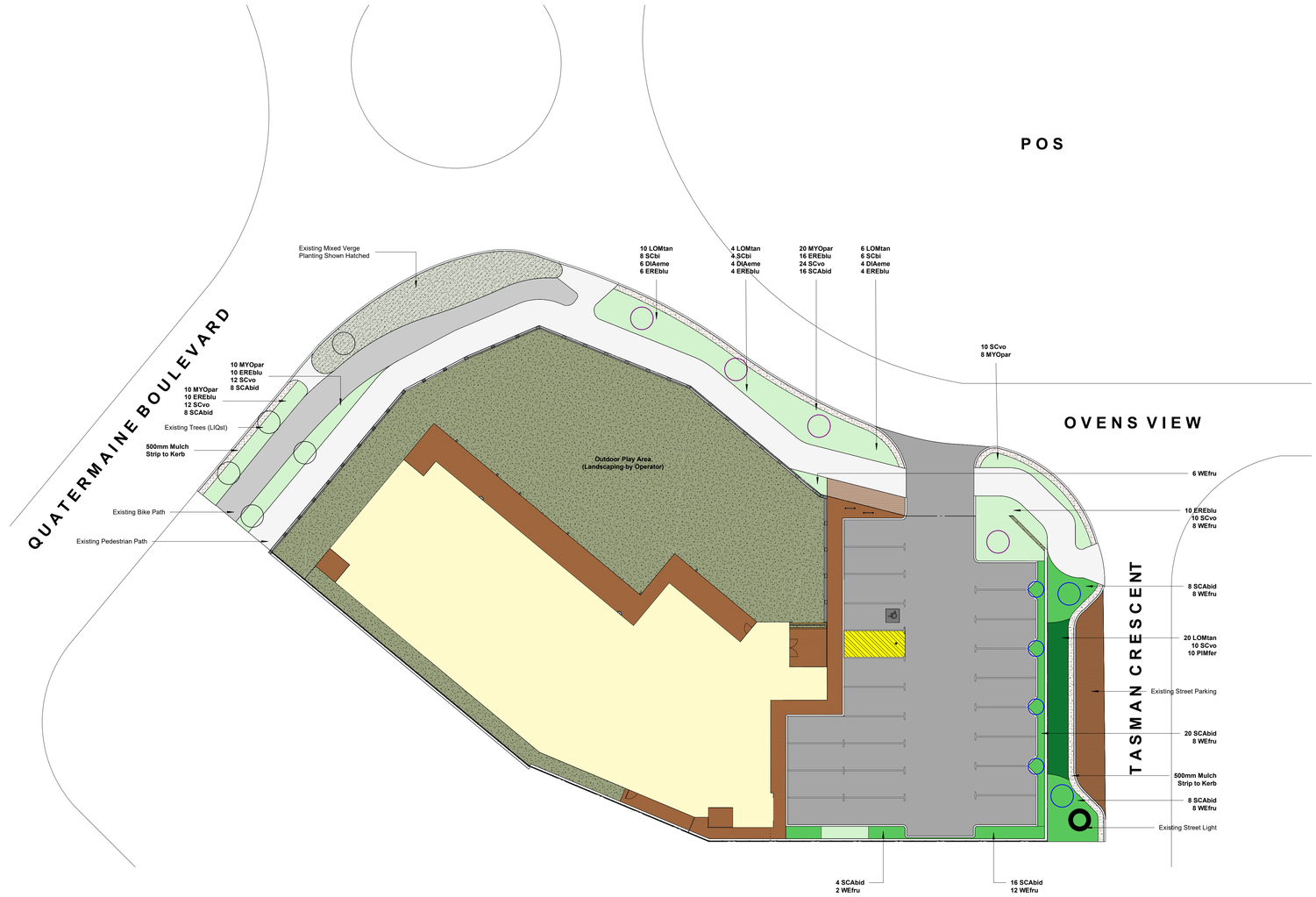

LANDSCAPING PLAN

SCALE: 1 : 200

PLANTING LEGEND

Symbol	Species
	MELALEUCA LEUCADENDRA
	EUCALYPTUS SPATHULATA
	EXISTING VERGE TREES
	PLANTING TYPE 1: NATIVE GROUND COVER
	PLANTING TYPE 2: SHRUBS
	PLANTING TYPE 3: NATIVE GRASSES / GROUNDCOVERS
	BITUMEN
	BRICK PAVING
	MULCH
	EXISTING VERGE PLANTING

PLANTING IMAGES


SCAbid


LOMtan


MYOpar


EUspa


EREblu


SCvo


LOMcon


WEfru


DIAeme


PIMfer


LIQst


MELeu

PLANTING SCHEDULE

Symbol	Species	Common Name	Quantities	Size
LIQst	Liquidambar styraciflua rotundiloba	Liquid Amber	Existing	
MELeu	Melaleuca leucadendra	Weeping Paperbark	4	100L
EUspa	Eucalyptus spathulata	Swamp Mallet	6	90L
Shrubs & Groundcovers				
SCvo	Scaevola	Purple Fusion	78	130mm
WEfru	Westringia fruticosa	Low Horizon	52	130mm
DIAeme	Dianella tasmanica	Emerald Arch	14	140mm
EREblu	Eremophila Blue Horizon	Emu Bush	50	140mm
SCAbid	Scaevola albida	Mauve Clusters	76	130mm
LOMtan	Lomandra	Tanika	40	200mm
SCbi	Scleranthus biflorus	Cushion Bush	14	200mm
MYOpar	Myoporum parvifolium	Yareena	48	140mm
PIMfer	Pimelea ferruginea	Pink Rice Flower	10	140mm

PRELIMINARY

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PROPOSED CHILDCARE DEVELOPMENT

LOCATION : LOT 541 BOULEVARD RD, APSLEY

FOR : QUBE PROPERTY

0 2 4 6 8 10 20

DATE: MAY 2024
REVISION: SK010
SHEET: 1003
SCALE: As indicated@B1

PROJECT NUMBER
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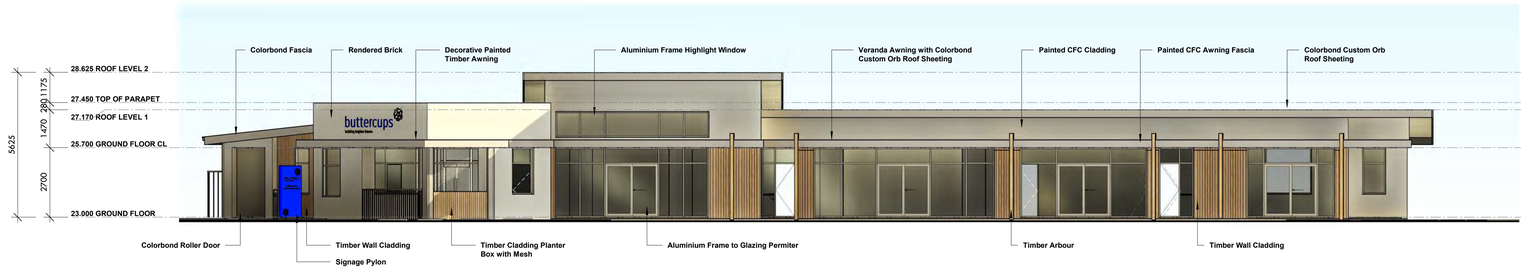
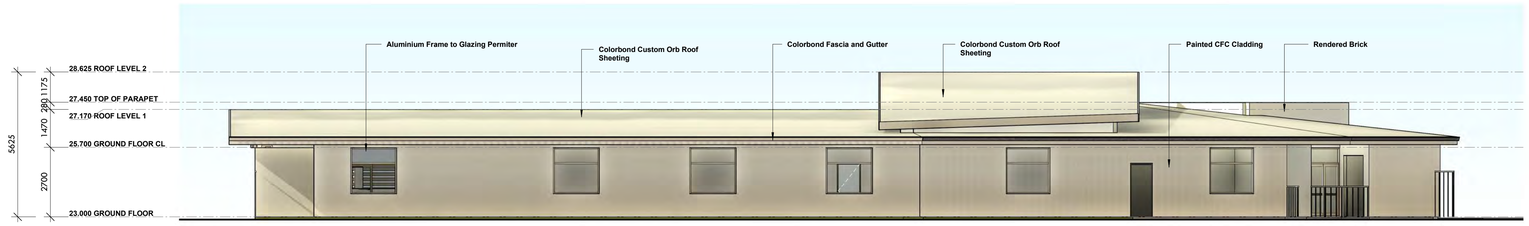


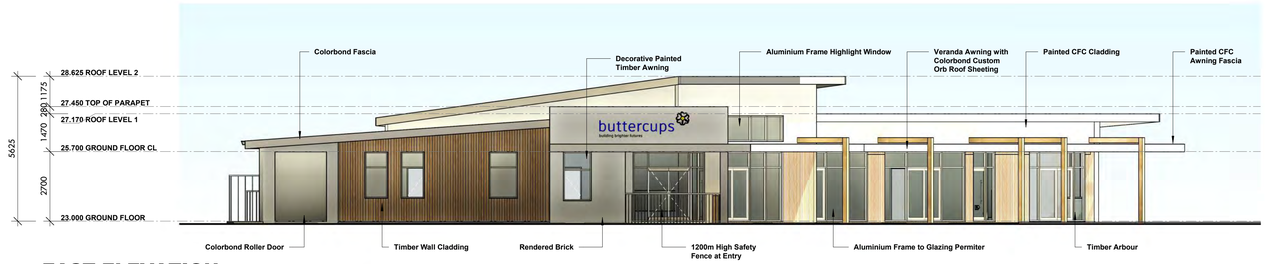
NORTH EAST ELEVATION

SCALE: 1 : 100



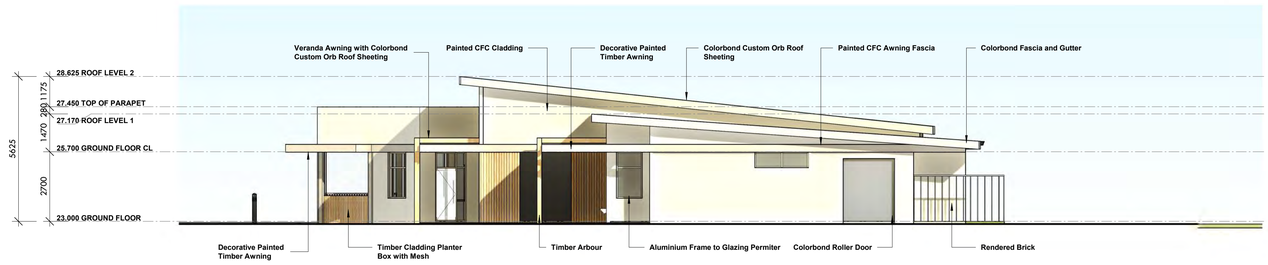
SOUTH WEST ELEVATION

SCALE: 1 : 100



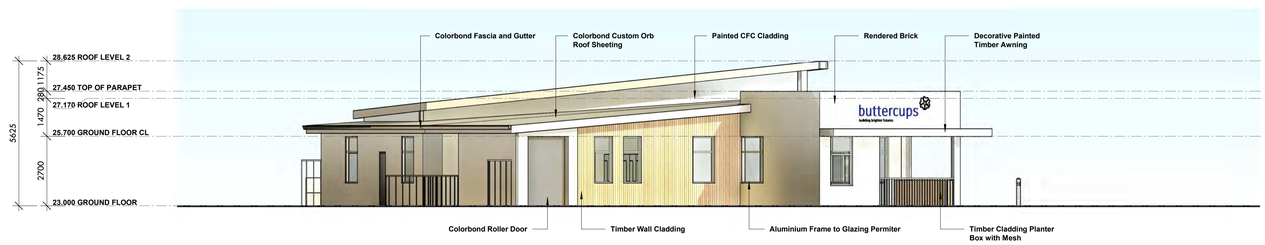
EAST ELEVATION

SCALE: 1 : 100



NORTH WEST ELEVATION

SCALE: 1 : 100



SOUTH EAST ELEVATION

SCALE: 1 : 100

EXTERNAL FINISHES

EXTERNAL RENDERED / PAINTED WALLS
COLOUR: DULUX HOG BRISTLE

EXTERNAL TIMBER CLADDING

MASONRY & COLORBOND FENCING
COLOUR: DULUX HOG BRISTLE

FENCING INFILL & TIMBER LATTICE
COLOUR: COLORBOND EVENING HAZE

CUSTOM-ORB ROOF SHEETING
COLOUR: COLORBOND SURFMIST

PERIMETER FENCING, GATES, FASCIAS, DOWNPIPES & GUTTERS
COLOUR: COLORBOND DUNE

POWDERCOAT WINDOW FRAMES
COLOUR: COLORBOND EVENING HAZE

PRELIMINARY

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PROPOSED CHILDCARE DEVELOPMENT

LOCATION : LOT 541 BOULEVARD RD, APSLEY

FOR : QUBE PROPERTY

0 1 2 3 4 5 10

DATE: MAY 2024
REVISION: SK010
SHEET: 2000
SCALE: As indicated@B1

PROJECT NUMBER
8923

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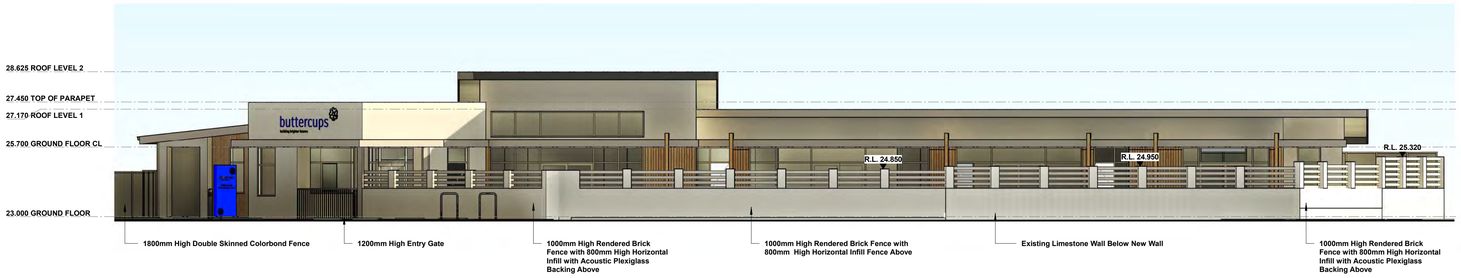
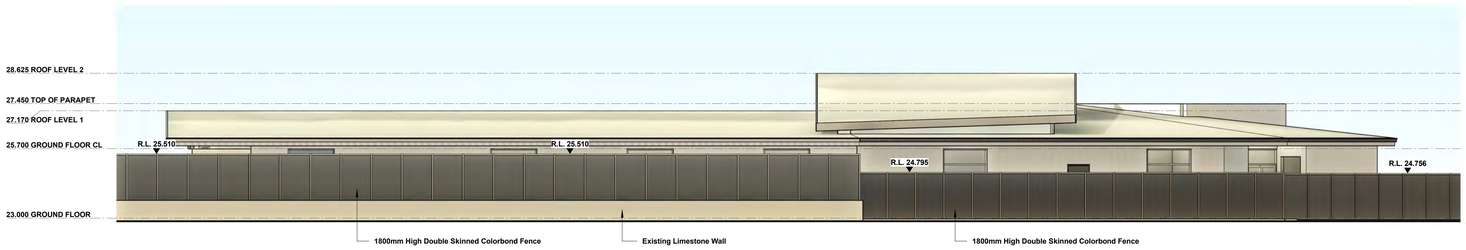


NORTH EAST FENCE ELEVATION

SCALE: 1 : 100

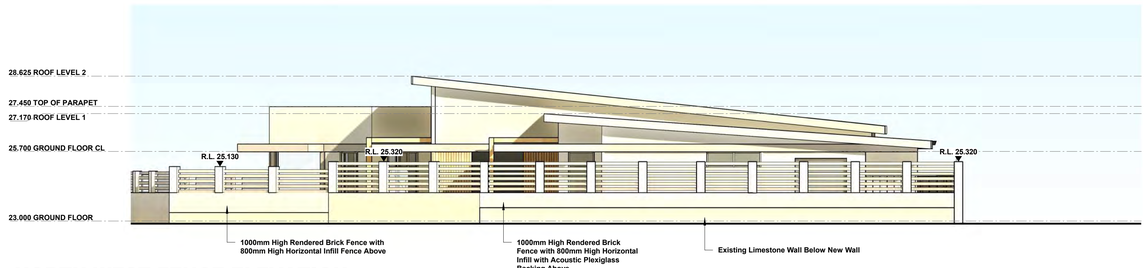


SOUTH WEST FENCE ELEVATION

SCALE: 1 : 100

EAST FENCE ELEVATION

SCALE: 1 : 100



NORTH WEST FENCE ELEVATION

SCALE: 1 : 100

SOUTH EAST FENCE ELEVATION

SCALE: 1 : 100

EXTERNAL FINISHES

EXTERNAL RENDERED / PAINTED WALLS
COLOUR: DULUX HOG BRISTLE

EXTERNAL TIMBER CLADDING

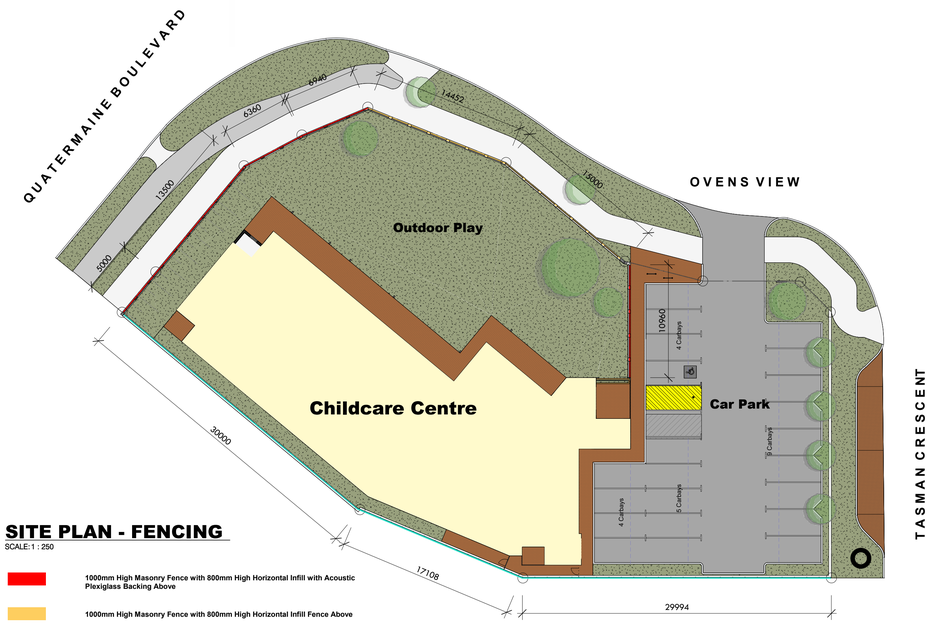
MASONRY & COLORBOND FENCING
COLOUR: DULUX HOG BRISTLE

FENCING INFILL & TIMBER LATTICE
COLOUR: COLORBOND EVENING HAZE

CUSTOM-ORB ROOF SHEETING
COLOUR: COLORBOND SURFMIST

PERIMETER FENCING, GATES, FASCIAS, DOWNPIPES & GUTTERS
COLOUR: COLORBOND DUNE

POWDERCOAT WINDOW FRAMES
COLOUR: COLORBOND EVENING HAZE



SITE PLAN - FENCING

SCALE:1 : 250

1000mm High Masonry Fence with 800mm High Horizontal Infill with Acoustic Plexiglass Backing Above

1000mm High Masonry Fence with 800mm High Horizontal Infill Fence Above

1800mm High Double Skinned Colorbond Fence

PRELIMINARY

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PROPOSED CHILDCARE DEVELOPMENT

LOCATION : LOT 541 BOULEVARD RD, APSLEY

FOR : QUBE PROPERTY

0 1 2 3 4 5 10

DATE: MAY 2024
REVISION: SK010
SHEET: 2001
SCALE: As indicated@A1

PROJECT NUMBER
8923

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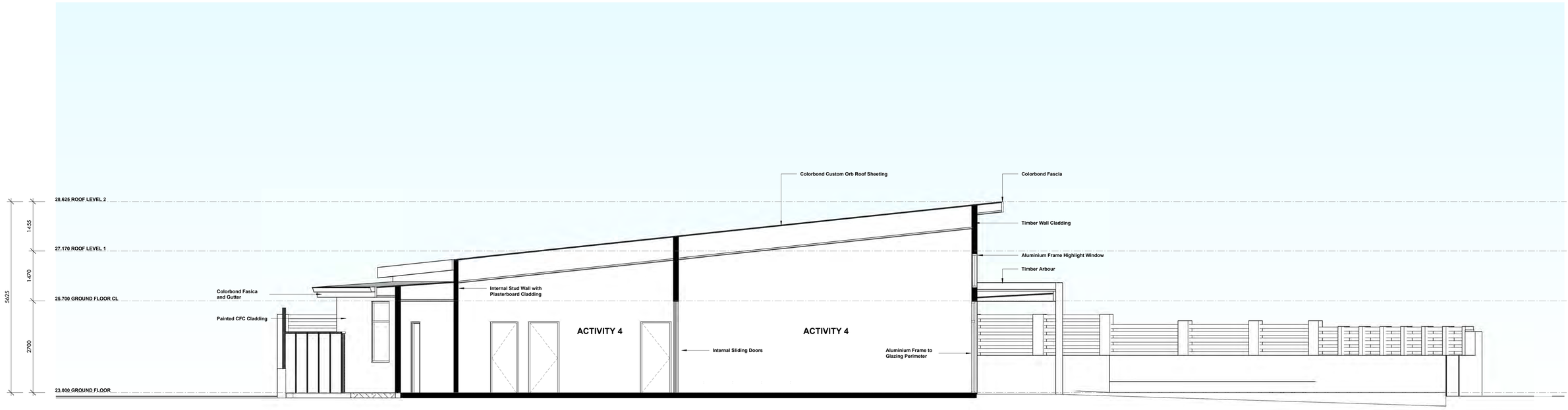

SECTION A

SCALE: 1 : 50

PRELIMINARY

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PROPOSED CHILDCARE DEVELOPMENT

LOCATION : LOT 541 BOULEVARD RD, APSLEY

FOR : QUBE PROPERTY

DATE: MAY 2024

REVISION: SK010

SHEET: 3000

SCALE: 1 : 50 @A1

PROJECT NUMBER **8923**

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PERSPECTIVE 1
SCALE:

PERSPECTIVE 2

PERSPECTIVE 3
SCALE:

PERSPECTIVE 4

PERSPECTIVE 5
SCALE:

PRELIMINARY

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PROPOSED CHILDCARE DEVELOPMENT

LOCATION : LOT 541 BOULEVARD RD, APSLEY

FOR : QUBE PROPERTY

DATE: MAY 2024
REVISION: SK010
SHEET: 4000
SCALE: @A1

PROJECT NUMBER
8923

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SCHEDULE OF SUBMISSIONS

DA10844 - Child Care Centre - Lot 541 (2) Ovens View MANDOGALUP

No.	Affected Property	Submission / Summary	Assessing Officer's Comments
1.	Tasman Crescent, Mandogalup	**Objection** The proposed 96 child daycare centre threatens to cause high traffic flow & potential noise pollution during peak hours of the day. The congested traffic area is already minimal and having a 96 child daycare potentially means 96 additional cars or foot traffic to the small area. The proposed hours of 6:30am - 6:30pm also does not allow a lull period in terms of daycare operations. Personally I believe the area & location will struggle with a 96 child daycare and surrounding neighbours will in time be disgruntled by the excess noise and traffic, a more suitable amount would be to not exceed 50 kids. Further safety concerns is the one way in and one way out of Mandogalup which having additional 96 kids located in a congested area may be a high risk in an event of bush fires etc. The idea of 96 concerned parents rushing to the aid of their kids during an emergency spells disaster as the current infrastructure does not allow for safe egress from the venue.	Officer's Comments: • Traffic & Parking - The City accepts that the local road network can accommodate the estimated additional traffic generated by the development. It is considered potential off-site parking impacts can be managed though the implementation of a Parking Management Plan. • Noise - The City accepts the noise mitigation measures in the applicant's Environmental Noise Assessment, including barrier fencing and limits on the time of children playing outside. • Bushfire - The site meets the requirements of the *Guidelines for Planning in Bushfire Prone Areas* for two access routes via the Ovens View to Hoffman Road emergency accessway. An Emergency Evacuation Plan is required in accordance with the *Guidelines*.
2.	Quartermaine Boulevard, Mandogalup	**Objection** Good Afternoon, requesting the fence line adjacent to property 125 Quartermaine Boulevard to be a no play zone. Thank you kindly.	Officer's Comments: The City accepts that the Centre can be approved subject to the noise mitigation measures in the applicant's Environmental Noise Assessment, including barrier fencing and limits on the time of children playing outside.

3.	Quartermaine Boulevard, Mandogalup	**No objection / Comments** No issue with the child care facility, however Please consider the below suggestions: 1) speed humps around the vicinity or extend the school zone speed limit 2) adequately sized pickup area / car park for the child care centre (no road parking allowed) 3) perimeter cctv 4) additional street lighting.	Officer's Comments: 1) Local area traffic management devices already exist in proximity to the site. The roundabout and road geometry will also be speed calming. The City does not consider that further traffic management is needed in the local road network. School zones are limited to the road frontage to school sites as required by Main Roads WA. 2) The City accepts that potential off-site parking impacts can be managed though the implementation of a Parking Management Plan. 3) The applicant has confirmed that CCTV will be considered at detailed design stage. 4) The Centre will not operate at night.
4.	Tasman Crescent, Mandogalup	**No objection / Comments** What type of parking will there be? What are the ages? Will it be play-based, nature, Reggio Emilia? When will it be opened etc?	Officer's Comments: • 22 onsite parking bays are proposed. The City accepts that acceptable noise levels can be managed though the implementation of an approved Environmental Noise Assessment. • Age ranges are 0 - 3+ years. • Approach to education is at the discretion of the operator and is not a planning consideration. • Operating times are M-F 6:30am-6:30pm.
5.	Tasman Crescent, Mandogalup	**No Objection** Very much needed by the local community. Lots of young families in the estate. Plenty of street parking locally.	Noted
6.	Howitt Way, Mandogalup	**No Objection** I am fully in support of this proposal. I do not currently have children of my own however will in the near future. The Apsley community is incredibly family focused and having a child care centre so local is a huge opportunity. Reducing the need for vehicle usage as it is in walking distance for many families, creating a real sense of	Noted

		community with local families and establishing healthier lifestyles with the ability to walk to and from the centre. Proposed location is well considered and will benefit the community.	
7.	Windich Road Mandogalup	**No Objection** I would only like to say we need childcare as soon as possible. Due to increasing numbers of residents. Thanks for the good work.	Noted
8.	Warburton Street, Mandogalup	**No Objection** A childcare situated inside the estate is one of the good proposed project of the estate as a lot of families will benefit to it, including us. We are excited to see it completed.	Noted
9.	Ovens View, Mandogalup	**No Objection** My partner and I are currently building in Florence on Ovens View. We are looking to start a family in the future and the early childcare centre would be a great help. Being only a short distance from home it will allow us to continue working from home when necessary. This was definitely one of the key reasons we chose to move to the area.	Noted
10.	Tasman Cresent Mandogalup	**No Objection** I am happy with the proposed childcare centre idea.	Noted
11.	Quartermaine Boulevard, Mandogalup	**No Objection** The childcare centre is a much needed facility in the area.	Noted
12.	Quartermaine Boulevard, Mandogalup	**No Objection** Would love to see a childcare here. Currently pregnant expecting twins, so this has come at the right time.	Noted

13.	Tasman Crescent, Mandogalup	**No Objection** It's welcome in Apsley. Will help young families and over a longer term women in their jobs if this centre can care for their children.	Noted

Engineering a better future for over 20 years!

Proposed Childcare Centre

Lot 541 (2) Ovens View, Apsley

Transport Impact Statement

PREPARED FOR:
Qube Property

February 2024

Document history and status

Author	Revision	Approved by	Date approved	Revision type
Roger Bajwa	r01	R White	25/07/2023	Draft
Roger Bajwa	r01a	R White	31/10/2023	Final
Vladimir Baltic	r02	R White	24/01/2024	1st Revision
Vladimir Baltic	r02a	B Bordbar	1/02/2024	2nd Revision
Vladimir Baltic	r02b	B Bordbar	6/02/2024	3rd Revision
Vladimir Baltic	r02c	B Bordbar	7/02/2024	4th Revision
Roger Bajwa	r02d	B Bordbar	8/02/2024	5th Revision

File name: t23.093.rb.r02d

Author: Roger Bajwa

Project manager: Behnam Bordbar

Client: Qube Property

Project: Lot 541 (2) Ovens View, Apsley

Document revision: r02d

Project number: t23.093

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1 Introduction

This Transport Impact Statement (TIS) has been prepared by Transcore on behalf of Qube Property with regard to a proposed childcare centre to be located at Lot 541 (2) Ovens View, Apsley in the City of Kwinana.

The subject site is located at the southeast corner of the Quartermaine Boulevard/ Ainsworth Crescent/Ovens View roundabout and is currently vacant. It is bound by Ovens View to the north, Tasman Crescent to the east, Quartermaine Boulevard to the west and future residential developments to the south, as shown in **Figure 1**.

Figure 1: Location of the subject site

The Transport Impact Assessment Guidelines (WAPC, Vol 4 – Individual Developments, August 2016) state: *"A Transport Impact Statement is required for those developments that would be likely to generate moderate volumes of traffic*[1] *and therefore would have a moderate overall impact on the surrounding land uses and transport networks"*.

Section 6 of Transcore's report provides details of the estimated trip generation for the proposed development. Accordingly, as the total peak hour vehicular trips are

[1] *Between 10 and 100 vehicular trips per hour*

estimated to be less than 100 trips, a Transport Impact Statement is deemed appropriate for this development.

Key issues that will be addressed in this report include the traffic generation and distribution of the proposed development, access and egress movement patterns and parking demand and supply.

2 Development Proposal

The Development Application (DA) for the subject site proposes the development of a childcare centre (GFA 645m^2) with an associated car park in the City of Kwinana. This childcare centre is proposed to accommodate up to 96 children and approximately 19 full-time and four part-time staff members.

According to the development plan provided in **Appendix A**, a total of 22 on-site parking bays, including one ACROD bay are proposed to address the parking demand of the proposed childcare centre. These bays comprise four pairs of tandem bays and 14 single bays. Additionally, a turnaround bay at the end of the car park aisle is also proposed to secure efficient vehicular circulation within the site.

A bin storage area is provided at the southeastern corner of the childcare building and immediately adjacent to the car park area. Waste collection and deliveries will be accommodated from within the site. It is proposed that servicing be conducted outside of the operating hours of the childcare centre.

Vehicular access to the subject site is proposed via a single, full-movement crossover on Ovens View. Pedestrian access to the proposed development is available via the existing external footpaths which are in place on Ovens View and Quartermaine Boulevard.

3 Vehicle Access and Parking

3.1 Access

As part of the development proposal, a 6.0m wide, full-movement crossover on Ovens View is proposed to serve the proposed childcare centre as illustrated in **Figure 2**.

Figure 2: Proposed development crossover

The crossover is positioned at the far east end of the site in order to achieve the maximum separation to the adjacent Quartermaine Boulevard/Ainsworth Crescent/ Ovens View roundabout intersection.

3.2 Parking Demand and Supply

It is noted that the City's local planning framework does not provide a parking rate for the Childcare Centre as a land use. Thus, in line with previous childcare centres projects undertaken in the City of Kwinana, the following parking rate is used as a general guide for the proposed childcare centre:

- 1 space for each staff member; plus,
- 1 bay per 10 children.

The childcare centre is proposed to accommodate up to 96 children cared for by 19 full-time and four part-time staff. Accordingly, the above general guidance suggests that a 29 bays should be provided for the proposed CCC. However this 'on paper' calculation does not consider the practical usage of parking bays by visitors or staff, which actually reduces peak parking requirement and balances out parking demand profile throughout the day. This would result in a lower partical parking demand.

The proposed development provides for a total of 22 on-site bays (inclusive of one ACROD bay), with an additional six public parking bays available within the 50m walking distance of the facility, resulting in 28 bays being potentially available to the facility. The parking supply and demand of the subject childcare centre are further discussed in the following section of the report.

3.3 Estimated Actual Parking Demand Based on Trip Generation

Transcore has undertaken a parking analysis based on the anticipated peak hour traffic generation of the proposed childcare centre to estimate the actual/practical peak parking demand of the centre.

Section 6.1 of this report details the anticipated peak hour traffic generation of the proposed childcare centre. It is established that the calculated morning peak hour trip generation of the proposed childcare centre is 48 vehicles in and 36 vehicles out of the car park (aftrenoon peak hour is estimated to generate fewer trips).

This represents up to potentially 48 vehicles using the childcare centre car park during the peak hour.

The NSW *"Guide to Traffic Generating Developments"* section on childcare centres provides commentary on childcare centre mode share, parking utilisation and parking length of stay. It should be noted that the commentary provided in the NSW guide is based on surveys of actual parking activity undertaken in New South Wales. The NSW guide indicates the highest parking demand of 0.23 cars per child (which represents a parking requirement of 22 bays for the proposed childcare centre) and the average recorded length of stay for all surveyed childcare centres of 6.8 minutes.

Conservatively assuming that the length of stay for pick-up/drop-off parking at the proposed childcare centre is 10 minutes, it is calculated that each parking bay can accommodate a turnover of up to 6 vehicles per hour.

It is therefore established that at least 8 bays (48/6 = 8 bays) should be reserved for pick-up and drop-off activities during peak hour periods.

3.3.1 Childcare Centre Staff Bays

It is proposed that CCC operations will be managed by 19 staff comprising 18 permanent "room-ratio" staff + centre manager. As advised by the CCC operator, the number of staff will fluctuate throughout the typical weekday in accordance with the children's attendance rate. In addition, a total of four additional "float" or part-time staff (three float staff + one cook) will attent the site on "as needed" basis, typically outside of peak operating times to assist during lunch breaks, shift changeover, etc. The staff scheduling is indicatively envisaged to occur as outlined in **Table 1**.

Table 1: Staff schedule

Time periods	FTE staff rostered	Float/Part-time staff
@ 6:30AM (Opening)	2	-
6:30AM – 7:00AM	4	-
7:00AM – 8:00AM	8	Cook
8:00AM – 9:00AM (peak drop-off)	**12**	**Cook**
9:00AM – 10:00AM	16	3 + Cook
10:00AM – 2:30PM	19	3 + Cook
2:30PM – 4:00PM	13	3
4:00PM – 5:00PM (peak pick-up)	**12**	**-**
5:00PM – 6:00PM	8	-
6:00PM – 6:30PM	4	-
@ 6:30PM	2	-

As can be seen, although there will be a total of up to 19 full-time staff attending the CCC between 10:00AM-2:30PM, a maximum of 12 staff members are required during the peak drop-off period (8:00AM–9:00AM) in the morning and a maximum of 12 staff members are required during the peak pick-up period in the afternoon (4:00PM–5:00PM). The staff will be at full capacity at the site only between 10:00AM – 2:30PM. During this time period, staff can utilise the visitor bays for parking which will be significantly underutilised during this period.

Accordingly, the estimated actual demand for staff parking bays during the peak drop-off/pick-up period of the centre is 12 bays. Thus, the maximum estimated actual peak hour parking demand of the proposed childcare centre is 20 bays (12 staff bays + 8 visitor bays during the peak peak drop-off/pick-up periods).

The proposed development provides a total of 22 bays (with potential additional six public bays in vicinity), which exceeds the estimated actual parking demand for the proposed childcare centre.

In addition to on-site parking, two on-street bays are in place on Tasman Crescent immediately adjacent to the site with additional four on-street bays on Ovens View, a short distance east of the site. These six public on-street bays could also be used for drop-off/pick-up activities and could be subject to a 15min time limit during the centre's peak drop-off and pick-up periods to ensure quick turnover.

Moreover, it also should be noted that:

- Some patrons of the childcare centre are likely to come from the local residential catchment and as such parents may walk their children to/from the childcare centre reducing the demand for on-site parking;
- Some of the childcare staff are expected to use public transport (as it becomes available with continued development of the locality), cycle, walk, ride-share or be dropped-off at the centre;
- The CCC operator will support local employment and would ensure proper consideration is given to local job applicants where possible over those residing further away from the CCC to further alleviate the demand on staff parking; and,
- The CCC operator will also encourage car-pooling as additional means of parking demand reduction strategy.

The distribution of existing childcare centres within wider locality suggests high likelihood of subject centre predominantly serving the residential zone within the immediate/close proximity to the centre. This would result in increased likelihood of local employment and potential higher-than-average proportion of staff and visitors walking to the centre. Such a situation would effectively reduce the demand for on-site parking.

For the reasons outlined above, it is considered that sufficient parking has been proposed on-site to address the actual parking demand of the proposed childcare centre.

4 Provision for Service Vehicles

A bin storage area is located at the southwest corner of the carpark as shown in the development plan in **Appendix A**.

Waste collection and deliveries will take place within the site. A private contractor will collect waste using an 8.8m service vehicle. The waste collection truck will be able to enter the site via the proposed full movement crossover on Ovens View in forward gear, park in a suitable position adjacent to the bin store for rubbish collection and then exit the site via the same crossover in forward gear. It is proposed that servicing be conducted outside of the operating hours of the proposed childcare centre so that the entire car park area is available for service vehicle manoeuvring.

It is expected that the childcare centre will generate a small volume of additional service vehicle traffic primarily associated with the deliveries for the childcare centre. It is recommended that smaller vehicles such as vans or trucks up to a size of 8.8m should be used for deliveries.

Turn path analysis is undertaken for an 8.8m service vehicle and included in **Appendix B** shows satisfactory access, egress, and circulation within the site.

5 Hours of Operation

The proposed childcare centre is proposed to operate during weekdays between 6:30AM and 6:30 PM from Monday to Friday.

6 Daily Traffic Volumes and Vehicle Types

6.1 Proposed Development Trip Generation

In order to establish an accurate traffic generation rate for the proposed childcare centre, traffic count surveys undertaken by Transcore at similar centres in the Perth metropolitan area during 2022 and 2023 were sourced.

Discussions with the respective centre managers revealed that the peak drop-offs and pick-ups for these centres occur between the hours of 7:30AM – 9:30AM and 3:00PM – 5:00PM.

From the total number of children at each of the centres on the surveyed days, the following average generation rates were established for the morning and afternoon surveyed periods:

- 7:30AM–9:30AM: 1.25 trips per child (57% in / 43% out); and,
- 3:00PM–5:00PM: 1.10 trips per child (49% in / 51% out).

From this information, the traffic generation rate for the combined period of 07:30AM–09:30AM and 3:00PM–05:00PM was calculated as 2.36 trips per child. To convert this figure to a daily generation rate, this figure was increased to 3.5 trips per child to account for any trips outside of the surveyed times. It was assumed that the daily in and out split for vehicle trips was 50/50.

Furthermore, the following peak hour generation rates were established from the surveys for the Child Care Centres:

- AM peak hour: 8:00AM – 9:00AM: 0.87 trips per child (57% in / 43% out); and,
- PM peak hour: 4:00PM – 5:00PM: 0.71 trips per child (47% in/ 53% out).

Accordingly, the following number of trips were estimated for the proposed childcare centre, assuming a maximum scenario of 96 children and 16 staff being present (i.e., centre at full capacity):

- AM peak hour: **84** trips generated (48 in / 36 out); and,
- PM peak hour: **68** trips generated (32 in / 36 out); and,
- Daily traffic generation: **336** trips generated (168 in / 168 out).

6.2 Traffic Flow

Based on the general spatial distribution of existing residential developments in the immediate area and the permeability of the local road network, the childcare centre's traffic distribution adopted for this analysis is as follows:

- 85% to/from the north on Quartermaine Boulevard;
- 10% to/from the south on Quartermaine Boulevard; and,
- 5% to/from the east on Ovens View.

Figure 3 illustrates trip generation and traffic distribution over the local road network for the proposed childcare centre.

Figure 3: Estimated traffic movements for the subject site - AM peak hour/PM peak hour/total daily trips

As the residential subdivision in the Mandogalup area continues to be developed in the future, the traffic distribution will progressively change with a higher proportion of traffic from the areas to the south and less from the north; however, the estimated traffic distribution at the childcare centre driveway is not expected to change significantly.

6.3 Impact on Surrounding Roads

The WAPC Transport Impact Assessment Guidelines (2016) provides guidance on the assessment of traffic impacts:

"As a general guide, an increase in traffic of less than 10 per cent of capacity would not normally be likely to have a material impact on any particular section of road but increases over 10 per cent may. All sections of road with an increase greater than 10 per cent of capacity should therefore be included in the analysis. For ease of assessment, an increase of 100 vehicles per hour for any lane can be considered as equating to around 10 per cent of capacity. Therefore, any section of road where development traffic would increase flows by more than 100 vehicles per hour for any lane should be included in the analysis."

It is clear that the traffic increase from the proposed childcare centre would be significantly less than the critical threshold (100vph per lane). As detailed in **Section 6.2**, the proposed development will not increase traffic on any lanes on the surrounding road network by more than 100vph, therefore the impact of the development traffic on the surrounding road network will not be significant.

7 Traffic Management on the Frontage Streets

Quartermaine Boulevard, west of the subject site, is constructed as a 10.5m wide, two-lane divided road with approximately 3.5m solid median as shown in **Figure 4**. Quartermaine Boulevard is classified as an *Access Road* in the Main Roads WA *Functional Road Hierarchy* and operates under the default built-up area speed limit of 50km/h. Quartermaine Boulevard forms a roundabout intersection with Ovens View/ Ainsworth Crescent.

Figure 4. Southbound view along Qurtermaine Boulevard

Ovens View, north of the subject site, is constructed as a 6m wide single carriageway road as shown in **Figure 5**. Ovens View is classified as an *Access Road* in the Main Roads WA *Functional Road Hierarchy* and operates under the default built-up area speed limit of 50km/h.

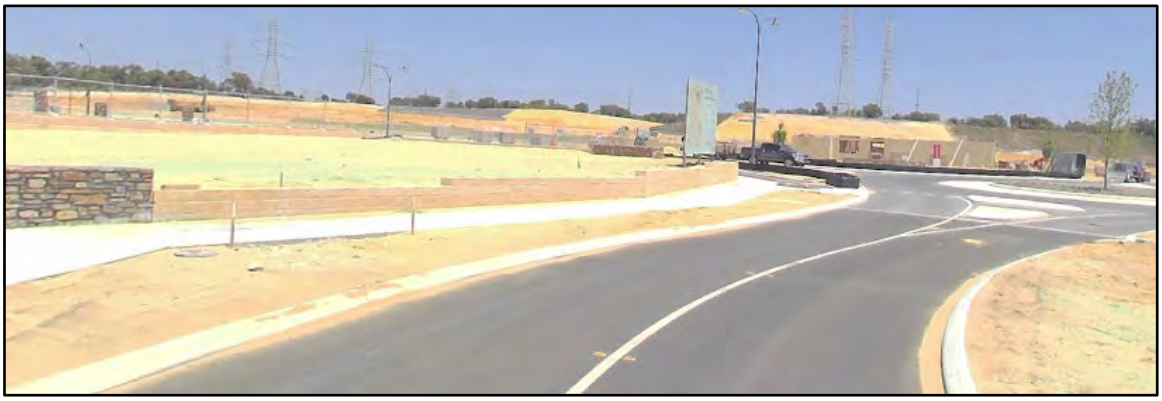

Figure 5. Westbound view along Ovens View

8 Public Transport Access

According to the current Transperth bus network map, the closest bus route is Transperth route 536 operating on Irvine Parade, north of the subject, as site shown in **Figure 6**. This bus route provides direct links to Aubin Grove Train Station. The nearest bus stop is located approximately 1.5km walking distance from the subject site. It is expected that the bus services will be extended further to the south as this area becomes more fully developed.

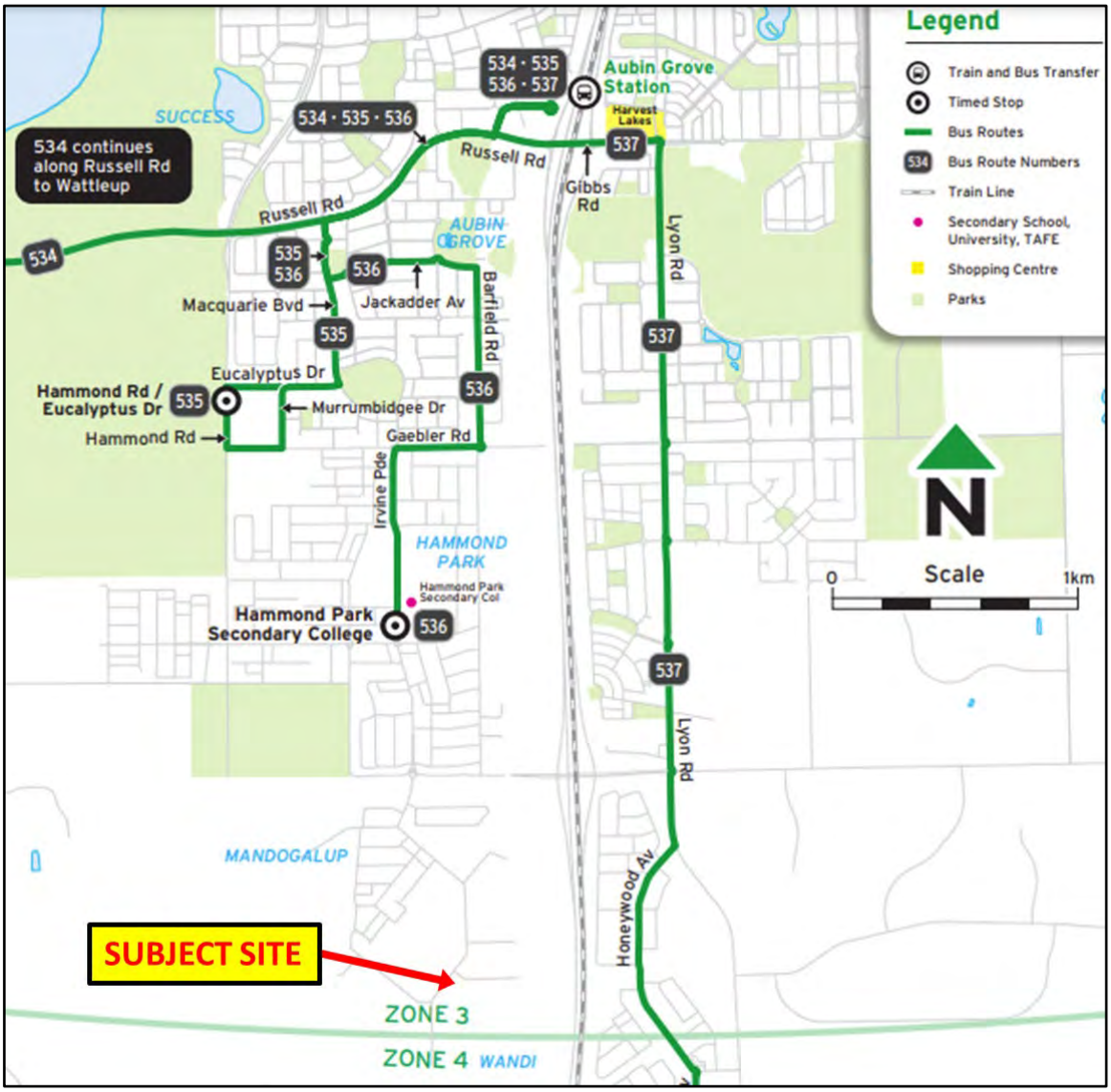

Figure 6: Public transport services (Transperth Maps)

9 Pedestrian Access

Pedestrian access to the proposed development is available via the existing external footpaths along Quartermaine Boulevard, Ovens View and Tasman Crescent which form part of the wider path network in this locality.

Pedestrian crossing facilities, including drop kerbs, are available at the 'T' intersection of Ovens View/Tasman Crescent and the roundabout intersection of Quartermaine Boulevard/Ovens View/Ainsworth Crescent.

10 Cycle Access

The Department of Transport Bike Maps shows the existing *"Principal Shared Path"* along the western side of Kwinana Freeway. Unfortunately, due to subject locality being developed only recently, the existing bike maps do not cover the immediate locality.

Current aerial photography confirms that a similar, *High Quality Shared Path* is also available along the newly constructed Quartermaine Boulevard and the section of Rowley Road that connects Kwinana Freeway with Quartermaine Boulevard. The Perth Bicycle Network Map illustrated in **Figure 7** shows the cyclist connectivity in the vicinity of the subject site.

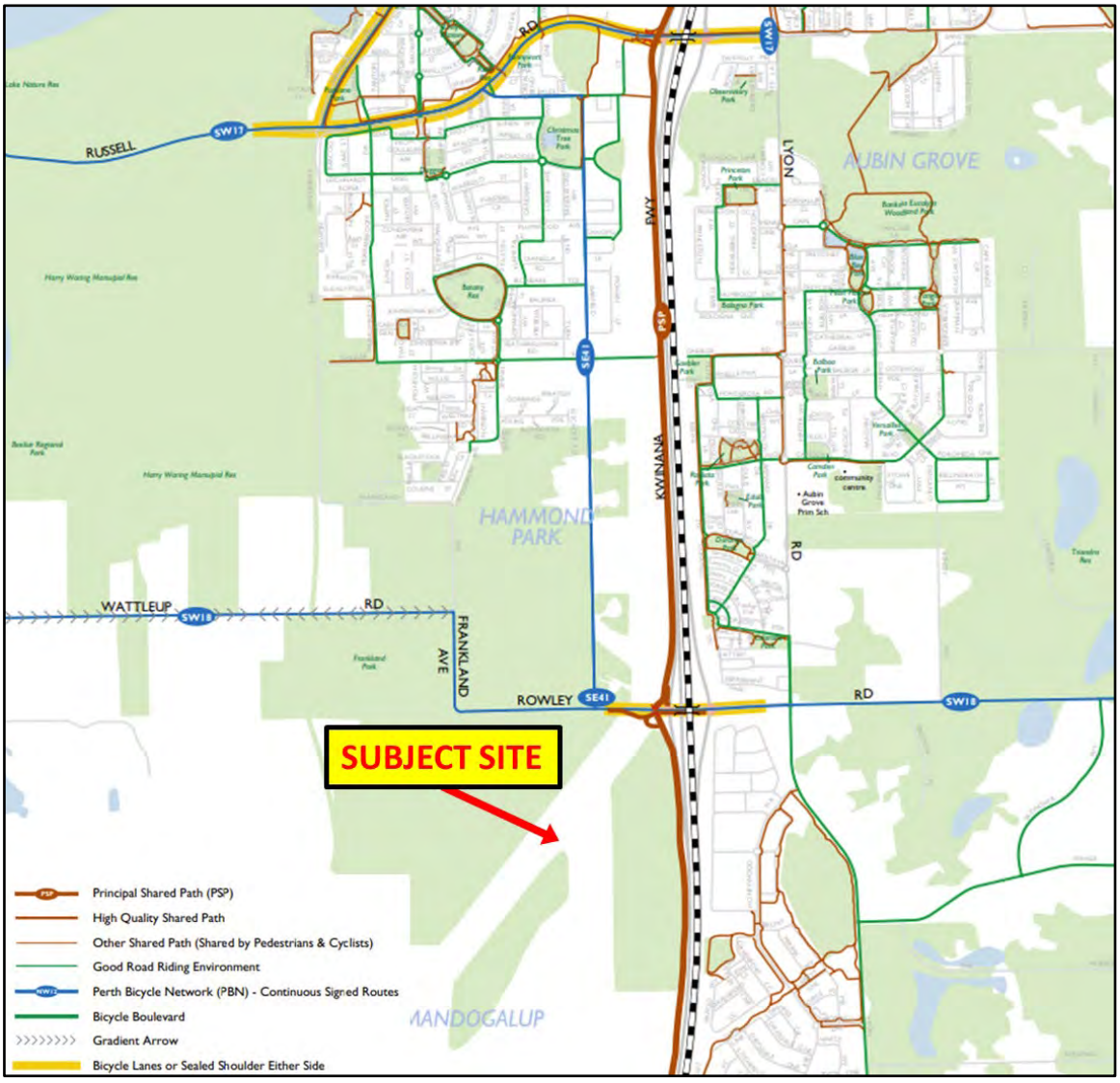

Figure 7: Extract from Perth Bicycle Network (Department of Transport)

11 Site Specific Issues

It is acknowledged that the on-site parking supply does not formally meet the statutory parking requirement for the CCC; however, the information provided in this report demonstratetes that the parking supply available to the development adequately meets the practical parking demand for the centre.

No other site-specific issues have been identified for the proposed childcare centre.

12 Safety Issues

No particular safety issues have been identified for the proposed childcare centre.

13 Conclusions

This Transport Impact Statement (TIS) has been prepared by Transcore on behalf of Qube Property with regard to a proposed childcare centre to be located at Lot 541 (2) Ovens View, Apsley, in the City of Kwinana.

The subject site is located at the southeast corner of the Quartermaine Boulevard/ Ainsworth Crescent/ Ovens View roundabout and is currently vacant land.

The Development Application (DA) for the subject site proposes the development of a childcare centre (GFA 608m^2). This childcare centre is proposed to accommodate up to 96 children and 19 staff members.

As part of the development proposal, a 6.0m wide full-movement crossover on Ovens View is proposed to serve the proposed childcare centre.

A total of 22 on-site parking bays, including one ACROD bay, are proposed to address the parking demand of the proposed childcare centre. These bays comprise four pairs of tandem bays and 14 single bays. In addition, a turnaround bay is also proposed to provide efficient vehicular circulation within the site.

Based on the estimated actual peak parking demand documented in this report, it is established that at least eight bays should be reserved for pick-up and drop-off activities and 11 car parking bays should be allocated to staff. The proposed development provides a total of 22 bays which exceeds the estimated maximum practical peak parking demand of the proposed childcare centre of 20 bays. Therefore, it is considered that sufficient parking has been provided on-site.

In addition, there are presently two on-street bays on Tasman Crescent and four on-street bays on Ovens View in the immediate proximity of the Centre. These bays could be used for drop-off/pick-up and be subject to a time limit during the peak pick-up and drop-off periods.

It is estimated that the proposed development would generate approximately **336** total daily trips with approximately **84** and **68** trips during typical weekday AM and PM peak hours, respectively. These trips include both inbound and outbound trips. Thus, the traffic generation of the proposed development is relatively low and as such the traffic operations of the road network in the vicinity of the proposed childcare centre would not be adversely impacted by the additional development traffic.

Deliveries and waste collection activities will be accommodated within the site. It is proposed that servicing will be conducted outside of the operating hours of the proposed childcare centre. Turn path analysis undertaken for an 8.8m service vehicle shows satisfactory access, egress, and circulation within the site.

The site features good connectivity via the existing road network and path network and access to the public transport service in this area is expected to be extended as this area becomes more fully developed.

No particular transport or safety issues have been identified for the proposed childcare centre development within the scope of this report.

It is concluded that the findings of this Transport Impact Statement are supportive of the proposed childcare centre development.

Appendix A

PROPOSED DEVELOPMENT PLAN

transcore

Engineering a better future for over 20 years!

GROUND FLOOR PLAN
SCALE: 1 100

PRELIMINARY

meyer shircore architects

PROPOSED CHILDCARE DEVELOPMENT

LOCATION : LOT 541 BOULEVARD RD, APSLEY
FOR : QUBE PROPERTY

DATE:	NOV 2023	PROJECT NUMBER	
REVISION:	SK009		8923
SHEET:	1001		
SCALE:	1 : 100 @B1		

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Appendix B

TURN PATH ANALYSIS

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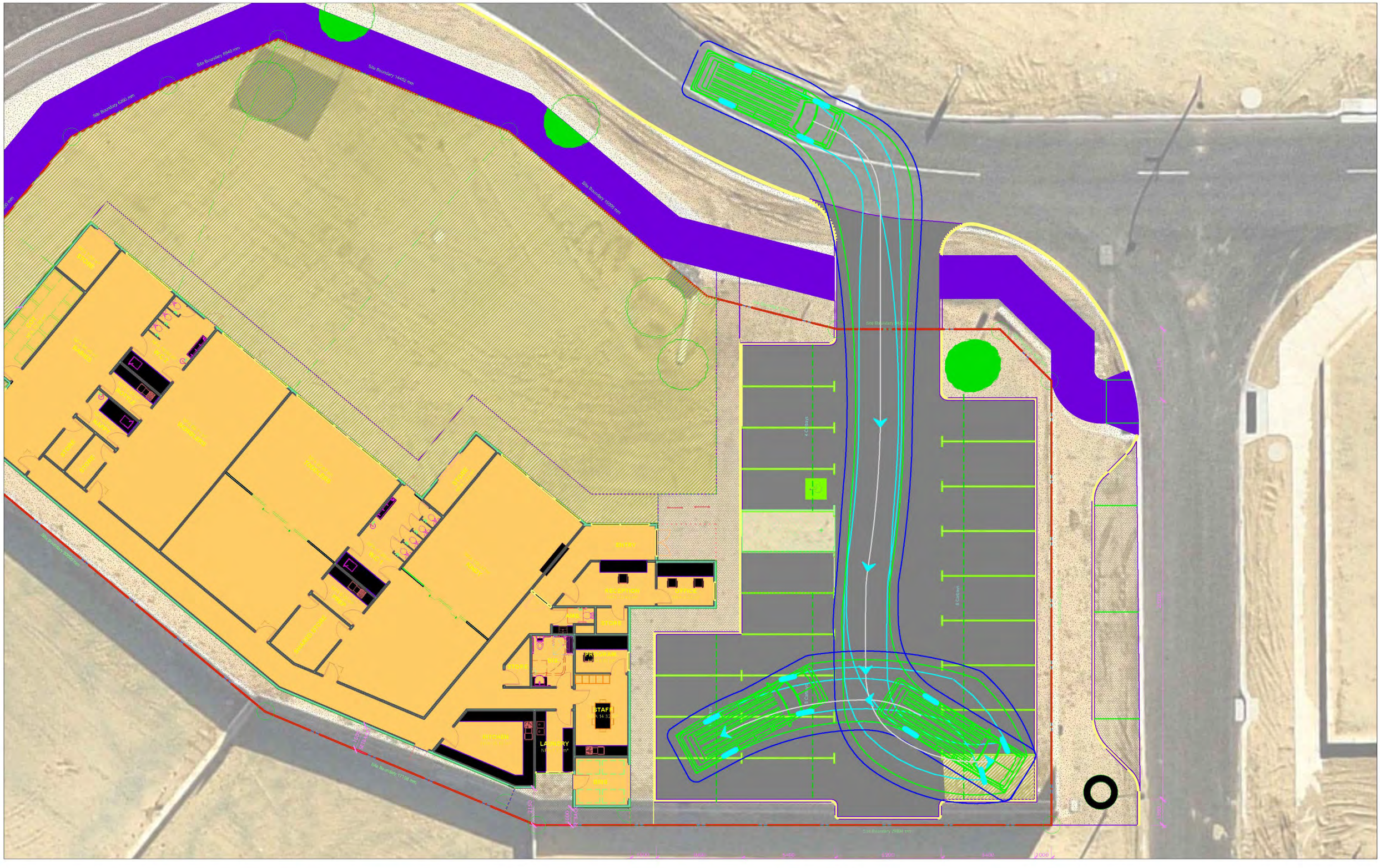


Lot 541 (2) Ovens View, Mandogalup

Austroads 2013: 8.8m Service Vehicle

Service vehicle entry

LEGEND

Vehicle Body

Wheel Path

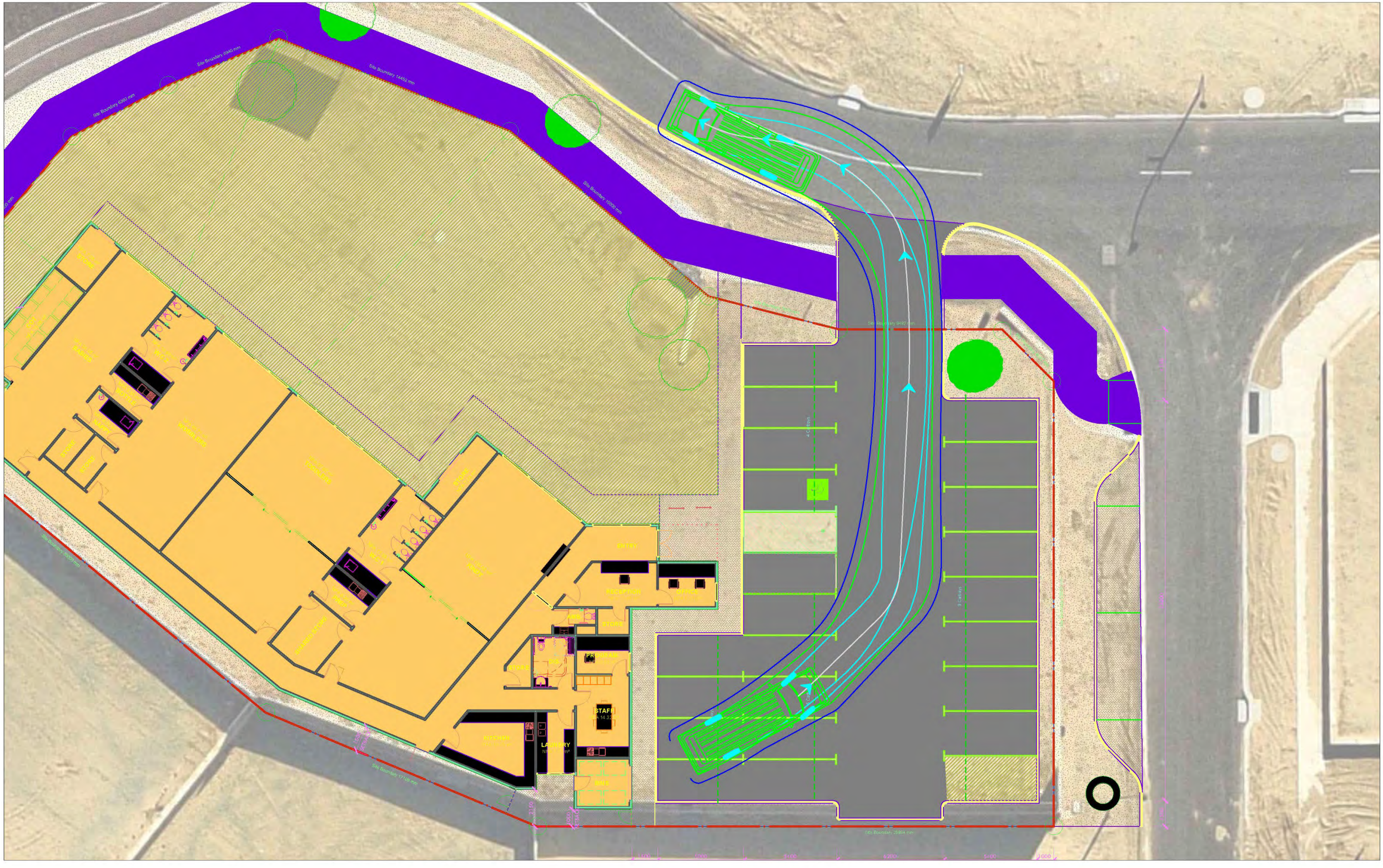
500mm Clearance

t23.093.sk01a

31/10/2023

Scale: 1:200 @ A3

transcore



Lot 541 (2) Ovens View, Mandogalup

Austroads 2013: 8.8m Service Vehicle

Service vehicle exit

LEGEND

Vehicle Body

Wheel Path

500mm Clearance

t23.093.sk02a

31/10/2023

Scale: 1:200 @ A3

transcore

Technical Note: No 1 **Date:** 7/01/2024
Project No: t23.093
Project: Proposed Childcare Centre - Apsley
Subject: Parking Management Plan

1 Introduction

Transcore has been engaged by QUBE Property to prepare a Parking Management Plan for the proposed Childcare Centre (hereafter CCC) to be located at Lot 541 (HN 2) Ovens View in Apsley, City of Kwinana. The subject site is located at the southeast corner of the Quartermaine Boulevard/ Ainsworth Crescent/Ovens View roundabout, as shown in **Figure 1**.

Figure 1: Location of subject site

2 Background

The centre is proposed to operate on weekdays between 6:30AM – 6:30PM. The proposed CCC contemplates total placement of 96 children to be catered for by 19 staff comprising, 18 "room ratio" staff and a centre manager (i.e., full-time staff), with additional four additional "float" or part-time staff (three float staff + one cook).

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Transcore Pty Ltd ACN 094 951 318 ABN 19 094 951 318
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www.linkedin.com/company/transcore/
instagram: @transcoreaustralia

The concept CCC development plans show a total of 22 on-site parking bays comprising 11 staff, eight visitor bays (inclusive of one ACROD bay) and three unallocated bays. An additional turnaround bay is provided within the car park to support efficient internal site circulation. Refer **Appendix A** for the approved development plans.

In addition to on-site parking provision, a total of two on-street bays are in place on Tasman Crescent immediately adjacent to the site with additional four on-street bays on Ovens View, a short distance east of the site. These six public on-street bays could also potentially be used for the off-site CCC parking due to proximity and convenience. Accordingly, potentially up to 28 parking bays are available to the centre throughout the day.

3 Childcare Centre Operations

It is understood that CCC operations will be managed by 19 full-time staff comprising 18 permanent "room ratio" staff and centre manager. Additional support from four part-time or "float" staff, including a cook, may be called in when required. The cook is expected to attend for half a day arriving in morning and departing after lunch. Other "float" staff will typically attend outside of peak operating times and on "as needed" basis.

As advised by the CCC operator, the number of full-time staff will typically fluctuate throughout the weekday in accordance with the children's attendance rate but is indicatively envisaged to occur as follows:

- At 6:30AM (CCC opening) – 2 staff rostered:
- 6:30AM–7:00AM – 4 staff rostered;
- 7:00AM–8:00AM – 8 staff rostered (cook arrives at 7:30AM);
- 8:00AM–9:00AM – 12 staff rostered for peak drop-offs (Manager arrives to CCC);
- 9:00AM–10:00AM – 16 staff rostered (+floating staff assisting from 9:30AM, if required);
- 10:00PM–2:30PM – 19 staff rostered -full attendance (+floating staff assisting, if required; cook departing by 1:30PM);
- 2:30PM–4:00PM – 13 staff rostered (+floating staff assisting until 3:30PM, as required);
- 4:00PM–5:00PM – 12 staff rostered for peak pick-ups;
- 5:00PM–6:00PM – 8 staff rostered;
- 6:00PM–6:30PM – 4 staff rostered;
- At 6:30PM – 2 staff rostered (CCC closing).

As can be seen, although a total of up to 19 staff are rostered during the middle part of the day (peak CCC occupancy/activity period), only 12 full-time staff members are required during peak drop-off and pick-up hours in the morning and afternoon periods.

Accordingly, assuming 1 full-time staff = 1 parking bay (i.e., all full-time staff attending site arrived by private vehicle), the balance 10 on-site bays will remain vacant and available to visitors of the childcare centre. Based on the practical visitor parking demand calculations (detailed in the Transport Impact Statement report for the CCC), it has been estimated that a total of eight on-site parking bays would need to be made available to meet the peak visitor parking activity periods, namely morning drop-offs and afternoon pick-ups.

Accordingly, the available 10 on-site parking bays during 8:00-9:00AM and 4:00-5:00PM drop-off/pick up periods would be sufficient to meet the anticipated peak visitor parking demand.

Accordingly, applying the proposed staff attendance strategy, the expected on-site car parking occupancy pattern is expected to be similar to that outlined in **Table 1** (peak drop-off/pick-up periods are bolded for clarity).

Table 1: Staff schedule

Time	Staff bays on-site	Visitor bays on-site	Total reserved bays on-site
@ 6:30AM	2	8	10
6:30AM – 7:00AM	4	8	12
7:00AM – 8:00AM	8	8	16
8:00AM – 9:00AM	**12**	**8+2 unallocated**	**22**
9:00AM – 10:00AM	16	6	22
10:00AM – 2:30PM	19	3	22
2:30PM – 4:00PM	13	8	21
4:00PM – 5:00PM	**12**	**8+2 unallocated**	**22**
5:00PM - 6:00PM	8	8	16
6:00PM – 6:30PM	4	8	12
@ 6:30PM	2	8	10

As can be seen, during the peak drop-off period (8:00AM–9:00AM) in the morning and peak pick-up period in the afternoon (4:00PM–5:00PM) a maximum required parking provision of 10 on-site bays for visitors (eight designated + two unallocated on-site bays) will be secured at the site. For the post peak morning drop-off hour (9:00-10:00AM) four visitor bays remain available as the drop-off activity is expected to reduce thus 40% of required bays for this operation is deemed appropriate and sufficient.

In addition to on-site parking, two on-street bays are in place on Tasman Crescent immediately adjacent to the site with additional four on-street bays on Ovens View,

a short distance east of the site. These six public on-street bays could also be used for drop-off/pick-up activities and could be subject to a 15min time limit during the centre's peak drop-off and pick-up periods to ensure quick turnover.

In addition to permanent staff, "float staff" (i.e., admin, chef, kitchen hand, etc.) may be required to attend the site on occasion. Float staff is unlikely to work full day but would rather attend the site outside peak drop-off/pick-up periods. As advised by the operator, this ancillary and non-contact staff would:

- Attend the site intermittently/periodically on "as needed" basis (chef is on-site for breakfast and lunch generally between 7:30AM-1:30PM;
- Provide support during permanent staff shift changeovers and lunch breaks to maintain the required number of staff on duty during peak attendance periods, typically between 9:30AM-3:30PM;
- Attend the site in case of permanent staff planned/unplanned absence (sick leave, personal leave, holiday periods etc);
- Assist with special event days such as "open days", staff inductions, children's enrolments, etc.

4 PMP Mission

The objective of the PMP is to ensure efficient, effective and safe use of the car park and to provide effective management of the car parking related to employees and visitors/parents through the application of pavement markings, signage and communication/education.

5 Management Plan

The parking associated with this development is to serve employees and visitors/parents of the CCC including occasional service/waste collection vehicles as needed.

The development includes a total of 22 on-site parking bays out of which eight bays are allocated to visitors, 11 to permanent CCC staff and additional three are unallocated/unmarked bays. All eight visitor bays including unallocated bays are positioned so that bay occupancy can be easily assessed from the entry point into the car park. Conversely, the staff bays are located in less convenient locations or in the tandem parking composition. Additionally, a turnaround bay is provided at the end of the car park aisle to assist with the internal parking operations and manoeuvring.

Such parking layout ensures easy and convenient access, egress and internal site manoeuvres for parents and other visitors of the site without the need to negotiate the entire car park area.

All staff bays in the car parks will be pavement-marked to indicate their specific use and avoid unnecessary confusion and internal congestion.

Additional six public parking bays in the immediate vicinity of the site are available to the centre, subject to occupancy, securing additional parking capacity for part-time staff and visitors, if required/needed.

The CCC operator proposes that the centre be staffed with 19 permanent staff and four additional part-time/"float staff" which will be engaged on "as needed" basis. On-site parking utilisation will be controlled and managed by the centre's management.

The following principles/strategies however would serve to further alleviate the demand for on-site staff parking at the subject site:

- The CCC operator will support local employment and would ensure proper consideration is given to local job applicants where possible over those residing further away from the CCC. This is of direct benefit as it secures flexibility in staff commute via alternative modes of transport (walk, cycling and public transport) and their ability to attend the site on short notice if/when required. This would alleviate the demand on staff parking;
- As described in the Transport Impact Statement prepared for the CCC, the subject site will ultimately have access to bus (extended) service No. 536 which operates along Irvine Parade. The bus services also provide access to the greater rail network via its link to Aubin Grove Train Station. This relatively good level of access to public transport services may further alleviate the demand for staff parking;
- The subject site also enjoys very good access to the local network of shared paths and footpaths. As such, the location of the subject site and provision of on-site cycling facilities further promotes the use of bicycles as a mode of transport to and from the site which may alleviate the demand on staff parking; and,
- The CCC operator will also encourage staff car-pooling as additional means of parking demand reduction strategy.

ACROD Parking

One ACROD parking bay is proposed within the site car parking area, which satisfies the requirements of the relevant Australian Standards.

Service Vehicles

Small service and delivery vehicles will be instructed to access the site outside the peak drop off/pick up times and only use visitor parking bays, as required.

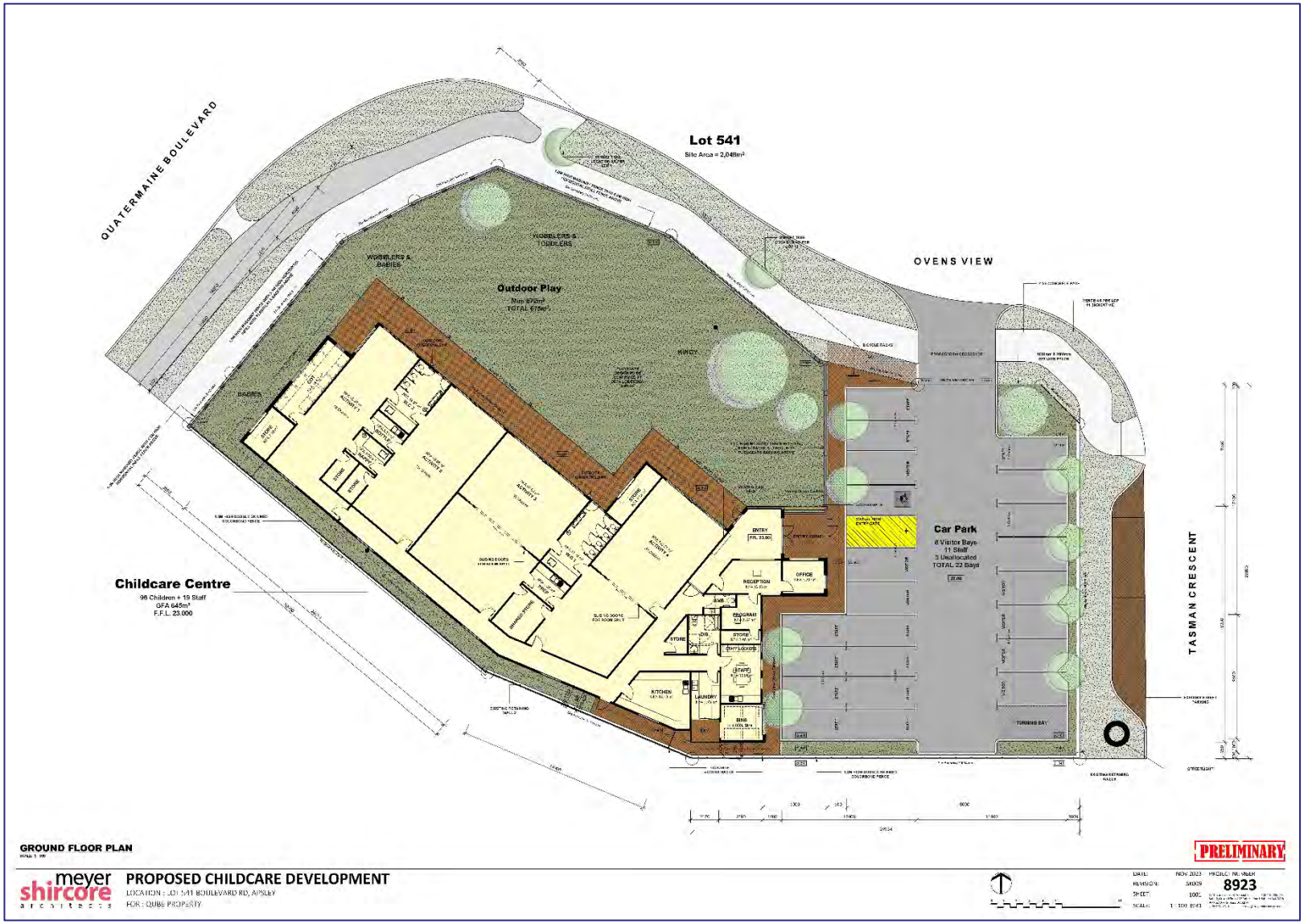
6 Communication and Education

It is proposed that all permanent and non-permanent/ancillary staff and visitors/parents be introduced to the PMP principles. This should be done at the time of children enrolment/staff hire by summarising the PMP and including a car park map into the induction session.

As noted above, the CCC management will continually monitor the operation of car park and propose improvements and changes to the PMP if required.

APPENDIX A

DEVELOPMENT PLAN


QUATERMAINE BOULEVARD
Lot 541
Site Area = 2,048m²
OVENS VIEW
TASMAN CRESCENT
WOBBLERS & TODDLERS
WOBBLERS & BABIES
Outdoor Play
Min 870m²
TOTAL 875m²
BABIES
KINDY
Childcare Centre
96 Children + 19 Staff
GFA 645m²
F.F.L. 23.000
Car Park
8 Visitor Bays
11 Staff
3 Unallocated
TOTAL 22 Bays
ENTRY
RECEPTION
OFFICE
STORE
STAFF
KITCHEN
LAUNDRY
BINS
TURNING BAY
GROUND FLOOR PLAN
PRELIMINARY
meyer shircore architects
PROPOSED CHILDCARE DEVELOPMENT
LOCATION : LOT 541 BOULEVARD RD, APSLEY
FOR : QUBE PROPERTY
DATE: NOV 2023
REVISION: 30039
SHEET: 100
SCALE: 1:100 @A3
PROJECT NUMBER
8923

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Environmental Noise Assessment - Childcare Centre

Lot 541 Quartermaine Boulevard, Mandogalup

Reference: 23058123-01A

Prepared for:
Qube Property

Association of Australasian Acoustical Consultants

Reference: 23058123-01A

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Date	Rev	Description	Author	Verified
27-Jul-23	0	Issued to Client	Matt Nolan	Matt Moyle
14-Feb-24	A	Updated drawings	Matt Nolan	-

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EXECUTIVE SUMMARY

Lloyd George Acoustics was engaged by Qube Property to undertake a noise assessment for a proposed childcare centre (CCC) to be located at Lot 541 Quartermaine Boulevard, Mandogalup. This report considered noise emissions from the proposed childcare centre to surrounding properties by way of noise modelling of child play, mechanical plant and car door closings.

The predicted noise from all children playing outside and car door closings is compliant provided the fences shown on the DA Plans are constructed. Where the fences are required, they are to be 1.8-metres high on top of the retaining wall and must be solid, free of gaps and of minimum surface mass 8 kg/m^2. Double sheeted *Colorbond* is permissible. For areas where visual permeability is required, sound-rated plexiglass can be used. Mechanical plant noise was calculated to exceed at a couple of the nearby receivers due to the AC and kitchen exhaust fan noise. It is predicted that compliance can practicably be achieved by ensuring the kitchen exhaust fan sound power level is less than 70 dB(A), and by operating the AC in quiet mode during the night period. Once the plant has been designed and selected, this should be further reviewed to ensure compliance prior to Building Permit.

1. INTRODUCTION

Lloyd George Acoustics was engaged by Qube Property to undertake an environmental noise assessment for a proposed childcare centre (CCC) to be located at Lot 541 Quartermaine Boulevard, Mandogalup (refer *Figure* 1-1) with the site plan shown in *Figure 1-2* and full Development Application (DA) plans provided in *Appendix A*. The purpose of this report is to consider noise emissions from the proposed childcare centre to surrounding properties.

Figure 1-1: Subject Site Location (Source: DPLH PlanWA)

The proposed childcare centre will be open Monday to Friday, 6.30am to 6.30pm and consist of the following:

- Six internal teaching spaces capable of accommodating up to 96 children;
- Outdoor play areas (not used prior to 7.00am);
- Amenities and associated mechanical plant such as:
  - Kitchen exhaust fan assumed to be located on roof above;
  - Various exhaust fans (toilets, laundry, nappy room) assumed to be located on the roof above;
  - Air-conditioning (AC) plant, assumed to located on the ground in the designated yard as shown on the DA Plans;
- Car parking on the east side of the lot.

Figure 1-2: Proposed Site Plan

With regard to noise emissions, consideration is given to noise from child play, mechanical services and closing car doors at neighbouring properties, against the prescribed standards of the *Environmental Protection (Noise) Regulations 1997*.

Appendix C contains a description of some of the terminology used throughout this report.

2. CRITERIA

Environmental noise in Western Australia is governed by the *Environmental Protection Act 1986*, through the *Environmental Protection (Noise) Regulations 1997* (the Regulations).

2.1. Regulations 7, 8 & 9

This group of regulations defines the prescribed standard for noise emissions applicable to child play, mechanical services and car door closing as follows:

*"**7. Prescribed standard for noise emissions***

(1) Noise emitted from any premises or public place when received at other premises –

(a) must not cause, or significantly contribute to, a level of noise which exceeds the assigned level in respect of noise received at premises of that kind; and

(b) must be free of –

(i) tonality; and

(ii) impulsiveness; and

(iii) modulation,

when assessed under regulation 9.

(2) For the purposes of subregulation (1)(a), a noise emission is taken to significantly contribute to a level of noise if the noise emission … exceeds a value which is 5 dB below the assigned level at the point of reception."

Tonality, impulsiveness and modulation are defined in regulation 9 (refer *Appendix C*). Under regulation 9(3), *"Noise is taken to be free of the characteristics of tonality, impulsiveness and modulation if -*

(a) the characteristics cannot be reasonably and practicably removed by techniques other than attenuating the overall level of noise emission; and

(b) the noise emission complies with the standard prescribed under regulation 7(1)(a) after the adjustments in the table [Table 2-1] … are made to the noise emission as measured at the point of reception."

Table 2-1 Adjustments Where Characteristics Cannot Be Removed

Where Noise Emission is Not Music*			Where Noise Emission is Music	
Tonality	Modulation	Impulsiveness	No Impulsiveness	Impulsiveness
+ 5 dB	+ 5 dB	+ 10 dB	+ 10 dB	+ 15 dB

* These adjustments are cumulative to a maximum of 15 dB.

The assigned levels (prescribed standards) for all premises are specified in regulation 8(3) and are shown in *Table 2-2*. The L_{A10} assigned level is applicable to noises present for more than 10% of a representative assessment period, generally applicable to "steady-state" noise sources. The L_{A1} is for short-term noise sources present for less than 10% and more than 1% of the time. The L_{Amax} assigned level is applicable for incidental noise sources, present for less than 1% of the time.

Table 2-2 Baseline Assigned Levels

Premises Receiving Noise	Time Of Day	Assigned Level (dB)		
		L_{A10}	L_{A1}	L_{Amax}
Noise sensitive premises: highly sensitive area[1]	0700 to 1900 hours Monday to Saturday (Day)	45 + influencing factor	55 + influencing factor	65 + influencing factor
	0900 to 1900 hours Sunday and public holidays (Sunday)	40 + influencing factor	50 + influencing factor	65 + influencing factor
	1900 to 2200 hours all days (Evening)	40 + influencing factor	50 + influencing factor	55 + influencing factor
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays (Night)	35 + influencing factor	45 + influencing factor	55 + influencing factor
Noise sensitive premises: any area other than highly sensitive area	All hours	60	75	80
Commercial Premises	All hours	60	75	80
Industrial and Utility Premises	All hours	65	80	90

1. ***highly sensitive area*** means that area (if any) of noise sensitive premises comprising —
   (a) a building, or a part of a building, on the premises that is used for a noise sensitive purpose; and
   (b) any other part of the premises within 15 metres of that building or that part of the building.

The influencing factor (IF), in relation to noise received at noise sensitive premises, has been calculated as between 0-2 dB, as determined in *Appendix B*. *Table 2-3* shows the assigned levels including the influencing factor and transport factor at the receiving locations.

Table 2-3 Assigned Levels

Premises Receiving Noise	Time Of Day	Assigned Level (dB)		
		L_{A10}	L_{A1}	L_{Amax}
+0 dB IF (West Residences) Noise sensitive premises: highly sensitive area[1]	0700 to 1900 hours Monday to Saturday (Day)	45	55	65
	0900 to 1900 hours Sunday and public holidays (Sunday)	40	50	65
	1900 to 2200 hours all days (Evening)	40	50	55
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays (Night)	35	45	55
+2 dB IF (East Residences) Noise sensitive premises: highly sensitive area[1]	0700 to 1900 hours Monday to Saturday (Day)	47	57	67
	0900 to 1900 hours Sunday and public holidays (Sunday)	42	52	67
	1900 to 2200 hours all days (Evening)	42	52	57
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays (Night)	37	47	57

It must be noted the assigned levels above apply outside the receiving premises and at a point at least 3 metres away from any substantial reflecting surfaces. Where this was not possible to be achieved due to the close proximity of existing buildings and/or fences, the noise emissions were assessed at a point within 1 metre from building facades and a -2 dB adjustment was made to the predicted noise levels to account for reflected noise.

The assigned levels are statistical levels and therefore the period over which they are determined is important. The Regulations define the Representative Assessment Period (RAP) as "*a period of time of not less than 15 minutes, and not exceeding 4 hours*, *determined by* an *inspector* or *authorised person to be appropriate for the assessment of a noise emission, having regard to the type and nature of the noise emission"*. An inspector or authorised person is a person appointed under Sections 87 & 88 of the *Environmental Protection Act 1986* and include Local Government Environmental Health Officers and Officers from the Department of Water Environmental Regulation. Acoustic consultants or other environmental consultants are not appointed as an inspector or authorised person. Therefore, whilst this assessment is based on a 4-hour RAP, which is assumed to be appropriate given the nature of the operations, this is to be used for guidance only.

2.2. Regulation 3

"3. Regulations do not apply to certain noise emissions

(1) Nothing in these regulations applies to the following noise emissions –

(a) Noise emissions from the propulsion and braking systems of motor vehicles operating on a road;"

The childcare centre car park is considered a road and therefore vehicle noise (propulsion and braking) is not assessed. Noise from vehicle car doors however are assessed, since these are not part of the propulsion or braking system.

2.3. Regulation 14A

"14A. Waste Collection and Other Works

(2) Regulation 7 does not apply to noise emitted in the course of carrying out class 1 works if –

(a) The works are carried out in the quietest reasonable and practicable manner; and

(b) The equipment used to carry out the works is the quietest reasonably available;

class 1 works means specified works carried out between -

(a) 0700 hours and 1900 hours on any day that is not a Sunday or a public holiday; or

(b) 0900 hours and 1900 hours on a Sunday or public holiday.

specified works means -

(a) The collection of waste; or

(b) The cleaning of a road or the drains for a road; or

(c) The cleaning of public places, including footpaths, cycle paths, car parks and beaches;"

In the case where specified works are to be carried out outside of class 1, a noise management plan is to be prepared and approved by the CEO.

3. METHODOLOGY

Computer modelling has been used to predict the noise emissions from the development to all nearby receivers. The software used was *SoundPLAN 8.2* with the ISO 9613 algorithms (ISO 17534-3 improved method) selected, as they include the influence of wind and are considered appropriate given the relatively short source to receiver distances. Input data required in the model are listed below and discussed in *Section 3.1* to *Section 3.4*:

- Meteorological Information;
- Topographical data;
- Ground Absorption; and
- Source sound power levels.

3.1. Meteorological Conditions

Meteorological information utilised is provided in *Table 3-1* and is considered to represent worst-case conditions for noise propagation. At wind speeds greater than those shown, sound propagation may be further enhanced, however background noise from the wind itself and from local vegetation is likely to be elevated and dominate the ambient noise levels.

Table 3-1: Modelling Meteorological Conditions

Parameter	Day (7.00am to 7.00pm)	Night (7.00pm to 7.00am)
Temperature (°C)	20	15
Humidity (%)	50	50
Wind Speed (m/s)	Up to 5	Up to 5
Wind Direction*	All	All

* The modelling package allows for all wind directions to be modelled simultaneously.

Alternatives to the above default conditions can be used where one year of weather data is available and the analysis considers the worst 2% of the day and night for the month of the year in which the worst-case weather conditions prevail (source: *Draft Guideline on Environmental Noise for Prescribed Premises*, May 2016). In most cases, the default conditions occur for more than 2% of the time and therefore must be satisfied.

3.2. Topographical Data

Topographical data was adapted from elevation contours of a previous project combined with lot heights on the site plan.

As this is a new development and there are currently no existing buildings surrounding, the locations of the buildings were estimated and included in the model with a height of 3.5-metres. Receivers were modelled at a height of 1.4-metres above floor level.

The childcare centre building and retaining walls are incorporated in the noise model as per the *Appendix A* plans. Fencing includes a 1.8-metre high fence on top of the retaining wall. Where shown to be solid, the fences

are assumed free of any gaps and of minimum surface mass 8 kg/m^2. Double sheeted *Colorbond* is permissible. For areas where visual permeability is required, sound-rated plexiglass can be used, ensuring all gaps between panels and brick work are sealed.

Figure 3-1 shows a 2D overview of the noise model with the location of all relevant receivers identified. Pink dots represent point sources in the noise model (car doors, mechanical plant) with the pink polygon representing child play.

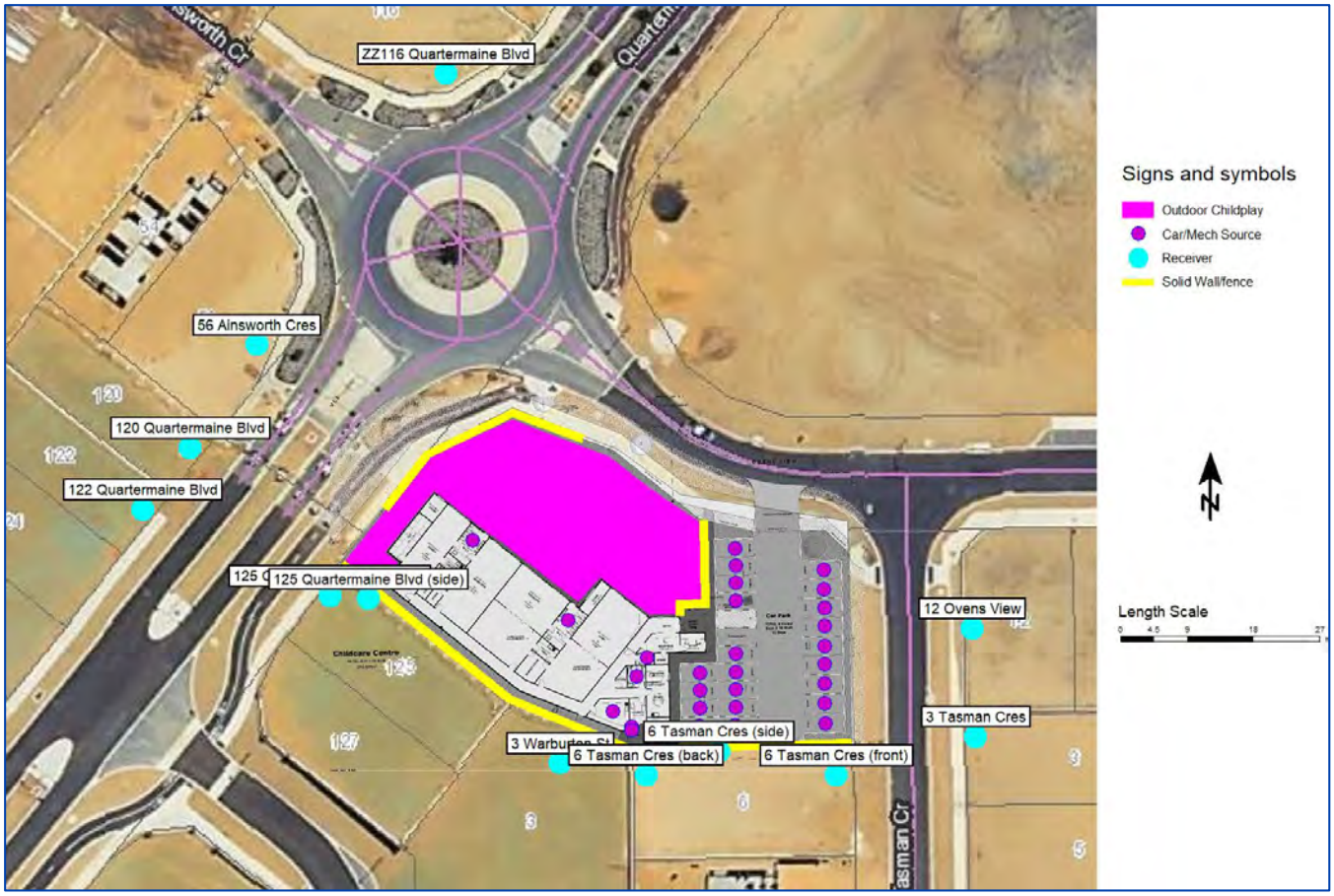


Figure 3-1: Overview of Noise Model

3.3. Ground Absorption

The ground absorption has been assumed to be 0.1 (10%) for the roads, 0.5 (50%) outside of the roads and 1.0 (100%) for the play areas, noting that 0.0 represents hard reflective surfaces such as water and 1.0 represents absorptive surfaces such as grass.

3.4. Source Sound Levels

The source sound power levels used in the modelling are provided in *Table 3-2*.

Table 3-2: Source Sound Power Levels, dB

Description	Octave Band Centre Frequency (Hz)								Overall dB(A)
	63	125	250	500	1k	2k	4k	8k	
Babies Play Aged 0-2 Years (10 kids), L_{10}	48	54	60	66	72	74	71	67	**78**
Toddler Play Aged 2-3 Years (10 kids), L_{10}	61	67	73	79	81	78	74	70	**85**
Kindy Play Aged 3+ Years (10 kids), L_{10}	64	70	75	81	83	80	76	72	**87**
AC Plant, double fan unit (each), L_{10}	72	74	68	69	63	61	53	47	**70**
General Exhaust Fans (each), L_{10}	60	65	62	63	60	61	56	53	**67**
Kitchen Exhaust Fan, L_{10}	50	64	61	70	69	66	62	50	**73**
Closing Car Door (each), L_{max}	71	74	77	81	80	78	72	61	**84**

The following is noted in relation to *Table 3-2*:

- Child play source levels are based on *Guideline for Childcare Centre Acoustic Assessments Version 3.0* produced by the Association of Australasian Acoustical Consultants (AAAC) published September 2020. Where the number of children for individual play areas is specified in the plans, these have been adjusted from the reference source levels using appropriate acoustical calculations. Outdoor child play was modelled as area sources at 1.0-metre above ground level. The sound power levels used in the model were scaled as follows:
  - 16 children aged 0-2 years = 80 dB(A);
  - 20 children aged 2-3 years = 88 dB(A);
  - 60 children aged 3+ years = 94 dB(A).
- Based on the AAAC Guideline 3.0, source sound power levels for AC condensing units were assumed. Medium sized (double fan) outdoor units were deemed appropriate with two (2) modelled as point sources in the drying area.
- Other mechanical plant includes four (4) exhaust fans (toilets and laundry) and one kitchen exhaust fan. All were modelled as point sources approximately 0.5 metres above roof level and above the area serviced.
- Car doors closing were modelled as a point source 1.0-metre above ground level. Since noise from a car door closing is a short term event, only the L_{Amax} level is applicable.

4. RESULTS AND ASSESSMENT

4.1. Outdoor Child Play Noise

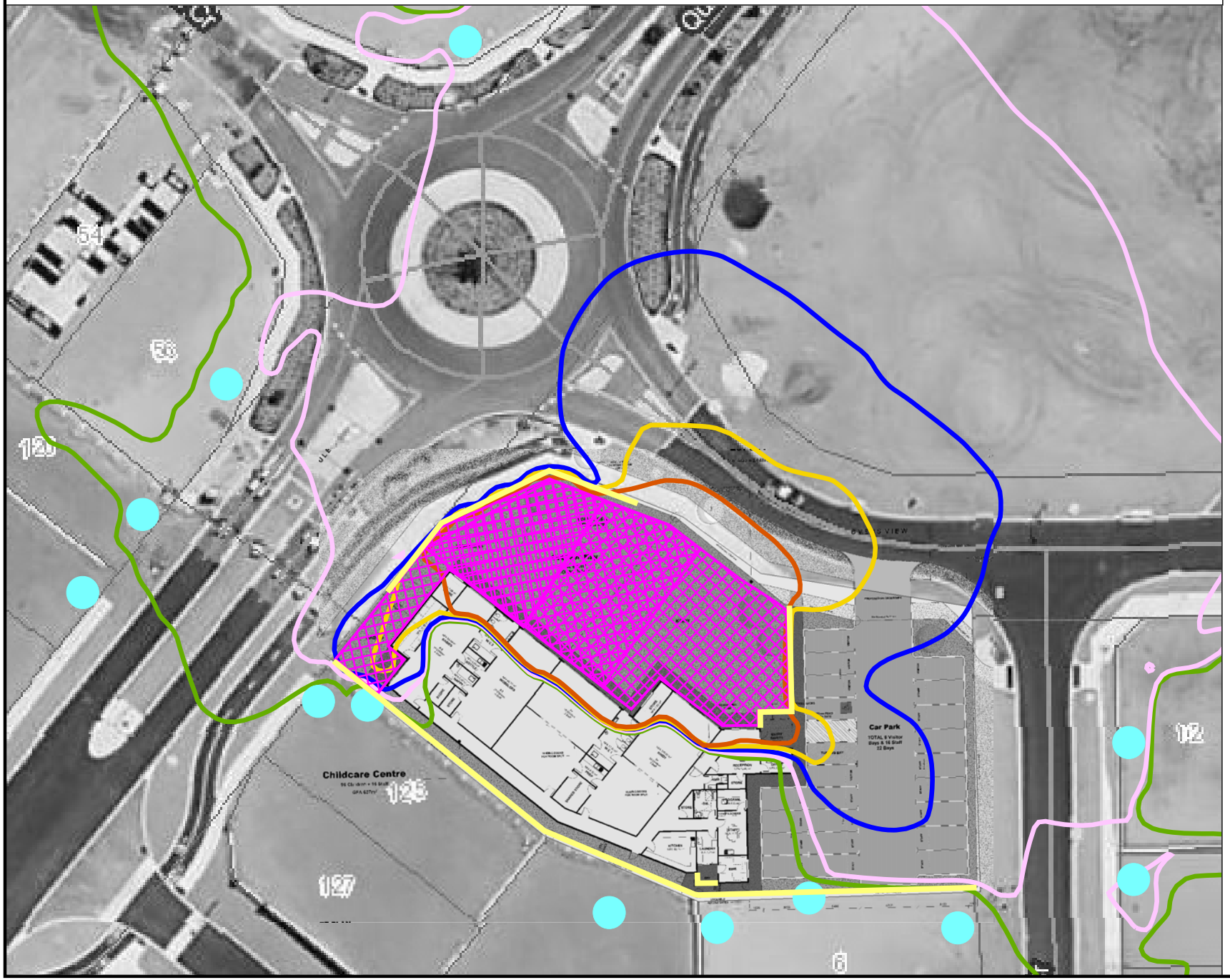
The childcare development will host up to 96 children. It is noted play time is generally staggered and therefore not all children would be playing outside at once for extended periods of time. However, noise levels were conservatively predicted for all children playing simultaneously, as a worst-case scenario with the results provided and assessed in *Table 4-1*. The critical assigned level is during the day, as whilst the childcare centre will open at 6.30am, child play will not commence until after 7.00am. Noise from child play is not considered to contain annoying characteristics within the definition of the Regulations and therefore no adjustments are made to the predicted noise levels. A noise contour plot is also provided in *Figure 4-1* showing noise levels at ground floor.

Table 4-1: Child Play Noise Predicted Levels and Assessment, dB L_{A10}

Receiver	Babies (0-2 yo)	Toddler (2-3 yo)	Kindy (3+ yo)	Total	Assigned Level	Assessment
3 Tasman Cres	23	32	39	40	**47**	*Complies*
3 Warburton St	17	22	29	30	**47**	*Complies*
6 Tasman Cres	13	21	30	30	**47**	*Complies*
12 Ovens View	24	34	41	42	**47**	*Complies*
56 Ainsworth Cres	28	35	42	43	**45**	*Complies*
116 Quartermaine Blvd	26	35	44	45	**45**	*Complies*
120 Quartermaine Blvd	27	33	38	40	**45**	*Complies*
122 Quartermaine Blvd	25	31	35	37	**45**	*Complies*
125 Quartermaine Blvd	36	32	31	38	**45**	*Complies*

Based on a conservative scenario of all 96 children playing outside simultaneously, the assessment demonstrates compliance is achieved during the day.

Figure 4-1 Child Play Noise Contour Plot (1.4m AGL), dB L_{A10}



Predicted Noise level

= 42
= 47
= 52
= 57
= 62

Legend

Receiver
Outdoor Childplay
Fence/Wall

N

Scale 1:600

0 3.5 7 14 21 m

Project No: 23058123
Consultant: MN
Date: 27/07/2023
Algorithm: ISO 9613
SoundPLAN Version: 8.2

Lloyd George Acoustics
PO Box 717
HILLARYS WA 6923
(08) 9401 7770

4.2. Mechanical Plant Noise

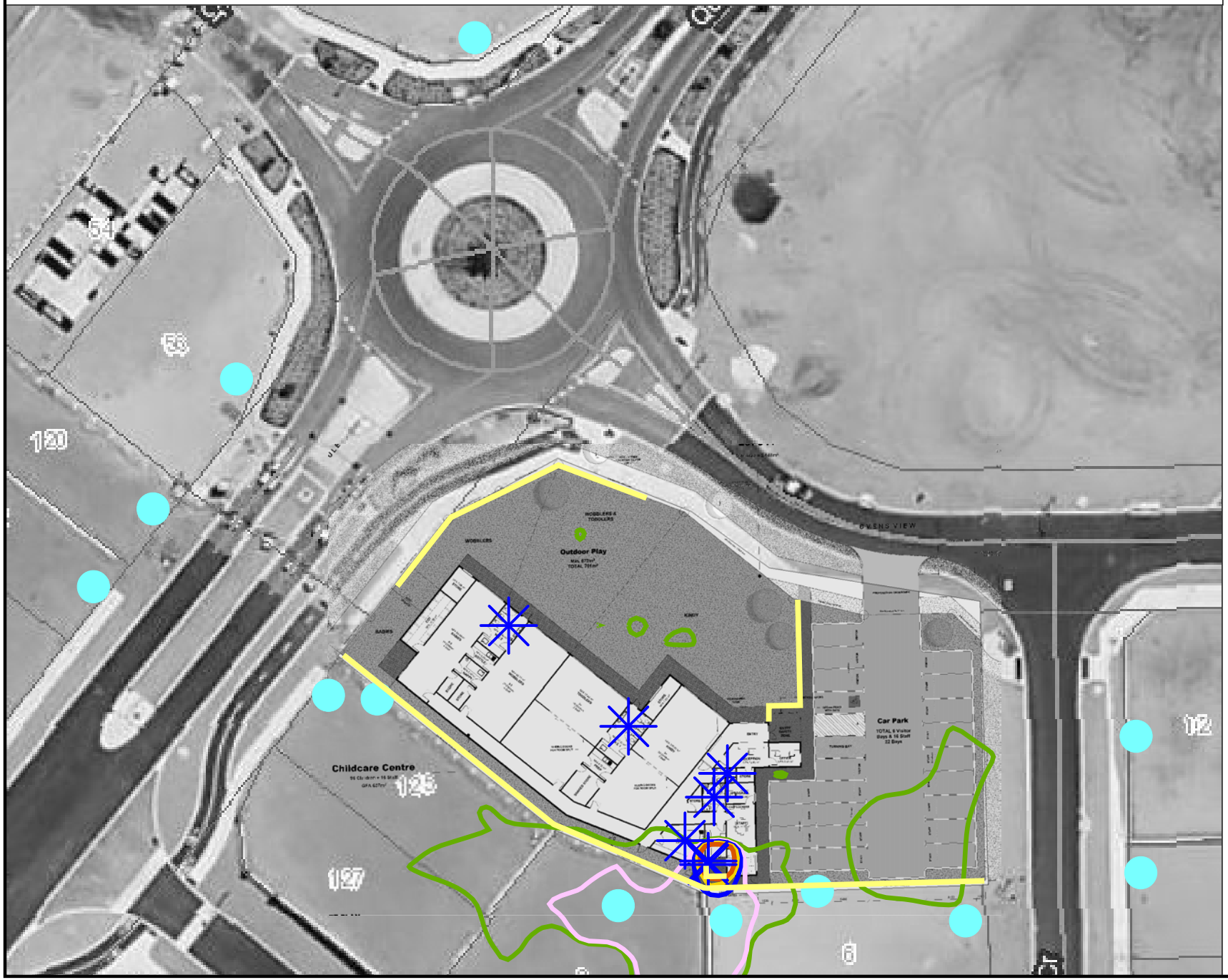
Mechanical plant noise consists of the outdoor AC condensing units and exhaust fans. Predicted and assessed noise levels are provided in *Table 4-2*. The critical assigned level is during the night, as the plant may operate prior to 7.00am. An adjustment of + 5 dB is included for tonality, since this may be present for such noise sources. A noise contour plot is also provided in *Figure 4-2* showing noise levels at ground floor.

Table 4-2: Mechanical Plant Noise Predicted Levels and Assessment, dB L_{A10}

Receiver	AC	Exhaust Fans	Total	Total Adjusted	Assigned Level	Assessment
3 Tasman Cres	11	26	26	**31**	**37**	*Complies*
3 Warburton St	26	34	35	**40**	**37**	+3 dB
6 Tasman Cres	35	31	36	**41**	**37**	+4 dB
12 Ovens View	10	26	27	**32**	**37**	*Complies*
56 Ainsworth Cres	1	24	24	**29**	**35**	*Complies*
120 Quartermaine Blvd	0	23	23	**28**	**35**	*Complies*
122 Quartermaine Blvd	0	22	22	**27**	**35**	*Complies*
125 Quartermaine Blvd	0	22	22	**27**	**35**	*Complies*

The calculations show compliance at all receiver locations except at 3 Warburton St and 6 Tasman Cres. The AC and kitchen exhaust fan is the cause of these exceedances. It is predicted that compliance can practicably be achieved by ensuring the kitchen exhaust fan sound power level is less than 70 dB(A) and by operating the AC in quiet mode during the night period. It must be noted that the assessment is based on assumptions in relation to the number, location, size and type of mechanical plant. Therefore, once the mechanical plant has been designed and selected, noise is to be reviewed by a suitably qualified acoustical consultant.

Figure 4-2 Mechanical Plant Noise Contour Plot (1.4m AGL), dB L_{A10}



Predicted Noise level

	= 32
	= 37
	= 42
	= 47
	= 52

Legend

- Receiver
- Car/Mech Source
- Fence/Wall

N

Scale 1:600

0 3.5 7 14 21 m

Project No: 23058123
Consultant: MN
Date: 27/07/2023
Algorithm: ISO 9613
SoundPLAN Version: 8.2

Lloyd George Acoustics
PO Box 717
HILLARYS WA 6923
(08) 9401 7770

4.3. Car Door Closing Noise

Predicted and assessed noise levels for car doors closing are provided in *Table 4-3* being the maximum noise level from the worst-case car bay for each receiver. The critical assigned level is during the night, as car door closings will occur prior to 7.00am. An adjustment of + 10 dB is included for impulsiveness, since this may be present for such noise sources. A noise contour plot is also provided in *Figure 4-3* showing noise levels at ground floor.

Table 4-3: Car Door Closing Noise Predicted Levels and Assessment, dB L_{Amax}

Receiver	Car Door	Total Adjusted	Assigned Level	Assessment
3 Tasman Cres	47	**57**	**57**	*Complies*
3 Warburton St	37	**47**	**57**	*Complies*
6 Tasman Cres	47	**57**	**57**	*Complies*
12 Ovens View	47	**57**	**57**	*Complies*
56 Ainsworth Cres	29	**39**	**55**	*Complies*
120 Quartermaine Blvd	36	**46**	**55**	*Complies*
122 Quartermaine Blvd	23	**33**	**55**	*Complies*
125 Quartermaine Blvd	19	**29**	**55**	*Complies*

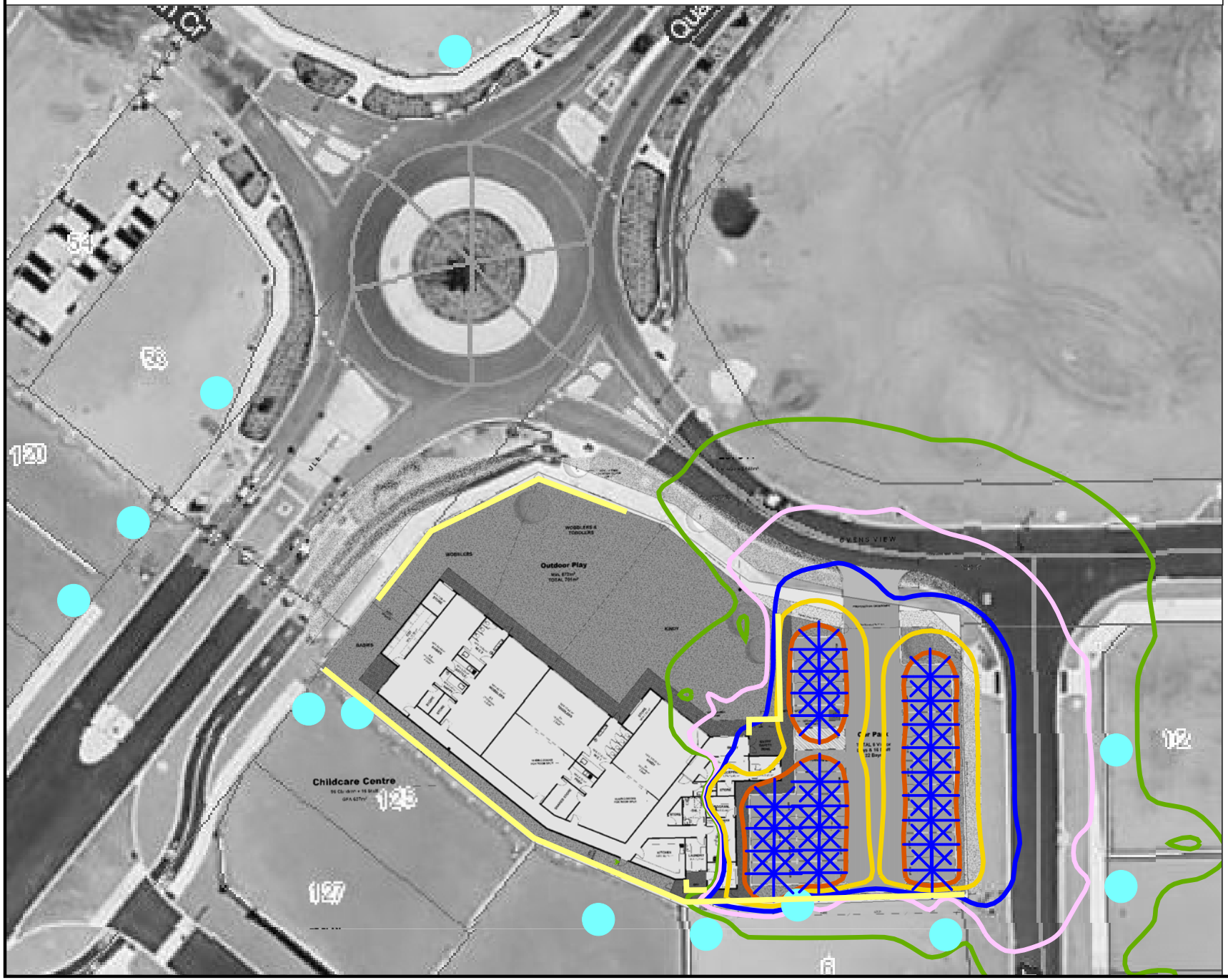
Noise from car doors is predicted to comply at all nearest receivers during the critical night period.

4.4. Indoor Child Play

An assessment of noise levels from indoor child play was carried out and the resulting noise levels at all locations were predicted to be well below that of outdoor child play considered in *Section 4-1*. This assessment was carried out based on the following considerations:

- Internal noise levels within activity rooms would not exceed those from outdoor play for each age group, regardless of windows being open or closed; and
- Any music played within the internal activity areas would be 'light' music with no significant bass content and played at a relatively low level.

Figure 4-3 Car Door Noise Contour Plot (1.4m AGL), dB L_{Amax}



Predicted Noise level

	= 47
	= 52
	= 57
	= 62
	= 67

Legend

- Receiver
- Car/Mech Source
- Fence/Wall

N

Scale 1:600

0 3.5 7 14 21 m

Project No: 23058123
Consultant: MN
Date: 27/07/2023
Algorithm: ISO 9613
SoundPLAN Version: 8.2

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(08) 9401 7770

5. RECOMMENDATIONS

5.1. Child Play

The predicted noise from all children playing outside is compliant provided the fences shown on the DA Plans are constructed. These are to be minimum 1.8-metres high on top of the retaining walls and must be solid, free of gaps and of minimum surface mass 8 kg/m^2. Double sheeted *Colorbond* is permissible. For areas where visual permeability is required, sound-rated plexiglass can be used provided all gaps are sealed.

Whilst not necessarily required for compliance, to further minimise noise impacts as part of best practice, the following are provided:

- The behaviour and 'style of play' of children should be monitored to prevent particularly loud activity e.g. loud banging/crashing of objects, 'group' shouts/yelling;
- Favour soft finishes in the outdoor play area to minimise impact noise (e.g. soft grass, sand pit(s), rubber mats) over timber or plastic;
- Favour soft balls and rubber wheeled toys;
- Crying children should be taken inside to be comforted;
- Child play to be staggered;
- No amplified music to be played outside;
- Any music played within the internal activity areas to be 'light' music with no significant bass content and played at a relatively low level;
- Car park drainage grates or similar to be plastic or metal with rubber gasket and secured to avoid excess banging.

5.2. Mechanical Plant

For mechanical plant, the following are recommended:

- Ensure kitchen exhaust fan sound power level is less than 70 dB(A);
- Once the mechanical plant has been designed and selected, the noise levels shall be reviewed prior to Building Permit;
- All exhaust fans shall be located inside the ceiling void and shall be axial fan type, allowing the incorporation of an attenuator if required;
- All fans shall be variable speed drive so that maximum speed is only occurring when necessary with demand;
- Air-conditioning shall have a ‘night’ / ‘quiet’ mode option, in case required for prior to 7.00am operation, subject to final detailed analysis;
- All plant shall be selected taking into consideration noise levels. That is, when comparing manufacturers of equivalent equipment, select the quieter model;
- All plant is to be appropriately vibration isolated to 95% isolation efficiency.

5.3. Car Doors

The predicted noise from car door closings is compliant provided the fences shown on the DA Plans are constructed. These are to be minimum 1.8- metres high on top of the retaining walls and must be solid, free of gaps and of minimum surface mass 8 kg/m^2. Double sheeted *Colorbond* is permissible.

Appendix A – Development Plans

PART D – SHIRE OF MURRAY

1. Declarations of Due Consideration

Any member who is not familiar with the substance of any report or other information provided for consideration at the DAP meeting must declare that fact before the meeting considers the matter.

2. Disclosure of Interests

3. Form 1 DAP Applications

3.1 Lot No. 9500 (No. 320) Gull Road, Keralup – Proposed Noxious Industry (Carbon Recycling Facility) – DAP/23/02622

4. Form 2 DAP Applications

Nil.

5. Section 31 SAT Reconsiderations

Nil.

Lot No. 9500 (No. 320) Gull Road, Keralup – Proposed Noxious Industry (Carbon Recycling Facility)

Form 1 – Responsible Authority Report
(Regulation 12)

DAP Name:	Metro Outer	
Local Government Area:	Shire of Murray	
Applicant:	Altus Planning	
Owner:	Development WA	
Value of Development:	$42 million	
Responsible Authority:	Shire of Murray	
Authorising Officer:	Coordinator Planning Services, Luke Cervi	
LG Reference:	P302/2023	
DAP File No:	DAP/23/02662	
Application Received Date:	21 December 2023	
Report Due Date:	12 March 2024, with additional 72 days agreed.	
Application Statutory Process Timeframe:	90 Days	
Attachment(s):	1. Development Plans: a) Overall b) Stage 1 c) Stage 2 2. Applicant's Planning Report and supporting documents 3. Public Submissions a) Submissions with theme allocation b) Applicant's response to submissions 4. Agency Submissions a) Department of Planning Lands and Heritage (DPLH) b) Department of Water and Environmental Regulation (DWER). c) Department of Mines, Industry Regulation and Safety (DMIRS) d) Department of Fire and Emergency Services (DFES) e) Department of Primary Industries and Regional Development (DPIRD) f) WA Health 5. Additional Odour documentation a) Addendum to Odour Impact Assessment b) Peer Review Memorandum 6. Additional Bushfire documentation a) Revised Bushfire Management Plan b) Applicant's performance principle request	
Is the Responsible Authority Recommendation the same as the Officer Recommendation?	☐ Yes ☒ N/A	Complete Responsible Authority Recommendation section

	☐ No	Complete Responsible Authority and Officer Recommendation sections

Responsible Authority Recommendation

That the Metro Outer Development Assessment Panel resolves to:

Approve DAP Application reference DAP/23/02622 and accompanying plans included in **Attachment 1** in accordance with Clause 68 of Schedule 2 (Deemed Provisions) of the *Planning and Development (Local Planning Schemes) Regulations 2015,* and the provisions of the *Peel Region Scheme* and the Shire of Murray *Local Planning Scheme No.* 4, subject to the following conditions:

Conditions

Management Plans

1. A Construction Management Plan to the satisfaction of the Shire is to be submitted to the Shire for approval prior to the works commencing. The Plan is to include, but not be limited to:

   a) Access to and from the site;
   b) The delivery of materials and equipment to the site;
   c) The storage of materials and equipment on the site;
   d) The parking arrangements for contractors and subcontractors;
   e) Management of construction waste;
   f) Dust control;
   g) Hours during which onsite construction works are to be limited; and
   h) Other matters that have potential to impact nearby properties.

   The approved Construction Management Plan is to be implemented on an ongoing basis during construction.

2. Prior to the commencement of works a fauna protection / relocation management plan is to be prepared and approved to ensure the identification and relocation of any native fauna potentially impacted by the clearing or operation of the site and arrangements being made for the implementation of the approved plan to the satisfaction of the Local Government.

3. Prior to the commencement of works a wetland management plan is to be prepared and approved to ensure the protection and management of the Conservation Category Wetland and Resource Enhancement Wetland with satisfactory arrangements being made for the implementation of the approved plan. This plan is to include but not necessarily be limited to; revegetation and weed management requirements and any associated fencing as well as other actions.

4. A Waste Management Plan to the satisfaction of the Shire is to be submitted to the Shire for approval prior to the use first commencing. The Plan is to include, but not be limited to:

   a) Identification of waste streams likely to be generated;

b) Waste avoidance/minimisation strategies;
c) On-site waste management system, including bin placement and access;
d) Recycling and disposal options to be utilised; and
e) How compliance with the 'plan' will be managed.

The approved Plan is to be implemented on an ongoing basis.

5. A Biofilter Management Plan to the satisfaction of the Shire is to be submitted to the Shire for approval prior to the use first commencing. The Plan is to include, but not be limited to:

a) Technical details of the biofilters;
b) Commissioning approach and testing requirements;
c) Operational requirements and maintenance regimes; and
d) Performance monitoring requirements.

The approved Plan is to be implemented on an ongoing basis.

6. An Odour Complaint Management Plan to the satisfaction of the Shire is to be submitted to the Shire for approval prior to the use first commencing. The Plan is to include, but not be limited to:

a) A clear and accessible procedure for the public to report odour complaints to the operator;
b) A system for logging and tracking complaints, including the date, time, nature of the complaint, and the complainant's contact information;
c) A process for investigating complaints promptly and effectively;
d) Communication protocols for informing complainants about the investigation outcomes and any actions to be taken and making this information available to Shire upon request.

The approved Plan is to be implemented on an ongoing basis.

7. An Odour Management Contingency Plan to the satisfaction of the Shire is to be submitted to the Shire for approval prior to the use first commencing. The Plan is to include suitable contingency measures to address odour issues that are to be implemented in the event that odour complaints are received and verified and may include, but are not limited to:

a) Temporary operational adjustments or shutdowns;
b) Additional odour control equipment or technologies;
c) Increased maintenance activities.

The approved Plan is to be implemented on an ongoing basis.

<u>Odour</u>

8. Prior to a building permit being lodged, Environmental and Air Quality Consulting Pty Ltd's Addendum to Odour Impact Assessment Report (EAQ23024-C-Wise-OdourImpactAssessment-Finalv3) is to be modified as follows:

a) Figure 1 updated by:
   (i) Amending references from ‘bunkers’ to ‘cocoons’:
   (ii) Including locations of all biofilters and stacks
b) Figure 2 updated by:
   (iii) Including locations of all biofilters and stacks

9. Prior to the use commencing, an odour control system generally in accordance with that described in Environmental and Air Quality Consulting Pty Ltd’s Addendum to Odour Impact Assessment Report (EAQ23024-C-Wise-OdourImpactAssessment-Finalv3) must be installed on site to treat odorous air from the:

   a) Receival building mixing area; and
   b) Proposed cocoon system;

   All to the satisfaction of the Local Government.

10. All biofilters and their duct work within the odour control system must be constructed in a way that allows expansion or modification of the system if the need arises to the satisfaction of the Local Government.

11. All biofilters must be designed, operated and maintained in a way that does not emit offensive odour and does not exceed 500 odour units at the biofilter surface.

12. The receival building must be enclosed and:
    a) Treat air from the mixing area via one or more of the biofilters;
    b) Discharge air from the remainder of the building via a dedicated stack/s with a velocity of at least 10 m/s at least 3 m above the highest point of the roof.

13. Fresh air must be used in the cocoons and mobile air floor systems. The mobile air floor systems are to be designed to be operated in a way to add odour control.

14. Odour concentration from the stack/s must not cause offsite nuisance.

15. The receival building must be cleaned frequently to avoid the generation of excessive odour.

16. Leachate ponds must be managed in a way to avoid the generation of offensive odour.

17. The tank farm is to be designed and managed to avoid the generation of odours which would lead to offsite impacts. The farm should be retrofittable to the odour control system if required, all to the satisfaction of the Local Government.

<u>Earthworks and drainage</u>

18. Engineering drawings and specifications are to be submitted, approved, and works undertaken in accordance with the approved engineering drawings and specifications and approved plans of development for grading and/or stabilisation of the site to ensure that finished ground levels at the boundaries of the development the subject of this approval match or otherwise coordinate with the existing and/or proposed finished ground levels of the land abutting.

19. Engineering drawings and specifications are to be submitted and approved, and works undertaken in accordance with the approved engineering drawings and specifications, for the filling and/or draining of the land, including ensuring that stormwater is contained on-site, or appropriately treated and connected to the local drainage system. Engineering drawings and specifications are to be in accordance with an approved Water Management Plan for the site, to the satisfaction of the Local Government

Access and parking

20. Prior to the development first being occupied, vehicle crossovers to be designed and constructed to the satisfaction and specifications of the Local Government.

21. Prior to the development first being occupied, internal access roads are to be designed and constructed to the satisfaction of the Local Government.

22. Prior to the development first being occupied, the parking bay(s), driveway(s) and points of ingress and egress to be designed in accordance with the Australian Standard for Off Street Parking (AS2890), and are to be kerbed, drained, line-marked and thereafter maintained in a sound state of repair to the satisfaction of the Local Government.

23. No parking bays shall be obstructed in any way or used for purposed of storage.

Environmental

24. Containment of all vehicle cleaning and wash-down areas and direction of waste materials to a suitable waste treatment facility (for instance a triple-interceptor) to the satisfaction of the Local Government.

Fencing

25. Boundary fencing must be of an open post and rail or post and wire design. Any more substantial fencing to be installed shall be limited to the immediate curtilages of the proposed carbon recycling facility.

Bushfire

26. Prior to a building permit being lodged, the Bushfire Management Plan (Bushfire Prone Planning Job Reference No. 220666 Version 1.4 dated 14 March 2024) is to be modified as follows:

    a) Section 5.5 – Assessment Statements for Element 3: Vehicle Access updated by including proposed Emergency Access Way requirements at A3.2b.
    b) Section 6.1 Developer / Landowner Responsibilities – Prior to Sale or Occupancy / Operation updated to include the construction of the Emergency Access Way and securing of necessary easement/s.

27. The landowner is to consent to the lodgement of a notification on the certificate of title of the subject land, pursuant to section 70A of the *Transfer of Land Act 1893,* to alert prospective purchasers that the land is located within a bushfire prone area and is subject to a bushfire management plan which imposes ongoing management requirements on the land. The landowner must not occupy the

approved development until such time as the notification is prepared and registered on the certificate of title of the subject land. All costs associated with the preparation and registration of the notification are to be met by the landowner. The notification is to state as follows:

"This land is within a bushfire prone area as designated by an Order made by the Fire and Emergency Services Commissioner. A Bushfire Management Plan applies to the site which imposes ongoing management requirements on the landowner."

Certification

28. A 'Certification by Bushfire Consultant' is to be provided to demonstrate that the measures required in Section 6.3 of the Bushfire Management Plan [Bushfire Prone Planning, Job Reference: 220666, Dated 14 March 2024] have been implemented prior to occupation of the facility.

29. Prior to use commencing, Certification by an Environmental Consultant suitably qualified and experienced in air quality management, must be provided to demonstrate that the measures required by conditions **9-14 and 17** have been implemented.

Advice Notes

A. Further to conditions **1-3**, implementation of the Management Plans that are ultimately approved may include actions that need to be undertaken prior to works commencing.

B. In regards to condition **4**, Shire waste services are not currently available to this site.

C. In regards to condition **14**, if offsite nuisance is experienced from the stack/s, these odour emissions are to be redirected to a biofilter/s.

D. In regards to condition **19**, the drainage concept submitted with the planning application is supported in principle. The water management plan will need to incorporate but not limited to drainage and ground water matters such as onsite drainage retention and ground water monitoring.

E. In regards to condition **24,** the washdown facility must comply with DWER guidelines https://www.wa.gov.au/system/files/2022-04/WQPN-68-Mechanical-equipment-washdown.pdf

F. In regards to condition **26**, the emergency access way as mentioned in the applicant's performance principle solution for Element 3: Vehicular Access is critical to achieving the performance principle and therefore must be included within the Bushfire Management Plan.

G. This land is in close proximity to known mosquito breeding areas. The predominant mosquito species is known to carry viruses and other diseases.

H. The use proposes activities that are 'prescribed premises' and require works approval/s under the *Environmental Protection Act 1986.*

I. Any native vegetation removal must be in accordance with a clearing permit obtained from Department of Water and Environmental Regulation or exempt from the need of a clearing permit.

J. Acid sulfate soils (ASS) risk mapping indicates that the site is located primarily within an area identified as representing a moderate to low risk of ASS occurring within 3 metres of the natural soil surface. Please refer to Department of Water and Environmental Regulation's acid sulfate soil guidelines for information to assist with the management of ground and/or groundwater disturbing works. https://www.der.wa.gov.au/your-environment/acid-sulfate-soils/69-acidsulfatesoils-guidelines

K. The proposal is located within the Peel-Harvey coastal plain catchment and the provisions of the Environmental Protection (Peel Inlet – Harvey Estuary) Policy 1992, the State Planning Policy No 2.1, Peel-Harvey Coastal Plain Catchment (SPP 2.1) and the Draft State Planning Policy 2.9 Planning for Water (SPP 2.9) shall apply

Details: outline of development application

Region Scheme	Peel Region Scheme
Region Scheme - Zone/Reserve	Rural
Local Planning Scheme	Shire of Murray Local Planning Scheme No. 4
Local Planning Scheme - Zone/Reserve	Rural
Structure Plan/Precinct Plan	N/A
Structure Plan/Precinct Plan - Land Use Designation	N/A
Use Class and permissibility:	Noxious Industry "SA"
Lot Size:	1,608.9031Ha
Existing Land Use:	Vacant Land
State Heritage Register	No
Local Heritage	☒ N/A ☐ Heritage List ☐ Heritage Area
Design Review	☒ N/A ☐ Local Design Review Panel ☐ State Design Review Panel ☐ Other
Bushfire Prone Area	Yes
Swan River Trust Area	No

Proposal:

The proposed development is for a Noxious Industry (Carbon Recycling Facility) with key activities being the acceptance and processing of a range of solid and liquid organic wastes to produce compost and similar products. These waste products are listed below:

1. Liquid wastes, consisting mainly of fertiliser wash waters;
2. Mixed source separated kerbside food organic garden organic (FOGO) wastes;
3. Commercial food waste; and
4. Natural fibrous organics.

The proposal, when fully operational will have the capacity to process 200,000 tonnes of solid organic materials and 60,000 tonnes of liquid wastes for recycling per annum.

At completion, the facility will cover a footprint of approximately 10ha. The footprint would be predominately contained to a single location in the south eastern portion of Lot 9500. More precisely the predominant footprint would be 142m from the southern boundary and 1.2km from the eastern boundary of Lot 9500. An administration office and weighbridge would also be provided approximately 500m to the north of the processing facility, adjacent to the recently constructed road access to the site.

The proposal is intended to be undertaken in 2 stages.

Stage 1 (refer **attachment 1b**) as proposed is approximately 5ha and would incorporate:

1. Office and crib room with footprint of approximately 200m^2 including verandahs;
2. Workshop of 500m^2;
3. Receival hall of 3,300m^2;
4. Carbon storage area of 12,390m^2;
5. Processing Area A structure of approximately 9,600m^2 (84m x 114.45m x 8m);
6. Processing Area B structure of approximately 9,600m^2 (84m x 114.45m x 8m);
7. Screening and dispatch area of approximately 13,520m^2;
8. Liquid waste receival area;
9. Liquid waste tank farm;
10. Leachate ponds;
11. Stormwater pond; and
12. Groundwater control drains.

Stage 2 (refer **attachment 1c**) will essentially duplicate stage 1 except as follows:

1. No additional office and crib room;
2. No additional workshop;
3. Modified carbon storage area – excludes tank farm footprint; and
4. No additional liquid waste receival area.

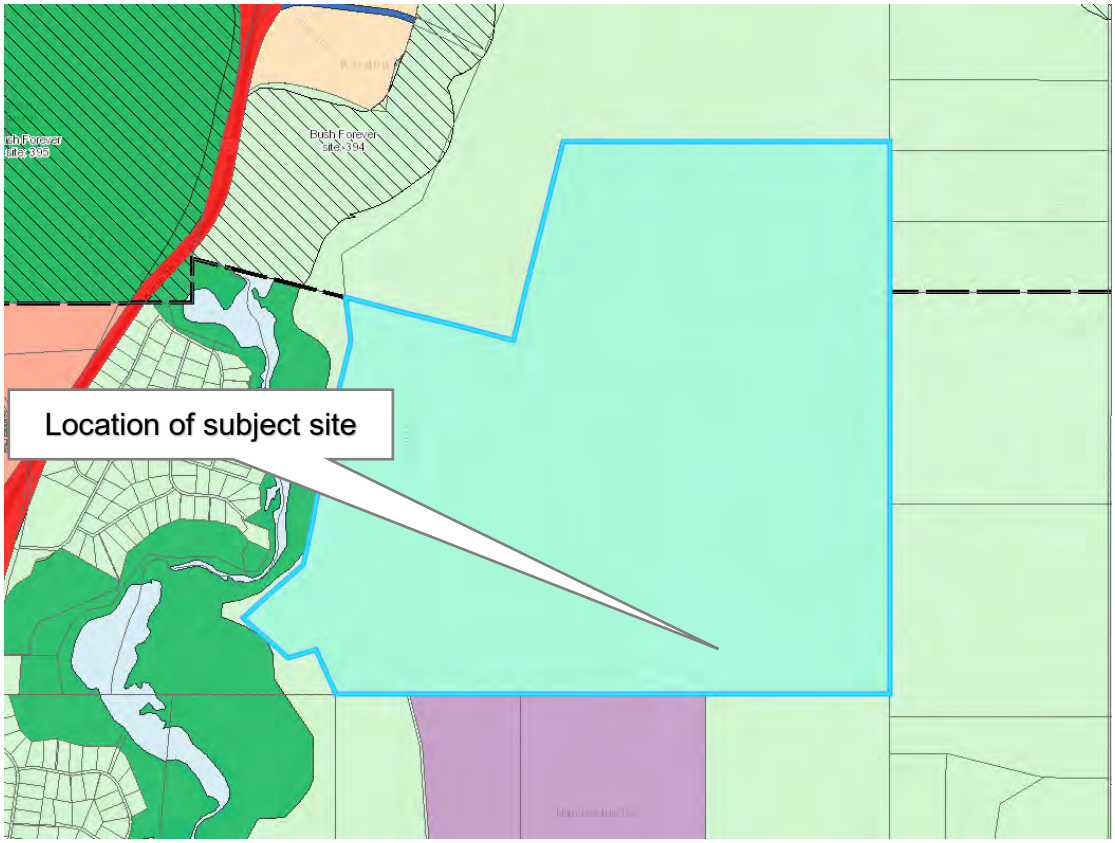
Stage 2 construction is expected to commence within two to three years of Stage 1 becoming operational.

Background:

Lot 9500 (**the Land**) is currently owned by DevelopmentWA, with DevelopmentWA leasing a section of the subject Land to the proponent. The Land measures approximately 1,608.9031 hectares (ha), with the lease area being approximately 269ha.

The lease area is vacant with scattered areas of cleared land and remnant vegetation contained within a variety of wetlands. Specifically, this vegetation consists of Conservation Category Wetlands, Resource Enhancement Wetlands and also Multiple Use Wetlands. Historically, it is understood that the Land has been used for agricultural purposes predominately related to extensive livestock grazing.

The Land is zoned ‘Rural’ under both the Peel Region Scheme (PRS) and the Shire’s Local Planning Scheme No.4 (LPS4). Abutting lands are predominately zoned Rural under the PRS and applicable Local Planning Schemes (Shire of Murray, City of Rockingham and Shire of Serpentine Jarrahdale). However, some adjoining lands to the south are zoned Industrial under the PRS and some abutting lands to the west are reserved for Regional Open Space under the PRS.



Peel Region Scheme zoning image

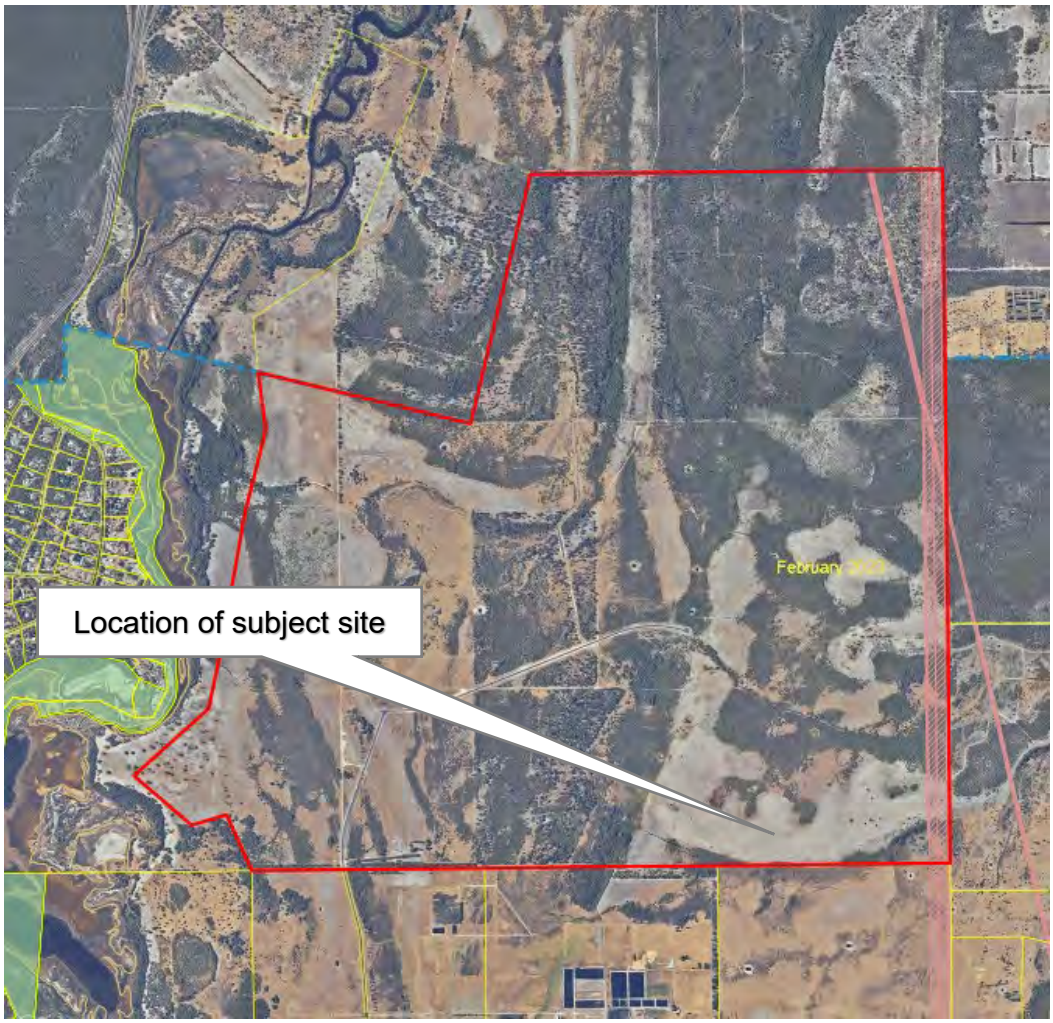
Local Planning Schemes zoning image

It is noted that numerous other zonings and reservation have been applied to sites located within 2km of the Land under both the Peel Region Scheme and applicable Local Planning Schemes. Furthermore, the Nambeelup Industrial Area District Structure Plan provides for expansion of Industrial lands abutting the southern boundary of the Land in support of the 'Transform Peel' initiative. At full buildout the Nambeelup Industrial Area is envisaged to support 33,000 jobs.

The intended operator of the proposed facility (C-Wise) currently operates a similar composting facility at an adjoining property to the immediate south of the subject Land at 230 Gull Road, Nambeelup. The application seeks to relocate those existing operations to the Land as Stage 2 of the development.

The existing C-Wise facility, is collocated with a Piggery and Mushroom Farm. A substantial number of community complaints have been made over many years relating to odour impacts originating from the location of these businesses.

During advertising of the application 83 submissions were received. Whilst submissions focussed on multiple themes, concerns regarding odour and health impacts associated with odour were prevalent. Many submissions focused on concerns that the proposed facility would exacerbate odour related amenity impacts already being experienced. Odour is discussed in detail under the 'Odour Impacts' section of this report.



An aerial photograph depicting the lot.

Legislation and Policy:

Legislation

- Planning and Development (Local Planning Schemes) Regulations 2015 (Regulations).
- Peel Region Scheme (PRS)
- Shire of Murray Local Planning Scheme No.4 (LPS4).

State Government Policies

- State Planning Policy 2.1 Peel-Harvey Coastal Plain Catchment (SPP2.1)
- State Planning Policy 2.5 Rural Planning (SPP2.5)
- Draft State Planning Policy 2.9 Planning for Water (SPP 2.9)
- State Planning Policy 3.7 Planning in Bushfire Prone Areas (SPP3.7)
- State Planning Policy 4.1 Industrial Interface (SPP4.1)
- EPA GS3 – Separation Distances between Industrial and Sensitive Land Uses (GS3)
- Perth and Peel @ 3.5 million
- South Metropolitan Peel Sub-regional Planning Framework
- Government Sewerage Policy (Government of Western Australia, 2019)

Local Policies

- Biodiversity Protection
- General Development Provisions Building Setbacks, Car Parking Standards
- Mosquito
- Vegetation Management
- Water Sensitive Urban Design
- Signs Local Planning Policy.

Consultation:

Public Consultation

In accordance with Regulation 64 of the Deemed Provisions under the *Planning and Development (Local Planning Schemes) Regulations 2015*. Public consultation was undertaken as follows:

- Notice sent to landowners of properties located within 500m of the development footprint;
- Notice sent to adjoining local governments:
    - City of Mandurah;
    - City of Rockingham;
- Notice in the Mandurah Times newspaper;
- Notice on the Shire's website.

The advertising period was 28 days from 17 January to 14 February 2024. Hard copies of the application and supporting documents were available for inspection online and at the Shire's Administration Office and Library for the duration of the advertising period.

Eighty-three (83) submissions were received (refer **attachment 3a**). All submissions raised matters of concern. The concerns have been grouped into themes and summarised as follows:

- Odour (79) – impacts of emissions on amenity;
- Residential enjoyment (29) – impacts on residential enjoyment of private properties;
- Health (17) – impacts of emissions on health;
- Devaluation (9) – impact of land use on property prices;
- Environment (8) – impact of land use on environment relating to air emissions and potential leachate and nutrient loading impacting soils and water;
- Location (7) – Land use conflicts due to proximity to residential areas, inconsistent with rural character, expectation to be located within industrial zone; and
- Consultation (6) – Insufficient consultation.

Whilst many of the submissions where explicit in their opposition to the proposal, the majority raised matters of concern implying opposition to the proposal. Two (2) submissions expressed some level of support. The level of support was caveated on the basis of specific local benefit or other unrelated agendas be met.

Issue Raised	**Officer comments**
Odour	The majority of the submissions (79) highlighted existing odour issues impacting on the amenity experienced at their property or in vicinity of the proposal. Importantly, as the application is not retrospective, the proposal itself cannot be responsible for existing odours experienced by the submitters. However, many submissions also were concerned about cumulative odour impacts or increased impacts occurring as a consequence of the proposed development. Exacerbating submitters concerns is that many submitters attribute existing odour concerns to the existing C-Wise facilities. Relevantly, all activities at the existing C-Wise facility are to be relocated to the proposed facility as part of Stage 2. It is noted that DWER have recently issued an Environmental Protection Notice against the existing nearby odour emitting businesses located within the Nambeelup area in response to complaints and their investigations. As the proposed facility is intended to incorporate all activities undertaken at the existing facility with the construction of stage 2, it is clear that odour emissions will result and adversely impact on surrounding lands unless appropriate controls are implemented to prevent odour emissions.

	This is a relevant planning consideration and considered further within this odour impacts section of this report.
Residential enjoyment	Twenty-nine (29) of the submissions made reference to residential enjoyment or quality of life concerns. Concerns related to existing odours and identified impacts such as: • Not being able to go outside; • Not being able to run air conditioners; • Not being able to open windows. The concerns are based on community experiences relating to the existing land uses and activities occurring in proximity to the land. Given that recent DWER investigations have identified more than one of the nearby businesses as being 'a source of the odours identified in the community', it is unclear if the resident enjoyment impacts are attributed to activities that are intended to be relocated to the proposed facility at Stage 2. These issues are discussed further under the Odour impacts and potential land use conflict sections of this report.
Health	Seventeen (17) of the submissions referenced health concerns. These concerns included details of physical health symptoms related to existing odours, such as nausea and headaches. These concerns primarily relate back to the odour concern and provides context to the nature and intensity of odours experienced by submitters. Concerns are based on community experiences relating to existing land uses and activities occurring in proximity to the land. Given that recent DWER investigations have identified more than one of the nearby businesses as being 'a source of the odours identified in the community', it is unclear if the health impacts are attributed to activities that are intended to be relocated to the proposed facility at Stage 2. These issues are discussed further under the Odour impacts and potential land use conflict sections of this report.
Devaluation	Adverse impacts on property prices have been raised in nine (9) submissions. This is not a relevant planning consideration.
Environment	Eight (8) submissions raised environmental concerns. Whilst most were general in nature and did not expand on those concerns, the following concerns were raised: • air emissions/pollution • location within a water catchment

	• nutrient outflow • impact on wildlife and livestock • leachate spillage/leaks • water table contamination One (1) submission asked if an Environmental Management Plan had been prepared. An Environmental Assessment and Management Plan (EAMP) had been prepared and had been made available on the Shire's website during the public consultation period. In addition, hard copies were available for viewing at the Shire's offices and library. One (1) submission highlighted the benefits of recycling organics and keeping them out of landfill. The environmental concerns raised are relevant planning matters and are considered further within the environmental impacts section of the report.
Location	Seven (7) submissions raised concerns regarding the location of the proposed facility. These concerns related to: • land use conflicts due to proximity to residential areas • inconsistent with rural character • more appropriately located within an industrial zone. It is noted that 'Noxious Industry' is a discretionary "SA" land use within the rural zone and that whilst other land may also be capable of containing the development, the application is for the Land (Lot 9500) and needs to be considered on merit. This is a relevant planning consideration and considered further within this potential land use conflict section of the report.
Consultation	Six (6) submissions highlighted concerns with the public consultation process. Most concerns appear to be related to pre-lodgement consultation undertaken by the proponent. However, some submissions raised concerns that they were not directly notified and only found out about the application via the media. This resulted in the submitters only becoming aware of the submission period part way through the period limiting the timeframe available for them to make a submission. One (1) submission was clear in their concerns relating to direct notification of landowners within proximity to the development. Concerns related to the adequacy of distances chosen for direct notification.

	This is a relevant planning consideration and a response / assessment provided below. Public consultation is a mandatory requirement for "SA" land uses. In this regard, the Deemed Provisions specify minimum requirements for advertising. Advertising by the Shire occurred as follows: • Public notice in the Mandurah Times newspaper • Public notice on the Shire's webpage and via social media accounts. • Letters sent to landowners within 500m of the development footprint. • Hard Copies of the application made available for inspection at Shire offices and library. In considering who to directly notify, due regard was had to the following: • Pre-lodgement consultation that had been undertaken by the proponent • EPA's Separation Distances between Industrial and Sensitive Land Uses. • Other forms of advertising to be undertaken. The advertising undertaken exceeded the minimum requirements specified in the Deemed Provisions. Pre-lodgement consultation by proponents is voluntary but should be encouraged particularly when it can assist in providing information to potential impacted persons and enable potential concerns to be addressed prior to lodgement. In this regard, it is admirable that the proponent chose to undertake pre-lodgement consultation. Unfortunately, how or even if these consultations have occurred has been brought to question in multiple submissions.

The applicant has also reviewed the submissions and provided a response (refer **Attachment 3b**). The applicant summarised the key themes raised in submissions as follows:

- Odour;
- Health;
- Property values;
- Environment;
- Consultation;
- Location;
- Management Plans;
- Development Potential;
- Dust;
- Employment;
- Modelling;

- Need;
- Scale.

The applicant's response to submissions is noted and has been considered when responding to planning matters at the relevant sections of this assessment report.

Referrals/consultation with Government/Service Agencies

The proposal was referred to the following government agencies:

- Environmental Protection Authority (EPA);
- Department of Planning Lands and Heritage (DPLH);
- Department of Water and Environment Regulation (DWER);
- Department of Mines, Industry Regulation and Safety (DMIRS);
- Department of Fire and Emergency Services (DFES);
- Department of Primary Industries and Regional Development (DPIRD); and
- WA Health.

All agency responses at located at **Attachment 4.**

Where relevant the comments and recommendations are discussed below.

Department of Mines, Industry Regulation and Safety (DMIRS)
Did not object to the proposal. Advised the proposal would be located over a Titanium - Zirconium resource. They would prefer the facility to be located outside of the resource envelope.
Shire Comment The existence of a Titanium - Zirconium resource is noted. Any relocation of the proposed facility should consider all relevant matters including but not limited to: • The Titanium - Zirconium resource • Bushfire risk • Native vegetation impacts • Odour buffers
Department of Fire and Emergency Services (DFES)
Modifications to the Bushfire Management Plan (BMP) are required. DFES noted that the land use is considered to be high risk within a bushfire prone area and identified the proposal is not compliant with performance principles. They further advised the BMP has assessed the development against Elements 1 – 4 of the *Guidelines for Planning in Bushfire Prone Areas* as a high-risk land use and Element 5 as a tourism day use. Numerous concerns were raised regarding the assessment including: • The occasional school visit is ancillary to the standard business operation and does not warrant the land use being classed as a vulnerable tourism land use or an assessment under Element 5 of the Guidelines.

- A 'Method 2' assessment has been undertaken but not validated.
- Sheltering on site does not address the performance principles for vehicular access and is therefore is not accepted as an alternative solution.

DFES further stated whilst provision of a 50,000L water tank for fire fighting purposes complies, additional water may be required to address structural firefighting requirements. This matter can be addressed at the building stage.

Shire Comment

Noted. The applicant provided additional commentary in response to concerns raised by DFES. However, they are seeking that a performance-based solution for Element 3 Vehicular Access, be supported by the decision maker. Therefore, should JDAP wish to support the application, it will need to be satisfied that the performance-based solution is appropriate or that risks can reasonably be addressed via conditions of approval.

This matter is discussed further in the Bushfire Impacts section of this report.

Department of Water and Environmental Regulation (DWER)

Did not object to the proposal.

Stated Lot 9500 was reported as a known or suspected contaminated site under section 11 of the Contaminated Sites Act 2003 (CS Act) on 22 May 2007.

Whilst not yet classified under the CS Act, a position was provided that it is unlikely that identified groundwater contamination is migrating in a northerly direction to affect the site. Therefore, the site is likely to be classified as report not substantiated under the CS Act in due course.

No conditions or advice notes are recommended in relation to contamination.

The site was also advised to be at a moderate to low risk of acid sulphate soils occurring within three metres of the natural surface, but high to moderate risk of acid sulphate soils beyond three metres below the natural soil surface.

An advice note is recommended in relation to acid sulphate soils.

Numerous approval processes in addition to development approval were identified that would need to be obtained. It was stated where applications had been received for those required approvals and their status at the time of referral. Of those applications that had been received all were currently under assessment.

Information was provided on relevant environmental regulation and identified documents that development must meet with and/or where due regard is required. These are:

- Stormwater Management Manual for Western Australia (DWER, 2022)
- Stormwater Management in Western Australia (DWER, 2017)
- Government Sewerage Policy (Government of Western Australia, 2019)

DWER also stated the proponent is to be advised that the proposal is located within the Peel-Harvey Coastal Plain Catchment and the provision of the *Environmental Protection (Peel Inlet – Harvey Estuary) Policy 1992*, the *State Planning Policy No*

2.1, Peel-Harvey Coastal Plain Catchment (SPP 2.1) and the Draft *State Planning Policy 2.9 Planning for Water* (SPP 2.9) shall apply.

Shire Comment

The advice of DWER is noted. Whilst reference was made regarding multiple documents that must be met or should be met with, no position of DWER was provided, except that it did not object to the proposal.

Odour has been identified as a significant issue for the proposal. In this regard, DWER's advice was limited to:

- The proposed facility is a 'prescribed premises' requiring a Works Approval.
- A Works Approval application has been submitted and is under assessment.
- The Environment Protection Act makes it an offense to cause an emission or discharge from a prescribed premise unless there is a holder of a works approval and the emission/discharge is in accordance with that approval.

It is unclear whether there was sufficient information available to DWER regarding odour emissions/discharges to address their regulatory requirements. Whilst the Works Approval will ultimately regulate emissions/discharges, the amenity impacts of and potential land use conflicts that could occur as a consequence of odour are relevant planning matters that need to be considered during the assessment of the planning application.

These matters are considered further at the Odour Impacts section of this report.

Department of Planning Lands and Heritage (DPLH)

Advised the Western Australian Planning Commission (WAPC) has delegated its authority to the Shire of Murray to determine the application under the Peel Region Scheme.

DPLH also provided details of relevant considerations for the Shire when making its recommendation to JDAP. This includes:

- The purpose of the rural zone
- SPP2.5 Rural Planning
- South Metropolitan and Peel Sub-Regional Planning Framework (Framework)
- A Conservation Category Wetland (CCW) is immediately adjacent to the development site

The Framework identifies Lot 9500 as 'Rural' with the annotation "Keralup (east) – Further Investigation to consider alternate (non-urban) future uses". No further investigation has been carried out in this regard by the WAPC, other than the technical information supporting the application.

The Framework also identifies a 'Proposed Regional Road' which appears to traverse the development site. The proposed development could prejudice more detailed planning required for this alignment, the development should avoid or account for this alignment.

Recommended referral to DWER and Department of Biodiversity, Conservation and Attractions (DBCA).
Shire Comment The advice of DPLH is noted. The applicant's submission included an application for approval under the PRS. The Shire was of the view that approval was required under the applicable PRS Clause 21 resolution as the development may not be consistent with the purposes of the rural zone. Under the relevant Instrument of Delegation, the Shire has the delegation to determine such applications and therefore in the case of this JDAP application a separate Responsible Authority Report from DPLH is not needed. Whether the technical information is sufficient to support the discretionary land use in lieu of further investigations being completed will need careful consideration. This will likely hinge on whether the land use is consistent with the current 'rural' zoning and/or will prejudice further investigations relating to the potential for Keralup East precinct being developed for alternative non-urban uses. This matter is considered further at the Potential Land Use Conflicts section of this report.
Department of Health (DoH)
DoH required connection to scheme water and reticulated sewerage as per *the Government Sewerage Policy 2019*. DoH expressed concern with the proposal given its proximity to sensitive land uses, noting that the adjoining neighbouring private residence is much less than the 100m, boundary to boundary, specified under the EPA Environmental Assessment Guideline (EAG) 3 '*Guidance for the Assessment of Environmental Factors No. 3 – Separation Distances between Industrial and Sensitive Land Uses.*' DoH recommended that some form of barrier, whether vegetation or built form, be installed between the proposal and existing residence.
Shire Comment The location of the proposed development is such that the nearest existing dwelling /sensitive receptor is approximately 2.57km from the development footprint. Separation distances and potential land use conflicts are an important consideration and explored further in the potential land use conflicts section of this report.

The applicant has also reviewed the agency submissions (refer **attachment 3b**). The applicant's response to agency submissions is noted and has been considered when responding to planning matters at the relevant sections of this assessment report.

Design Review Panel Advice

Not applicable.

Other Advice

Not applicable.

Planning Assessment:

The proposal has been assessed against all the relevant legislative requirements of the Scheme, State and Local Planning Policies outlined in the Legislation and Policy section of this report. The following matters have been identified as key considerations for the determination of this application:

- Odour impacts;
- Environmental impacts;
- Bushfire impacts; and
- Potential Land Use conflicts.

These matters are outlined and discussed below.

Odour Impacts

Odour impacts were the most commonly referenced concern or theme raised during public consultation.

It is noted that most submissions referenced concerns relating to current odours experienced as opposed to direct comments on the proposed development and/or details contained within the associated Odour Impact Assessment. Many submissions specifically reference the existing nearby C-Wise operated composting facility. This is relevant as the original Odour Impact Assessment included model projections based on the existing C-Wise operations as opposed to the proposed facility. It is noted C-Wise is the intended operator of the proposed facility which will relocate activities currently undertaken at the existing facility as part of Stage 2 which is included in the application being considered.

Submitters concerns with odour included:

- Adverse health symptoms including nausea, headaches and sleep issues;
- Impacts on residential enjoyment with adverse odours impacting on use of outdoor areas, opening of windows and use of air conditioners.

The originally submitted Odour Impact Assessment modelling projections raised concerns about how odour would be managed and that expansive offsite impacts would result from the proposed facility. Significant discussions and correspondence between the Shire, applicant and odour consultant ensued. Ultimately, the consultant who prepared the Odour Impact Assessment and an independent odour consultant expert acting on behalf of the Shire were tasked with reaching a consensus on whether the proposal would result in off-site impacts and if so, are those impacts acceptable.

The outcome of this work was that the odour experts were able to reach a consensus that by implementing certain odour control measures, any off-site impacts resulting from the proposed facility would be acceptable from an odour perspective. In reaching this conclusion the following matters were considered and consensus achieved:

1. Identifying odour levels that the experts were in agreeance would be unlikely to cause nuisance to offsite properties based on their planning characteristics (i.e. land zoning having regard to existing, permitted and discretionary land uses).
2. Incorporating odour control systems to limit offsite emissions from the proposed facility to the agreed levels that were unlikely to cause nuisance offsite.
3. Providing appropriate levels of detail on the odour control systems to be used and modelling resulting emissions that reflect point 1 & 2.

The odour experts had due regard to a range of regulatory frameworks relating to odour as well as the planning framework applying to the land and that of nearby properties. From that they determined that acceptable offsite odour levels would be:

- 5 odour units per m^3 at the 99.5 percentile ($C_{99.5\ 1hr}$ = 5 ou) for industrial zoned lands. Essentially this means that the 44th worst hour of the year to result in emissions of no more than 5 odour units per cubic metre at nearby industrial zoned lands.
- 2.5 odour units per m^3 at the 99.5 percentile ($C_{99.5\ 1hr}$ = 2.5 ou) for residential and special rural zoned lands. Essentially this means that the 44th worst hour of the year to result in emissions of no more than 2.5 odour units per cubic metre at nearby residential and special rural zoned lands.

To provide context of the odour unit levels, the following is helpful:

> *In general, a ground level odour concentration of 7-10 odour units best represents the concentration of an odour mixture in ambient air where an observer may be able to both detect and recognise an odour, that is; detect an odour. (i.e., I smell an odour) and positively assign its odour character to a known odour source (recognition).*

At the 2.5 odour units per m^3 modelled to occur at the boundary of the land, a person may be able to detect an odour but not to an extent where it would be recognisable.

To achieve these acceptable offsite impacts, odour control measures are required to be introduced on areas where odour concentrations would otherwise create unacceptable offsite impacts. In this case these odour control measures include biofilters and stacks. The control measures proposed, will see the malodours (i.e. offensive smells) being removed and replaced by a more natural 'bark' type odour.

Conceptual details have been provided for the odour control systems (refer **attachment 5a**) and are considered to be appropriate for planning purposes. However, conditions (odour) have been recommended that will provide for further detailed design and implementation prior to the use commencing. An addendum to the odour impact assessment has been provided which focuses on the odour matters relevant to this planning assessment. Some minor changes are recommended for clarity should DAP decided to approve the proposal (refer to **condition 8**). The modelled odour footprint based on the introduction of the proposed control measures can be seen in Figure 3 from the Addendum (refer **attachment 5a** and shown next page).

Whilst the initial broader odour impact assessment has been useful for understanding existing odours and is necessary for obtaining DWER's works approval to operate, it's primary benefit for the planning application assessment is the odour modelling relating to the existing C-Wise facility which has been a key contributor to the community

concerns raised in submissions. When shown in conjunction with figure 3 from the addendum, it is clear that improved odour outcomes will be achieved by the proposal (assuming the existing facility is decommissioned once stage 2 becomes operational as intended). However, it is important to note that this is an indirect odour improvement and the proposal itself won't directly result in changes to odour emissions and experiences of community relating to existing development.

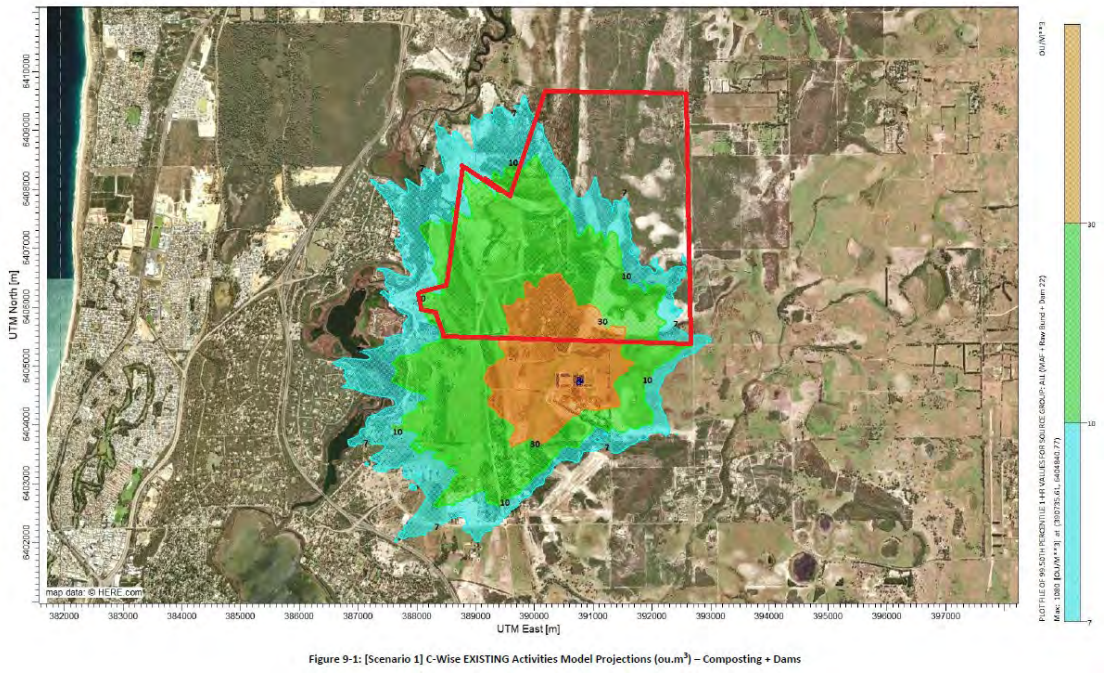


Figure 9-1: [Scenario 1] C-Wise EXISTING Activities Model Projections (ou.m^3) – Composting + Dams

C-Wise existing activities modelling projections

Figure 3: Facility Biofilters & Receivals Buildings' Odour Footprint

Figure 3 Facility Biofilters & Receivals Buildings Odour Footprint (proposed development)

When considering the proposal individually, the information provided has indicated that some minimal offsite impacts related to odour may be experienced. However, consensus has been obtained from two odour experts, including the independent expert, that any offsite impacts would be acceptable and unlikely to cause nuisance.

There are a range of additional odour related conditions recommended to ensure the proposal is easily able to accept additional odour control systems; predicted odour levels are verified upon first operation; complaints management procedures are implemented; and contingencies undertaken if necessary.

Environmental impacts

The application included an Environmental Assessment and Management Plan as well as a Surface Water and Leachate Management Plan. These plans have identified key environmental issues such as:

- Flora and fauna including proposed clearing to facilitate the development;
- Geology matters including contamination and acid sulphate soil investigations;
- Groundwater and surface water studies and protection measures to be incorporated into development;
- Wetland identification and protection measures;
- Aboriginal heritage; and
- Noise and dust management considerations for proposed development.

A flora and vegetation assessment has been undertaken which identified the types and quality of vegetation on site as well as informed the intended location of the facility. The development footprint will predominately cover an area of clear pasture and areas of degraded vegetation. However, a clearing permit will still be required to clear 6.55ha of native vegetation and has been lodged with DWER. If approved, it is recommended that fauna relocation be undertaken prior to commencement of clearing.

The site has been reported to DWER as being a known or suspected contaminated site. Details provided by DWER having indicated no information suggesting possible contamination which is likely to result in the site being classified 'report not substantiated' in due course. Additionally, the site has been identified as being of a moderate to low risk of Acid Sulphate Soils within 1-3m of the surface (i.e. the area likely to be disturbed if the development is approved). In the event Acid Sulphate Soils are encountered, management measures in accordance with DWER guidelines are intended to be undertaken.

Extensive groundwater studies have been undertaken and the development footprint located in part to maximise separation distances to groundwater. Additionally, it is intended to establish controlled groundwater levels which will require licencing by DWER. An amendment to an existing licence has been submitted to DWER in relation to this matter.

Groundwater protection measures are proposed which includes the majority of infrastructure being located greater than 2m above the controlled groundwater levels. DPIRD has advised that a minimum 2m separation to groundwater is recommended and if not achieved additional engineering controls are required. Whilst, leachate ponds are proposed with only 1.5m separation to groundwater, the following controls are proposed:

- 300mm thick Compacted Subgrade Layer;
- Geosynthetic Clay Liner (GCL); and

- 2mm thick HDPE Geomembrane.

DPIRD acknowledged the proposed controls but were unable to comment on their appropriateness. These proposed controls appear appropriate however, if approved, it is recommended that groundwater monitoring be undertaken (via the water management plan – **condition 19**). In the event contamination of groundwater is observed, rectification works should be required.
The land contains portions of two unnamed palusplain Conservation Category Wetlands (CCW). These CCW's are located at least 50m from the proposed development footprint with most infrastructure being at least 100m away. Fencing is proposed between the development footprint and 50m buffer distance to the CCW's. If approved, it is recommended that wetland monitoring be undertaken and provided to the Shire annually (refer **condition 3**).

Due diligence of aboriginal heritage significance was supported by a previous ethnographic and archaeological survey that had been undertaken on the land. No registered sites are located on the land and as such no impact on aboriginal cultural heritage is envisaged.

There is potential for noise and dust generation during operations. However, due to separation distances to sensitive receptors and proposed operational management risks have been classified as 'low'. It is considered that construction is likely to present greater risk of adverse noise and dust generation and therefore should the application be approved it is recommended that a Construction Management Plan be prepared and implemented to ensure appropriate amenity outcomes related to these potential issues (refer **condition 1**).

Bushfire Impacts

As the Land has been identified as bushfire prone, SPP3.7 is applicable. Under SPP3.7, the facility was classified as a 'high risk facility' requiring a Bushfire Management Plan (BMP) to be prepared and referral to DFES.

DFES raised a number of concerns and issues of non-compliance with SPP3.7. Issues raised include:

- Element 5 of the BMP being prepared on the basis of a vulnerable tourism land use is not warranted;
- Preparation of BAL contour map under method 2 has not been validated;
- Vehicle access requirements of the Bushfire Protection Criteria do not comply or have not been demonstrated;
- Proposed sheltering onsite is not accepted as an alternative solution.

The applicant provided a response to concerns raised by DFES (refer **attachment 3b**). However, they have sought the decision maker to agree to a performance principle solution in response to Element 3 Vehicle access of the Guidelines for Planning in Bushfire Prone Areas (Bushfire Guidelines).

The Bushfire Guidelines include development descriptors with the relevant descriptor for this application type being 'development application for any other development'. Therefore, there are 4 applicable 'vehicle access' requirements. They are:

- A3.1 Public roads
- A3.2a Multiple access routes
- A3.2b Emergency access way
- A3.6 Private driveways

The proposal does not meet the acceptable solutions for A3.2a and A3.2b being multiple access routes and emergency access way (EAW) and are therefore seeking approval of a performance principle solution.

The performance principle to be met is:

> *The design and capacity of vehicular access and egress is to provide for the community to evacuate to a suitable destination before a bushfire arrives at the site, allowing emergency services personnel to attend the site and/or hazard vegetation.*

In summary, the applicant has contended that by providing 3 different destinations for evacuees to travel the performance principle is achieved. These destinations are stated as:

1. Vehicular access is provided to Gull Road;
2. Vehicular access is provided to the EAW which travels to Yangedi Road; and
3. A dedicated onsite Shelter that is located within a BAL-12.5 area

Importantly, the BMP only references the onsite shelter and not the EAW.

Whilst the acceptable solution of multiple access routes is not met, long term plans are for access from Gull Road to be extended east to Yangedi Road which would provide for two access routes (west and east) along Gull Road to the land. In the long term, this will be constructed and dedicated as a public road. However, in the interim, the landowner of Lot 9500 is negotiating with the landowner to the east and liaising with the Shire with the intent of providing an approximately 3.2km *restricted public EAW* or *right-of-carriageway EAW.*

Regardless of which interim EAW option is progressed, the intent is that access will not be permitted during non-emergency periods. In practicality, this will see the EAW gated and locked. In principle agreement has been received from all impacted parties on these terms. The EAW is intended to be secured by easement under section 195 of the *Land Administration Act 1997*. The option chosen will ultimately be dependent on who will be needing and receiving benefit of the *EAW*. It is expected that as a minimum the benefactors would include all of Lot 9500.

Actual construction of the EAW is intended to be undertaken by the Shire on behalf of the landowner of Lot 9500 (Development WA) and will be constructed to the bushfire guidelines specifications for an EAW. However, as the EAW length would be approximately 3.2km, it will be greater than 500m allowed for the ‘acceptable solution’ for an EAW to be met.

Whilst it will not meet the ‘acceptable solution’ for an EAW, it is considered to meet the performance principle as it will provide a practical path of vehicle travel in an alternate direction from which the public road access is available (i.e. to the east whereas Gull Road is available to egress to the west). Although the access would be approximately 3.2km in length, it would be predominately straight and constructed to the EAW standards of the bushfire guidelines. Therefore, it is considered appropriate for vehicle egress in a bushfire emergency.

Given the EAW is being progressed by a third party (the landowner of Lot 9500), if supported, it would be appropriate to require the BMP to be amended to include the

EAW requirement to be secured and constructed prior to occupation of the use (refer **condition 26**)

In addition, to the EAW, on site shelter is proposed by the applicant. Importantly, this is the only alternate solution currently provided for in the BMP to achieve the performance principle.

DFES have rightly pointed out that an onsite refuge is not a substitute for two access routes which provides safe and efficient access and egress for the community, while simultaneously providing a safe operational environment for emergency services personnel. Therefore, onsite shelter as a sole alternate solution is not considered to meet the performance principle intended to be achieved. However, when provided in addition to an EAW, it is considered to be of benefit.

Whilst the performance principle focuses on evacuating the site before a bushfire arrives, the onsite shelter is being proposed on the basis that early evacuation is not possible. Given the high-risk land use classification provided to the facility under SPP3.7, it makes sense that some onsite responses may be needed to minimise risks to both the facility and surrounds should a bushfire reach the site. Additionally, given that the EAW would not meet the 'acceptable solution' requirements, a contingency is desirable.

This is provided for in Section 6.6 of the SPP which identifies development applications for high-risk use should include an emergency evacuation plan and/or a risk management plan for any flammable onsite hazards. In this regard a Bushfire Emergency Plan (BEP) has also been submitted. Importantly, due to the class of buildings proposed within the use under the National Construction Code, bushfire construction requirements would not be mandated. However, the BEP has identified onsite shelter, in the event safe (early) evacuation has not been achieved. Therefore, having a building designed for onsite shelter is an integral component on the BEP. For these reasons it is considered not only appropriate but desirable that a contingency of onsite shelter is provided in the event that safe (early) evacuation has not been achieved.

Potential Land Use conflicts

The subject lot is zoned rural under both the PRS and LPS. Noxious Industry is a 'SA' discretionary land use under the LPS.

Prior to approval being granted under the PRS, the decision maker needs to be satisfied that the land use is consistent with the purpose of the Rural Zone. Prior to approval being granted under the LPS, the decision maker needs to be satisfied that either the land use will not result in offsite impacts or if it will, that those impacts are acceptable.

Is the land use consistent with the purpose of the Rural Zone under the PRS?

Under the PRS the purpose of the Rural Zone is:

> *"to provide for the sustainable use of land for agriculture, assist in the conservation and wise use of natural resources including water, flora, fauna and minerals, provide a distinctive rural landscape setting for the urban areas and accommodate carefully planned rural living developments;*

The following details are relevant:

a) Noxious industry is a discretionary use (SA) under the Rural zone of the Shire of Murray Local Planning Scheme. This indicates that the use, in principle, could be suitable in a rural area but technical analysis and consultation would be required to inform if this would be appropriate.

b) SPP 2.5 Rural Planning defines a 'Rural Land Use' as:
Land uses that are rural in nature and that support and are associated with primary production, basic raw material extraction, biodiversity conservation, natural resource management, public purposes (eg. prisons, cemeteries, public utilities and waste management facilities) and protection of landscapes and views.

Having regard to the above, it is considered that the facility would provide for 'waste management' which is a Rural Land Use envisaged by SPP 2.5. This is further reinforced by cl 6.3.1 of SPP 2.5 which refers to the use of the terms 'noxious' and 'hazardous' in schemes. It is WAPC policy that these terms should not be used in region or local planning schemes. However, the LPS does contain the land use 'Noxious Industry' which is defined as:

> *means an industry in which the process involved constitutes an offensive trade within the meaning of the Health Act, 1911 (as amended) but does not include fish shops or dry cleaning establishments.*

Given this land use is consistent with the type of 'rural' land uses envisaged by SPP2.5 (i.e. waste management facility) and that activities intended to be undertaken at the facility would assist in the conservation and wise use of resources by providing for the recycling of organic materials, it can be concluded that the proposed land use would be consistent with the purpose of the Rural Zone under the PRS. For these reasons, the land use could reasonably be granted approval.

Would the proposed land use result in any offsite impacts?

SPP4.1 requires consideration of off-site impacts. Of relevance is that impacts of land uses should be contained on site and consideration given to applicable standards and guidelines. In this instance the EPA's EAG '*Guidance for the Assessment of Environmental Factors No. 3 – Separation Distances between Industrial and Sensitive Land Uses.*'(separation guideline), and DWER's *Better practice organics recycling* provide guidance (organics guideline). This separation guideline indicates that a generic buffer distance of 150m-1000m should be provided for composting facilities dependent on operational characteristics.

The applicant has provided significant supporting documentation with the application intended to demonstrate that the proposal would not result in adverse impacts or that those impacts would be acceptable. This supporting documentation included:

- Odour Impact Assessment
- Environmental Assessment & Management Plan
- Surface Water & Leachate Management Plan
- Bushfire Management Plan
- Bushfire Emergency Plan
- Bushfire Risk Report
- Traffic Impact Statement,

The documentation has been reviewed and in most regards has provided sufficient information to prove or reasonably demonstrate that impacts will or can be contained on site except for odour. The Odour Impact Assessment included within the Environmental Assessment & Management Plan initially raised concerns. However, as described in the odour impacts section of this report, additional information has been provided by way of an addendum. The additional information includes modelling to a 2.5 odour units per m^3 ($C_{99.5\ 1hr}$ = 2.5 ou) level which shows these odours contained on site. However, some offsite odour impacts will be experienced on occasion.

Are the off-site impacts acceptable?

Acknowledging that the intent around the odour modelling scenarios is not for odour impact compliance purposes, they do provide value in determining the extent of off-site impacts and whether they are acceptable.

It is noted that submissions received that raised odour as a concern extended out to coastal communities including Singleton and Madora Bay. Physical health symptoms such as nausea and headache where raised by submitters in Stake Hill, Lakelands and Meadow Springs. These coastal locations are beyond the 7ou.m3 modelling provided for in Scenario 4 (i.e. existing worst case) of the odour impact assessment.

Having regard to the consequences of similar odours (i.e. from current Nambeelup enterprises) claimed to have been experienced by submitters including physical health symptoms such as nausea and impacts on residential enjoyment of properties, it is likely that odour levels around the 7ou.m3 level would result in nuisance and land use conflicts with nearby residential zoned lands. This is consistent with the two odour experts consensus that stated maximum odour levels of 2.5 odour units per m^3 at the 99.5 percentile ($C_{99.5\ 1hr}$ = 2.5 ou) as being 'acceptable' for residential and special rural zoned lands.

Off-site impacts of odour from the proposal on nearby Industrial Zoned lands (including future Industrial lands planned for under the Nambeelup Industrial Area District Structure Plan) also need to be considered. In this regard, the consensus of the two odour experts was that maximum odour levels of 5 odour units per m^3 at the 99.5 percentile ($C_{99.5\ 1hr}$ = 5 ou) would be 'acceptable' for industrial zoned lands.

After incorporating the proposed odour control measures, modelling shows maximum odour levels of 2.5 odour units per m^3 at the 99.5 percentile ($C_{99.5\ 1hr}$ = 2.5 ou) at the boundary of the land. This is below the 5 odour units per m^3 at the 99.5 percentile ($C_{99.5\ 1hr}$ = 2.5 ou) considered 'acceptable' for these adjoining lands.

<u>Conclusion</u>

The applicant is requesting that the decision maker (DAP) exercise their discretion under both the Peel Region Scheme and Shire of Murray Local Planning Scheme No.4 to approve the proposed Noxious Industry – Carbon Recycling Facility. Through the supporting information it has been demonstrated that the proposal is generally consistent with the planning framework and capable of being supported. Whilst the proposal has been subject to extensive community concern and opposition primarily related to odour, the concerns raised are generally related to issues with existing development and not the proposed development.

It is recommended that DAP exercise their discretion to approve the development subject to conditions.

Alternatives

The DAP may decide to refuse the application with sufficient reasons.

Council Recommendation

N/A

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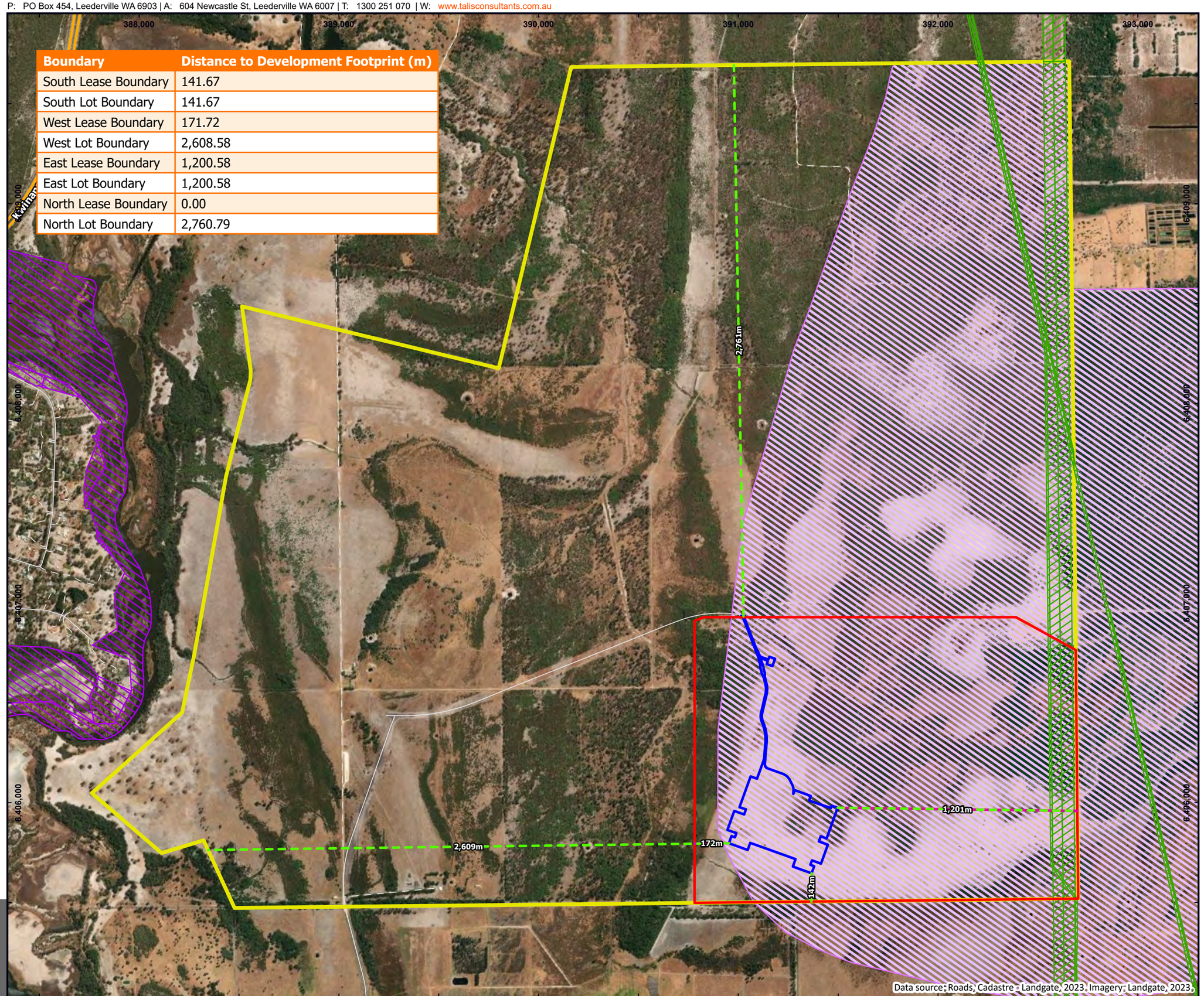
Boundary	Distance to Development Footprint (m)
South Lease Boundary	141.67
South Lot Boundary	141.67
West Lease Boundary	171.72
West Lot Boundary	2,608.58
East Lease Boundary	1,200.58
East Lot Boundary	1,200.58
North Lease Boundary	0.00
North Lot Boundary	2,760.79



LEGEND

- Site Boundary (Proposed Lease Area)
- Development Footprint
- Lot Boundary
- Strategic Minerals & Basic Raw Materials Resource Policy Areas

Separation Distances

- Lease Boundary
- Lot Boundary

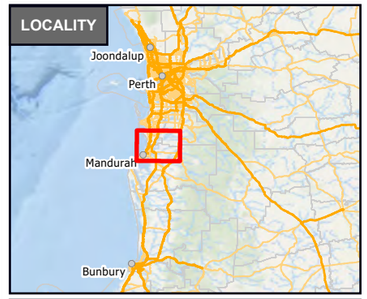
Cadastre

- Easement
- Reserve

Western Australian Roads

- Freeway / Highway
- Minor Road
- Other

LOCALITY



0 50 100 150 200 250 km

BLOCK PLAN

Clearing Permit Application

C-Wise
320 Gull Road
Keralup WA 6182

N 0 200 400 600 800 m

Coordinate System: GDA2020 MGA Zone 50
Scale @ A3: 1:18,000

Prepared:	E Jackson	Date:	5/12/2023
Reviewed:	T Hunter	Revision:	A
Project:	TW21124		

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Figure 18

Document Path: \\server\talis\SECTIONS\Waste\PROJECTS\TW2021\TW21124 - C-WISE Due Diligence and approvals\GIS\Maps\TW21124 - C-Wise - Clearing Permit Application\TW21124 - C-Wise - Clearing Permit Application.aprx

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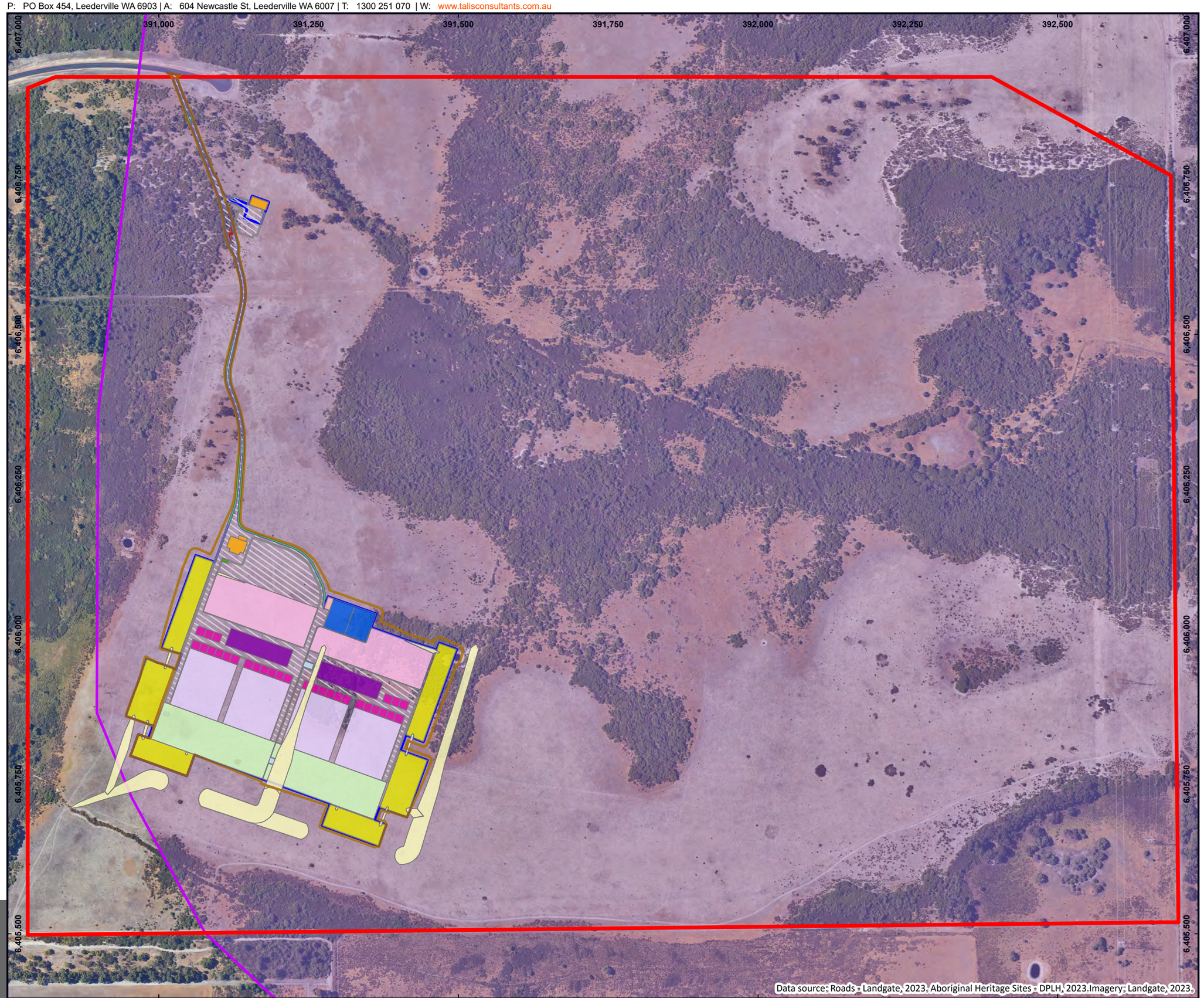


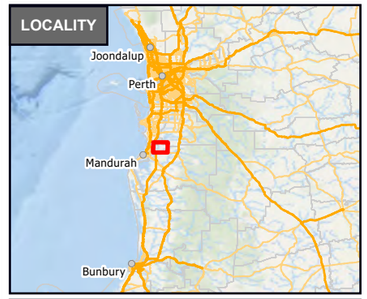
LEGEND

- Site Boundary
- Development Footprint
- Strategic Minerals & Basic Raw Materials Resource Policy Areas

Proposed Site Plan

- Levee
- Ponds
- Stage 2 1m Wall
- Buildings
- Carbon Storage
- Cocoon Area
- Dispatch Area
- Fuel Store
- Process Area
- Recieval Hall
- Stage 2 Ramps
- Tank Farm Areas
- Waste Receival
- Weighbridge
- Road - Edge of Shoulder Formation
- Road - Edge of Seal
- Earthwork boundary

LOCALITY



0 50 100 150 200 250 km

SITE PLAN

Clearing Permit Application

C-Wise
320 Gull Road
Keralup WA 6182

N

0 50 100 150 200 250 m

Coordinate System: GDA2020 MGA Zone 50
Scale @ A3: 1:6,000

Prepared:	E Jackson	Date:	5/12/2023
Reviewed:	T Hunter	Revision:	A
Project:	TW21124		

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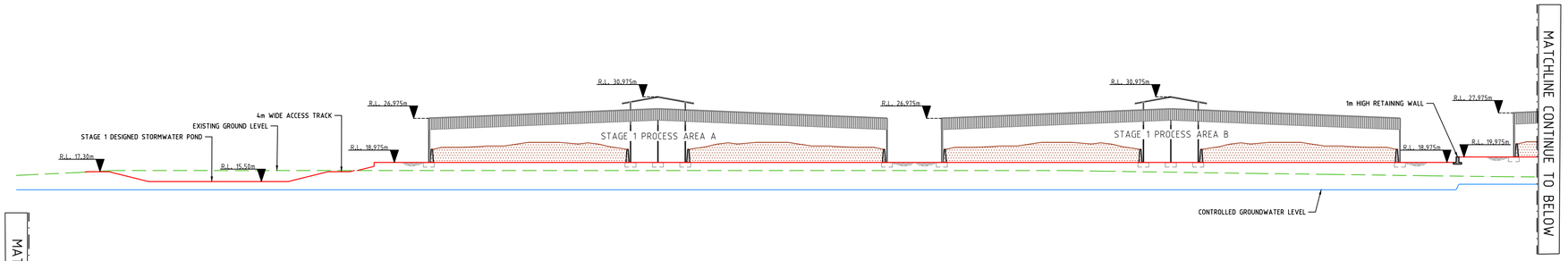
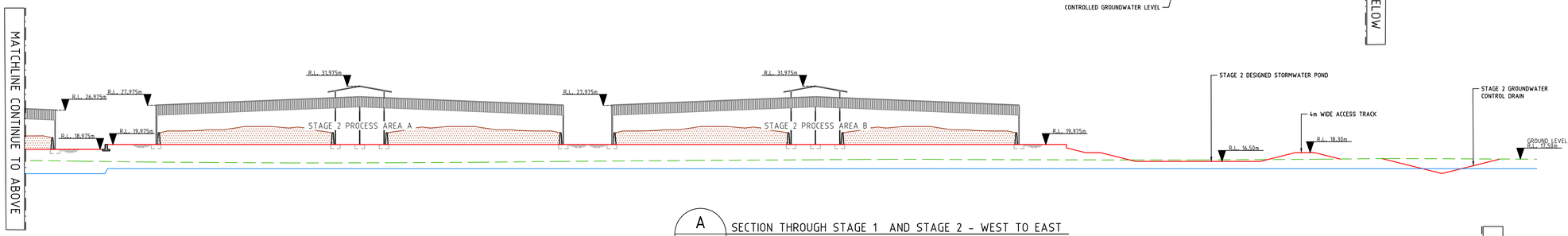
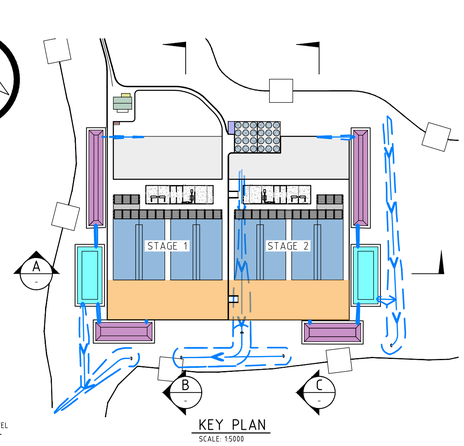
Figure 19

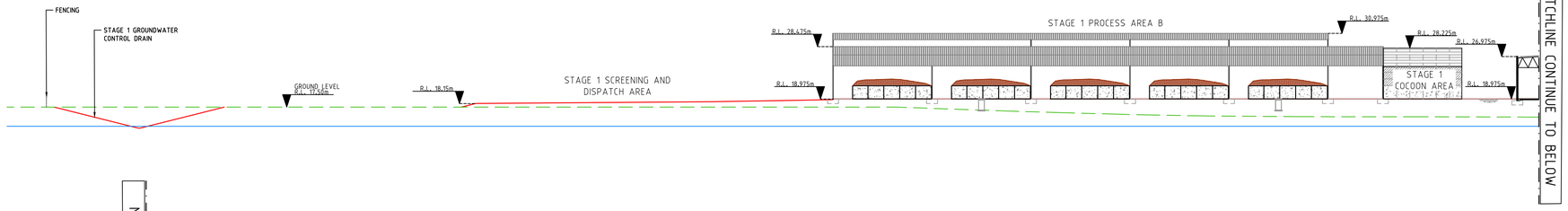
Data source: Roads - Landgate, 2023. Aboriginal Heritage Sites - DPLH, 2023.Imagery: Landgate, 2023.







A — SECTION THROUGH STAGE 1 AND STAGE 2 - WEST TO EAST
SCALE: 1:500



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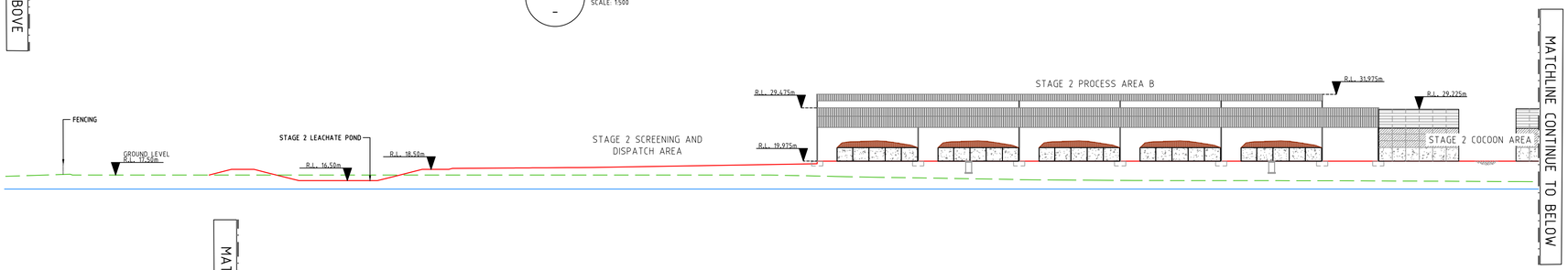
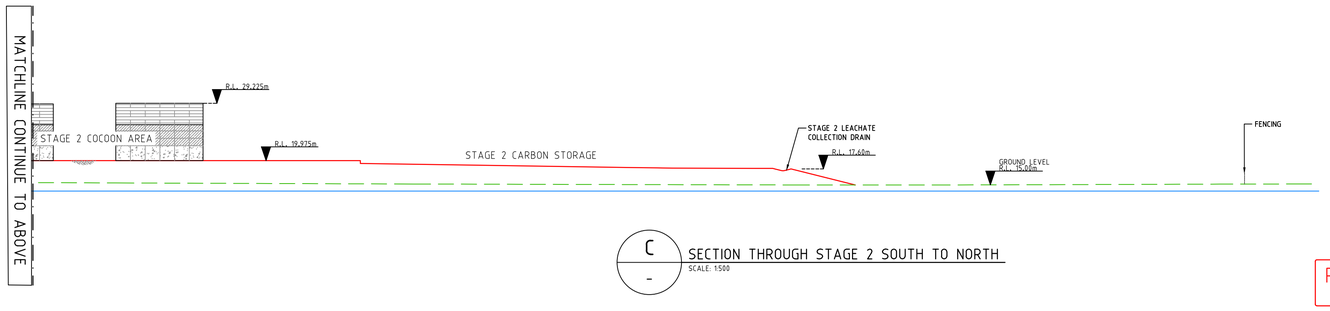
SCALE: 1:500





C — SECTION THROUGH STAGE 2 SOUTH TO NORTH
SCALE: 1:500

VERTICAL DATUM: AUSTRALIAN HEIGHT DATUM
HORIZONTAL DATUM: MGA 94 ZONE 50

PRELIMINARY ONLY
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20m 0m 20m 40m
1:500 @ A1

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PERTH
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Client: C·WISE™ Soil Carbon Solutions

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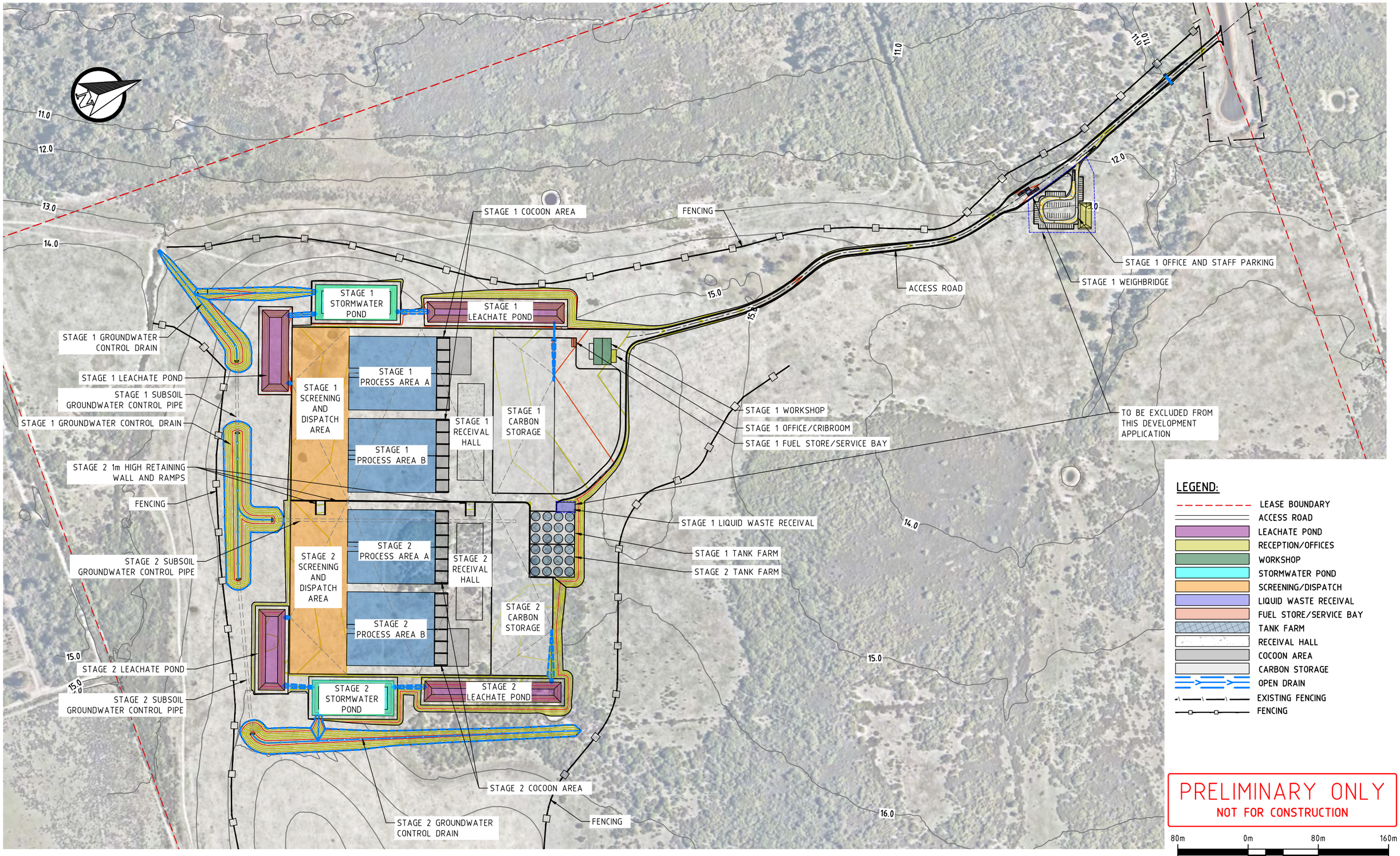
No.	Date	Dr	Ch	Amendment / Issue	App.
A	04.12.2023	YJ	SH	ISSUED FOR DEVELOPMENT APPROVAL	SH

Project: C-WISE DUE DILIGENCE AND APPROVALS

Title: OVERALL STAGES SECTION

Scale: AS SHOWN @ A1 | Date: 08.09.2022
Drawn: YJ | Checked: SH | Approved:
Job No: TW21124 | Drg. No: S-901 | Rev: A
Filename: TW21124-STRUC-DA-SET.DWG



LEGEND:

- LEASE BOUNDARY
- ACCESS ROAD
- LEACHATE POND
- RECEPTION/OFFICES
- WORKSHOP
- STORMWATER POND
- SCREENING/DISPATCH
- LIQUID WASTE RECEIVAL
- FUEL STORE/SERVICE BAY
- TANK FARM
- RECEIVAL HALL
- COCOON AREA
- CARBON STORAGE
- OPEN DRAIN
- EXISTING FENCING
- FENCING

PRELIMINARY ONLY
NOT FOR CONSTRUCTION

80m 0m 80m 160m

1:4000 @ A3

VERTICAL DATUM: AUSTRALIAN HEIGHT DATUM
HORIZONTAL DATUM: MGA 94 ZONE 50

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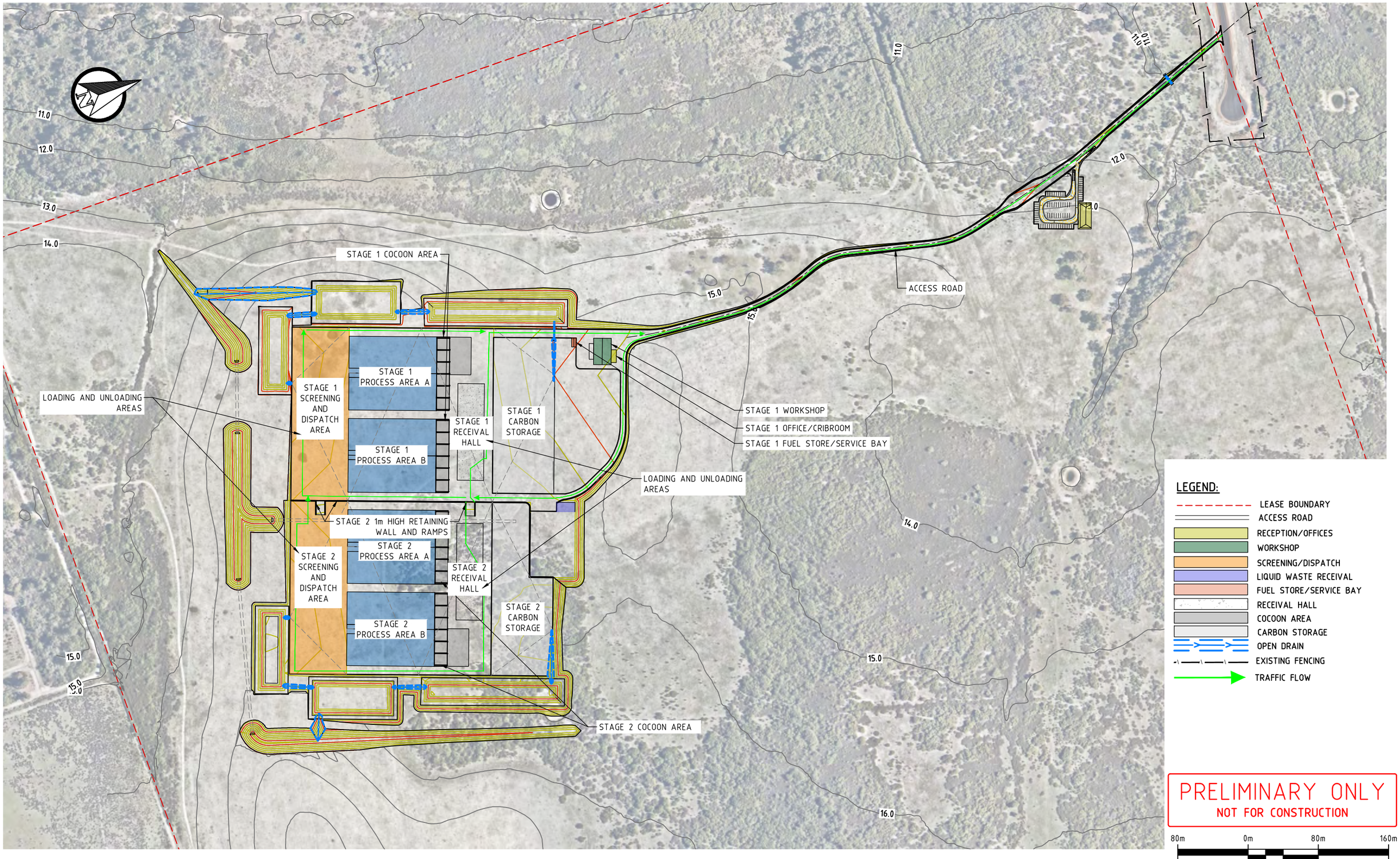
No.	Date	Drwn.	Chk.	Amendment / Issue	App.
A	11.12.2023	JS	AB	PRELIMINARY ISSUE	MH

Project: C-WISE DUE DILIGENCE AND APPROVALS

Title: PLANNING APPLICATION LAYOUT

Scale: 1:4000 @ A3		Date: 11.12.2023	
Drawn: JS	Checked: AB	Approved: MH	
Job No: TW21124	Drg. No: C-400	Rev: A	
Filename: TW21124-SET.DWG			



LEGEND:

- LEASE BOUNDARY
- ACCESS ROAD
- RECEPTION/OFFICES
- WORKSHOP
- SCREENING/DISPATCH
- LIQUID WASTE RECEIVAL
- FUEL STORE/SERVICE BAY
- RECEIVAL HALL
- COCOON AREA
- CARBON STORAGE
- OPEN DRAIN
- EXISTING FENCING
- TRAFFIC FLOW

PRELIMINARY ONLY
NOT FOR CONSTRUCTION

80m 0m 80m 160m

1:4000 @ A3

VERTICAL DATUM: AUSTRALIAN HEIGHT DATUM
HORIZONTAL DATUM: MGA 94 ZONE 50

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Client: C-WISE Soil Carbon Solutions

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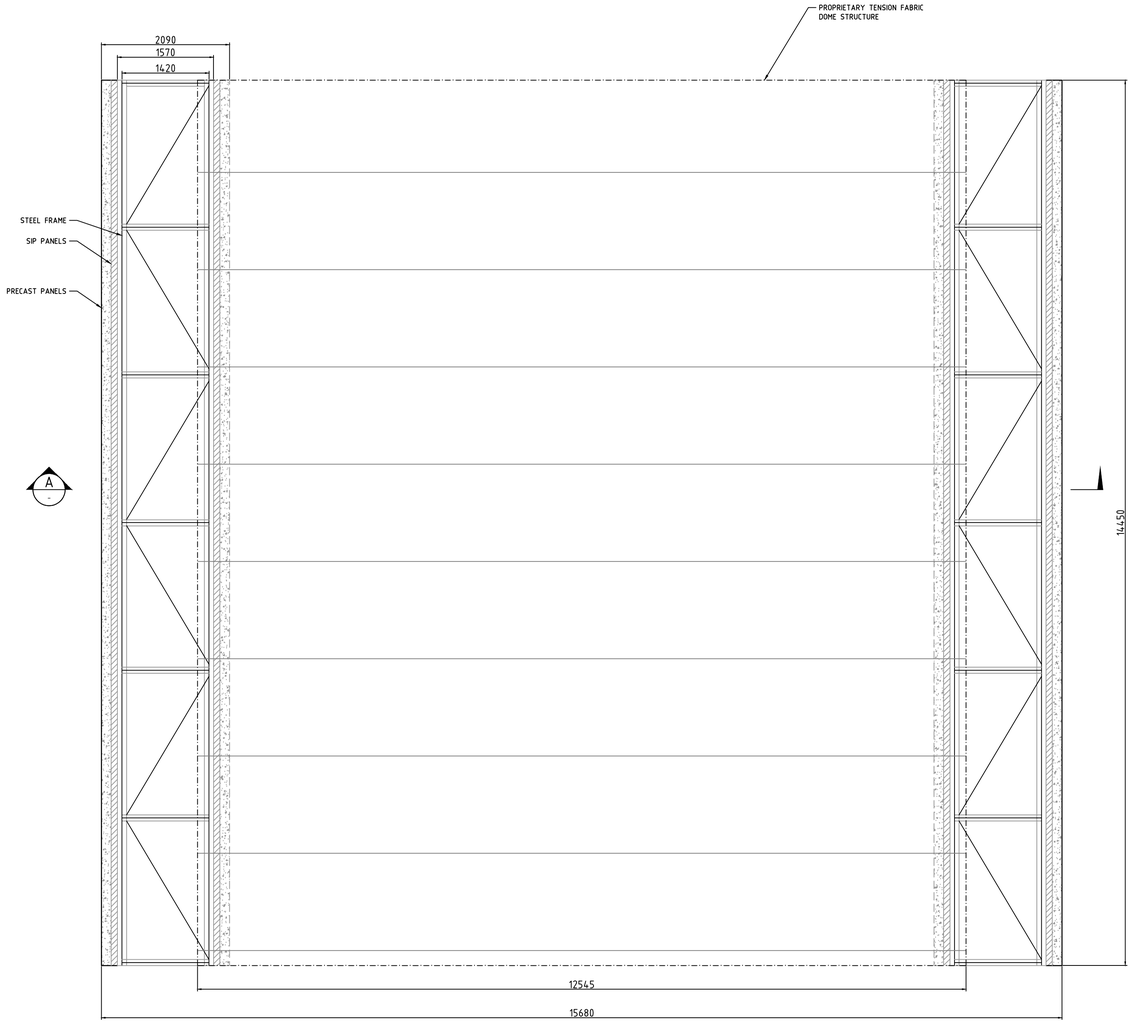
No.	Date	Drwn.	Chk.	Amendment / Issue	App.
A	11.12.2023	JS	AB	PRELIMINARY ISSUE	MH

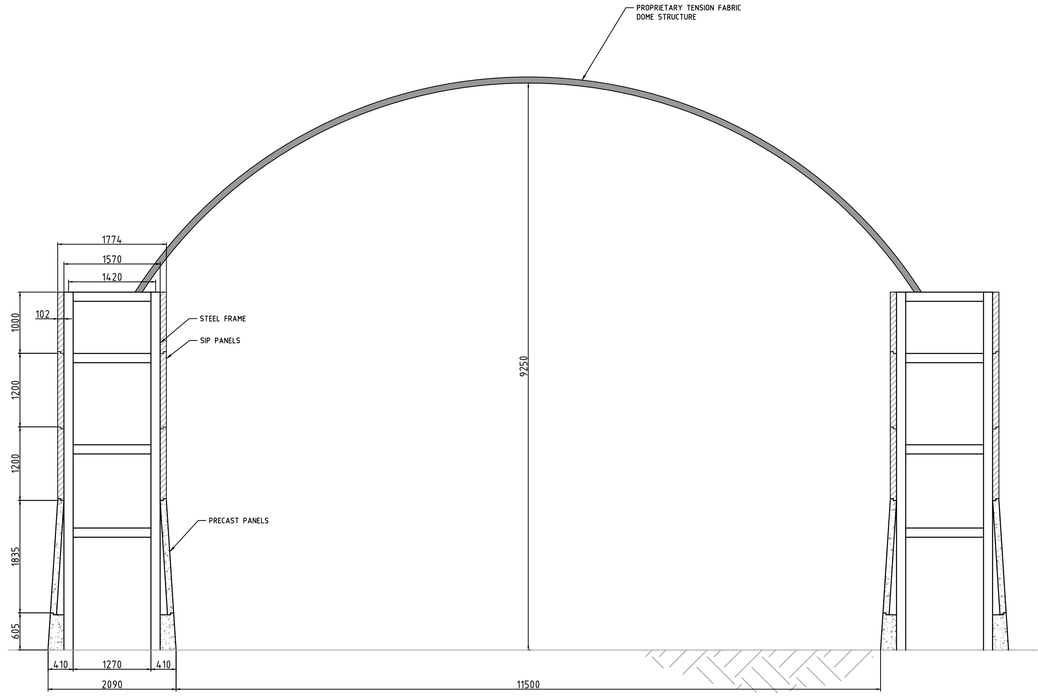
Project: C-WISE DUE DILIGENCE AND APPROVALS

Title: PLANNING TRAFFIC FLOW

Scale: 1:4000 @ A3		Date: 11.12.2023	
Drawn: JS	Checked: AB	Approved: MH	
Job No: TW21124	Drg. No: C-401	Rev: A	
Filename: TW21124-SET.DWG			



TYPICAL BUNKER PLAN
SCALE: 1:50



A BUNKER TYPICAL SECTION
SCALE: 1:50

PRELIMINARY ONLY
NOT FOR CONSTRUCTION

2.0m 0m 2.0m 4.0m
1:50 @ A1

VERTICAL DATUM: AUSTRALIAN HEIGHT DATUM
HORIZONTAL DATUM: MGA 94 ZONE 50

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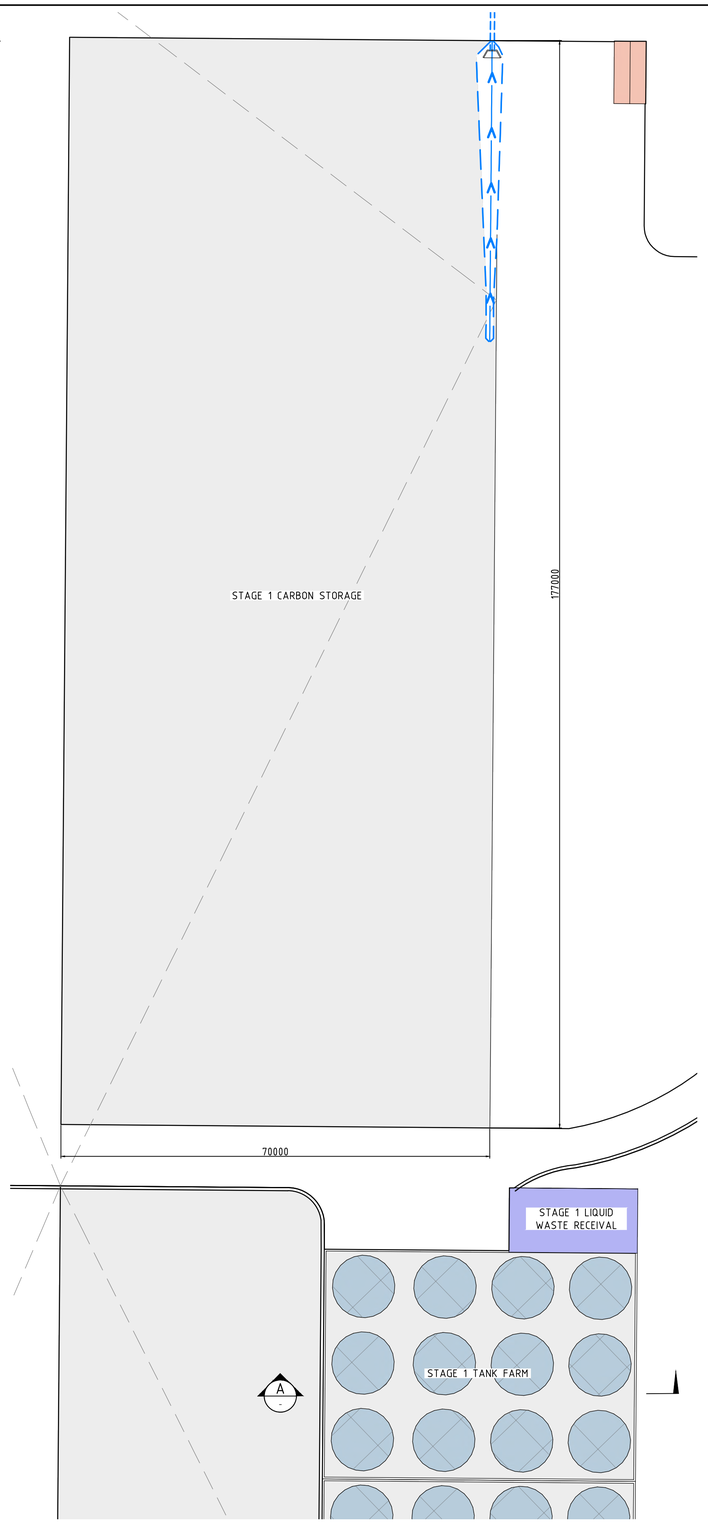
No.	Date	By	Ch	Amendment / Issue	App.
B	04.12.2023	YJ	AB	ISSUED FOR DEVELOPMENT APPROVAL	SH
A	08.09.2022	YJ	SH	PRELIMINARY ISSUE	SH

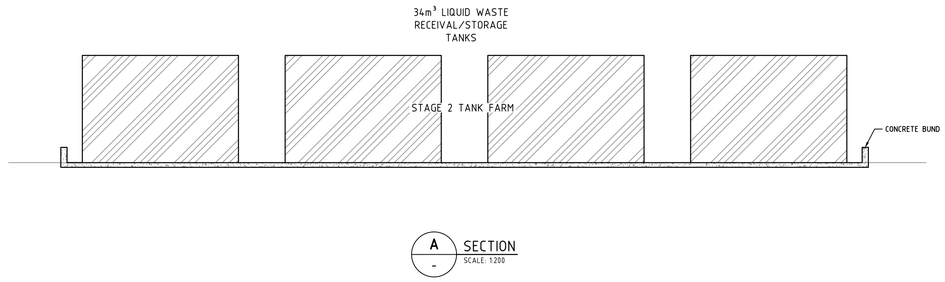
Project: C-WISE DUE DILIGENCE AND APPROVALS

Title: STAGE 1 BUNKER PLAN AND TYPICAL SECTION

Scale: 1:50 @ A1 | Date: 08.09.2022
Drawn: YJ | Checked: SH | Approved:
Job No: TW21124 | Drg. No: S-103 | Rev: B
Filename: TW21124-STRUC-DA-SET.DWG



PLAN
SCALE: 1:500



A
-
SECTION
SCALE: 1:200

VERTICAL DATUM: AUSTRALIAN HEIGHT DATUM
HORIZONTAL DATUM: MGA 94 ZONE 50

8.0m 0m 8.0m 16.0m
1:200 @ A1

20m 0m 20m 40m
1:500 @ A1

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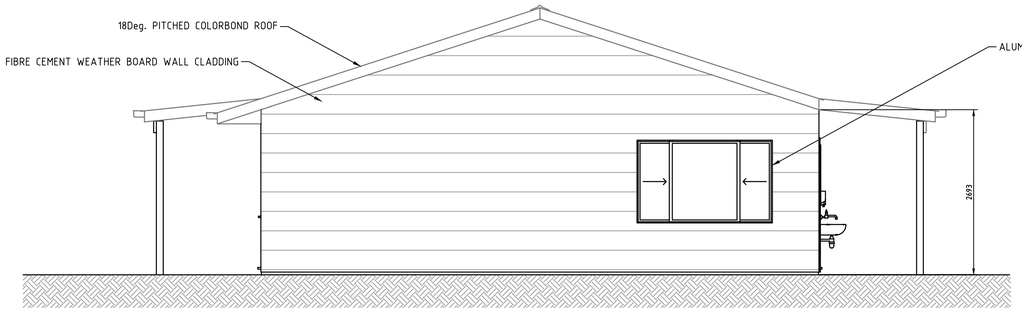
No.	Date	Dr	Ch	Amendment / Issue	App.
B	04.12.2023	YJ	AB	ISSUED FOR DEVELOPMENT APPROVAL	SH
A	08.09.2022	YJ	SH	PRELIMINARY ISSUE	SH

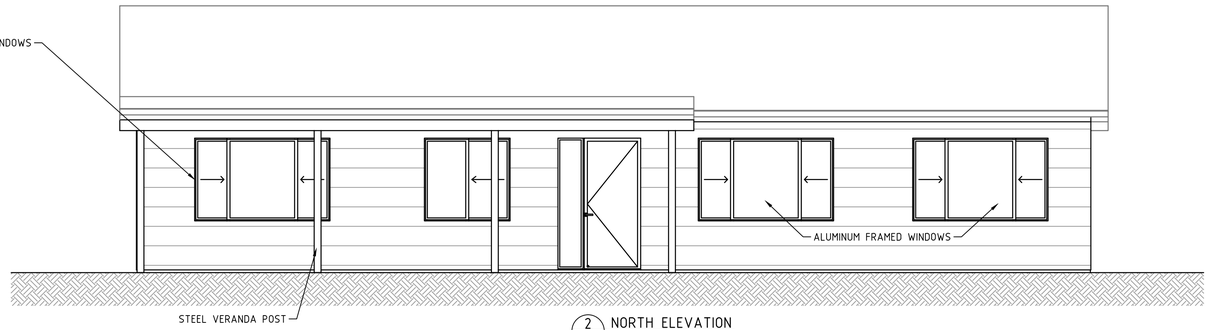
Project: C-WISE DUE DILIGENCE AND APPROVALS

Title: STAGE 1 CARBON STORAGE AREA AND TANK FARM - PLAN AND SECTION

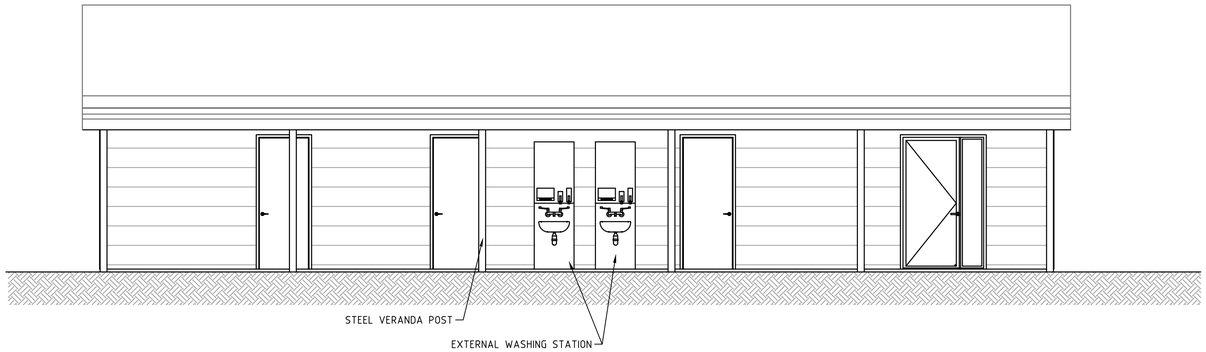
Scale: AS SHOWN @ A1 | Date: 08.09.2022
Drawn: YJ | Checked: SH | Approved:
Job No: TW21124 | Drg. No: S-401 | Rev: B
Filename: TW21124-STRUC-DA-SET.DWG



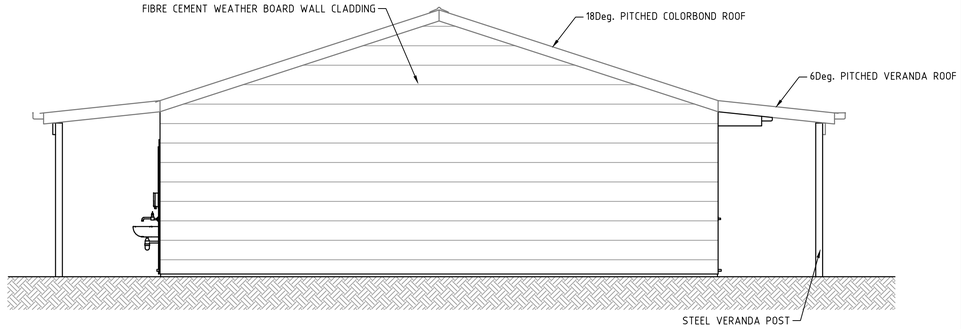
1 C-601 WEST ELEVATION
SCALE: 1:50



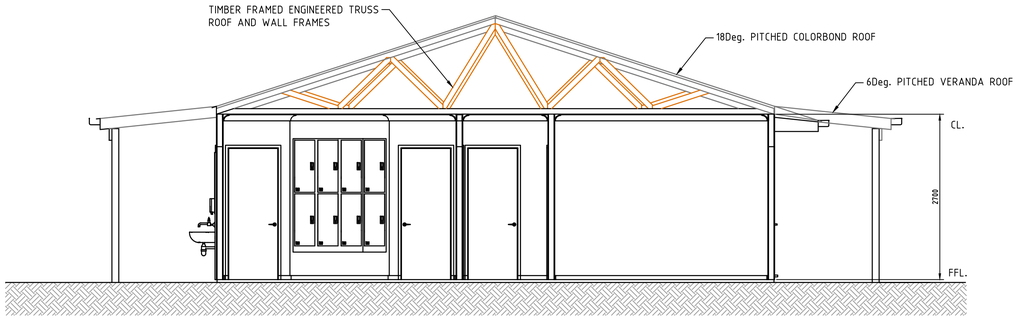
2 C-601 NORTH ELEVATION
SCALE: 1:50



3 C-601 SOUTH ELEVATION
SCALE: 1:50



4 C-601 EAST ELEVATION
SCALE: 1:50



A C-601 SECTION
SCALE: 1:50

SURVEY REFERENCE: ABCD
DATE: DD.MM.YYYY
VERTICAL DATUM: AUSTRALIAN HEIGHT DATUM
HORIZONTAL DATUM: MGA 2020 ZONE 50

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2.0m 0m 2.0m 4.0m
1:50 @ A1

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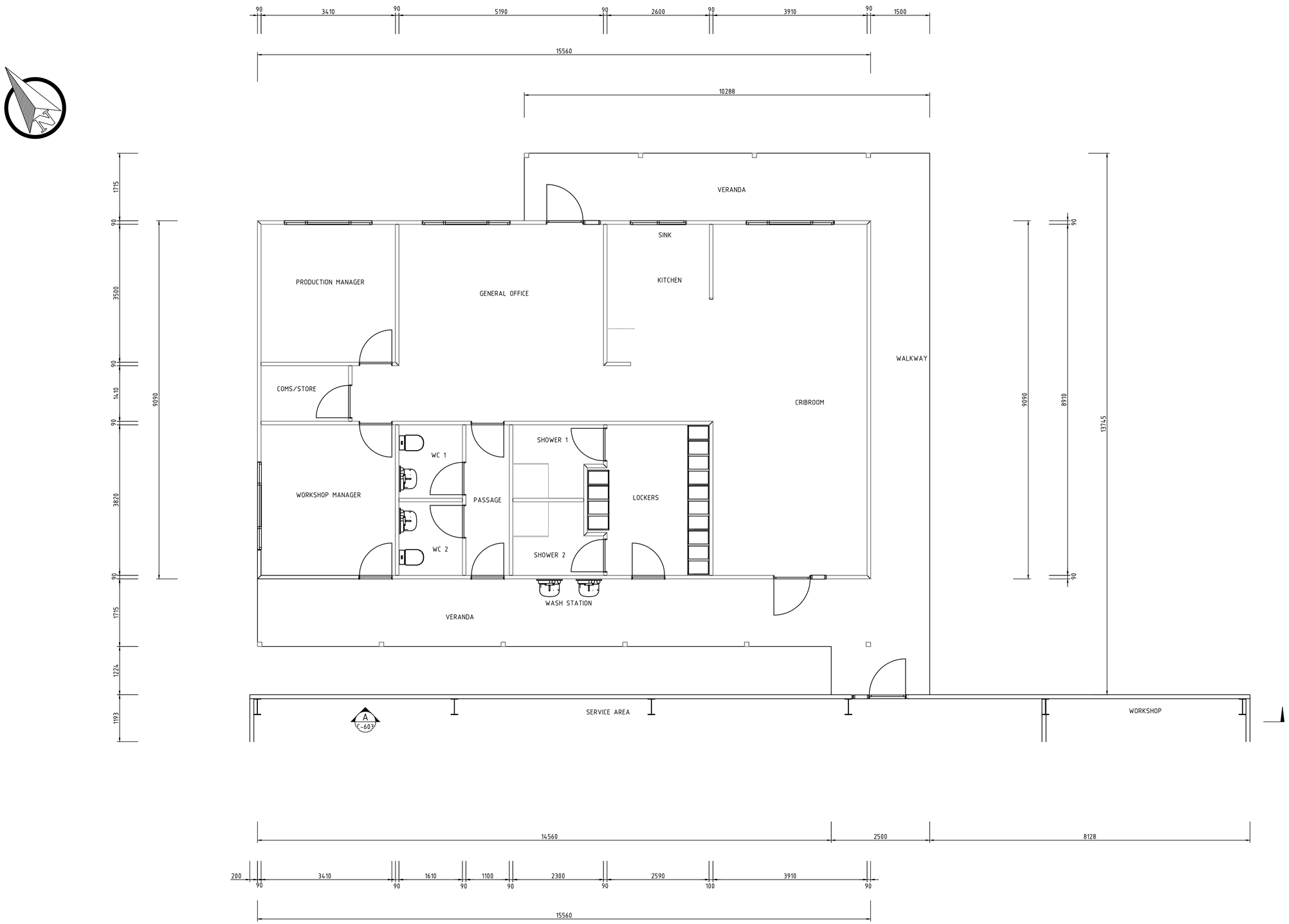
No.	Date	Dr.	Ch.	Amendment / Issue	App.
B	04.12.2023	YJ	AB	ISSUED FOR DEVELOPMENT APPROVAL	SH
A	16.11.2023	JS	AB	PRELIMINARY ISSUE	SH

Project: C-WISE DUE DILIGENCE AND APPROVALS

Title: OFFICE ELEVATIONS

Scale: 1:200 @ A1		Date: 16.11.2023	
Drawn: JS	Checked: AB	Approved: SH	
Job No: TW21124	Drg. No: C-603	Rev: B	
Filename: TW21124-BLDG.DWG			



SURVEY REFERENCE: ABCD
DATE: DD.MM.YYYY
VERTICAL DATUM: AUSTRALIAN HEIGHT DATUM
HORIZONTAL DATUM: MGA 2020 ZONE 50

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2.0m 0m 2.0m 4.0m
1:50 @ A1

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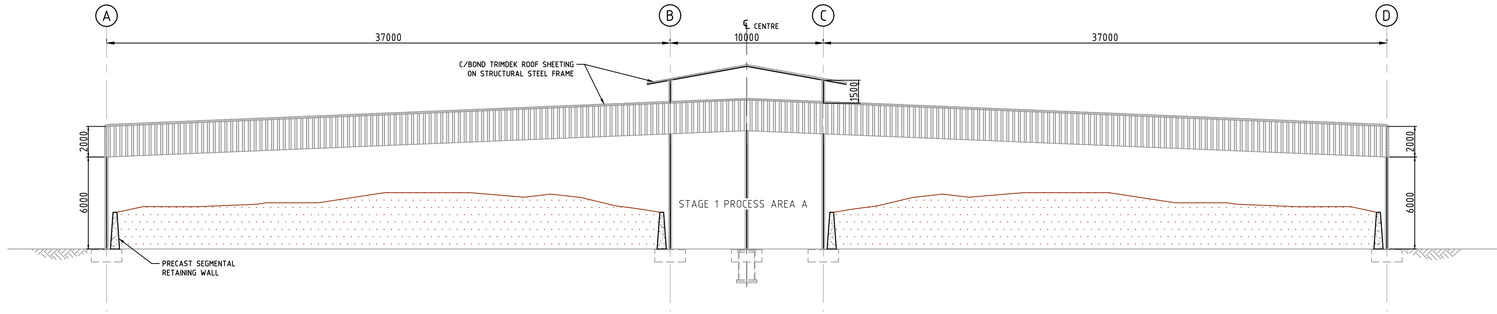
No.	Date	Dr	Ch	Amendment / Issue	App.
B	04.12.2023	YJ	AB	ISSUED FOR DEVELOPMENT APPROVAL	SH
A	16.11.2023	JS	AB	PRELIMINARY ISSUE	SH

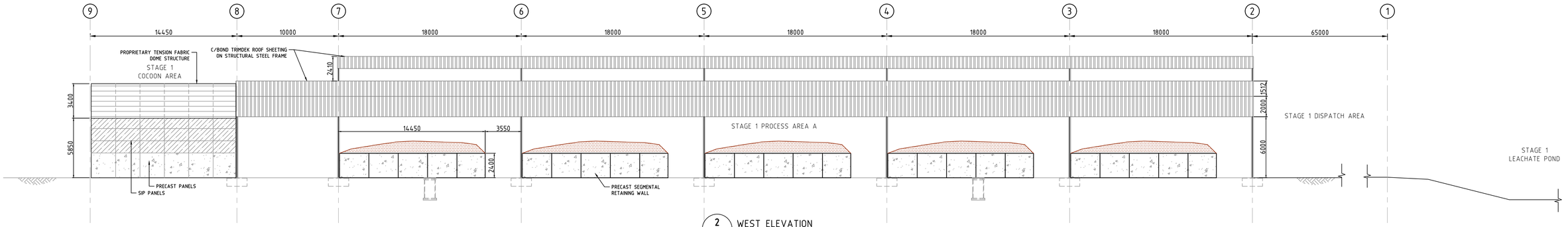
Project: C-WISE DUE DILIGENCE AND APPROVALS

Title: STAGE 1 OFFICE FLOOR PLAN

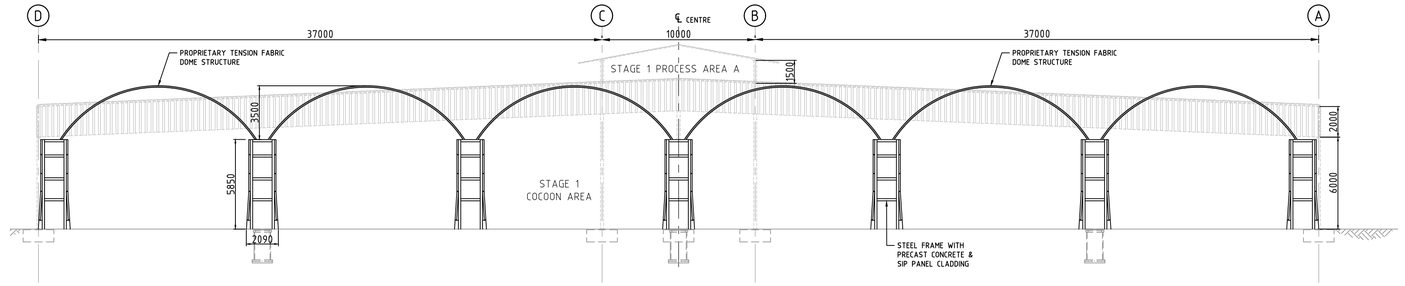
Scale: 1:200 @ A1 | Date: 16.11.2023
Drawn: JS | Checked: AB | Approved: SH
Job No: TW21124 | Drg. No: C-601 | Rev: B
Filename: TW21124-BLDG.DWG



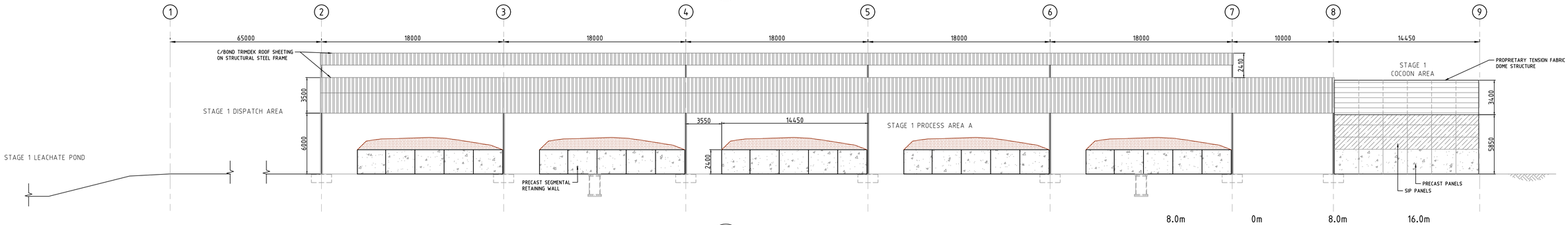
1 / S-101 SOUTH ELEVATION
SCALE: 1:200



2 / S-101 WEST ELEVATION
SCALE: 1:200



3 / S-101 NORTH ELEVATION
SCALE: 1:200



4 / S-101 EAST ELEVATION
SCALE: 1:200

8.0m 0m 8.0m 16.0m

1:200 @ A1

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VERTICAL DATUM: AUSTRALIAN HEIGHT DATUM
HORIZONTAL DATUM: MGA 94 ZONE 50

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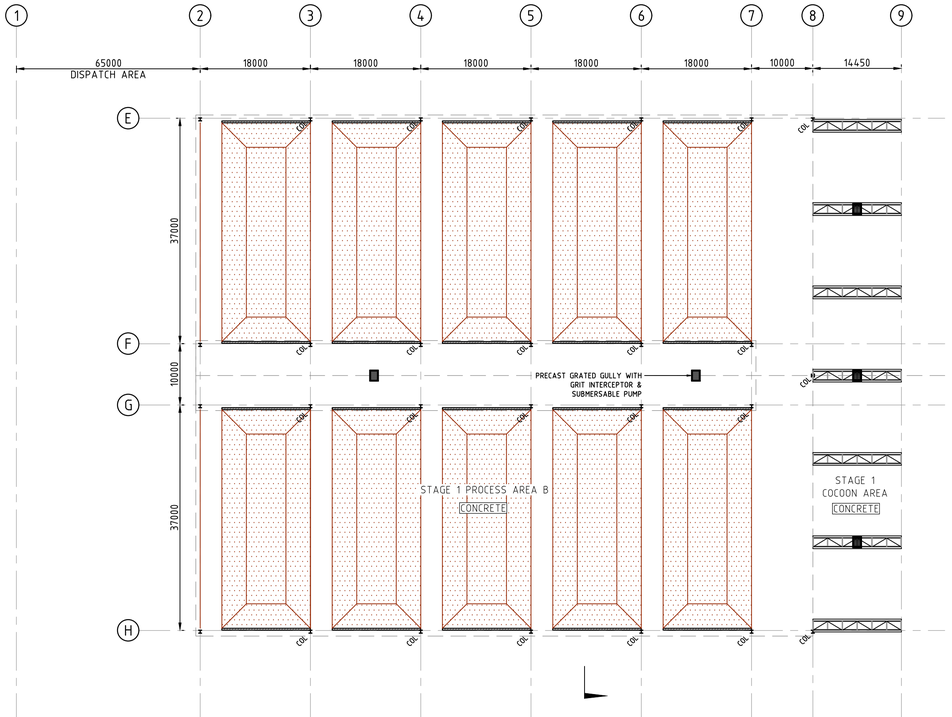
No.	Date	by	ch	Amendment / Issue	App.
B	04.12.2023	YJ	AB	ISSUED FOR DEVELOPMENT APPROVAL	SH
A	08.09.2022	YJ	SH	PRELIMINARY ISSUE	SH

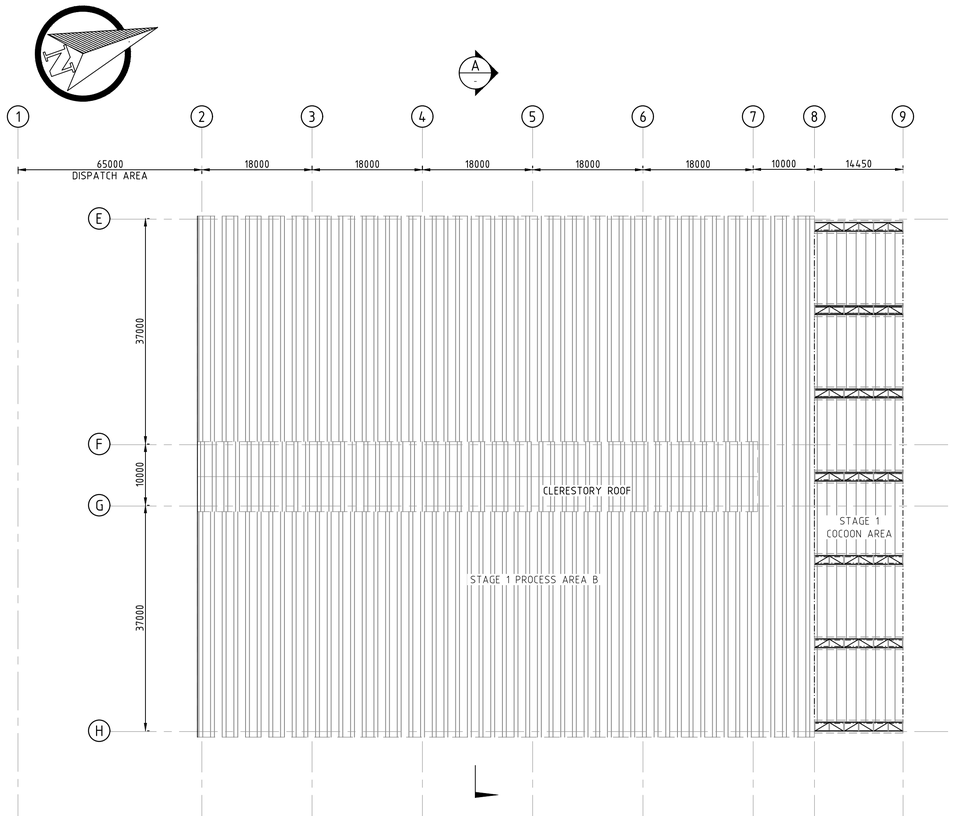
Project: C-WISE DUE DILIGENCE AND APPROVALS

Title: STAGE 1 PROCESS AREA A - ELEVATIONS

Scale: 1:200 @ A1 | Date: 08.09.2022
Drawn: YJ | Checked: SH | Approved:
Job No: TW21124 | Drg. No: S-102 | Rev: B
Filename: TW21124-STRUC-DA-SET.DWG

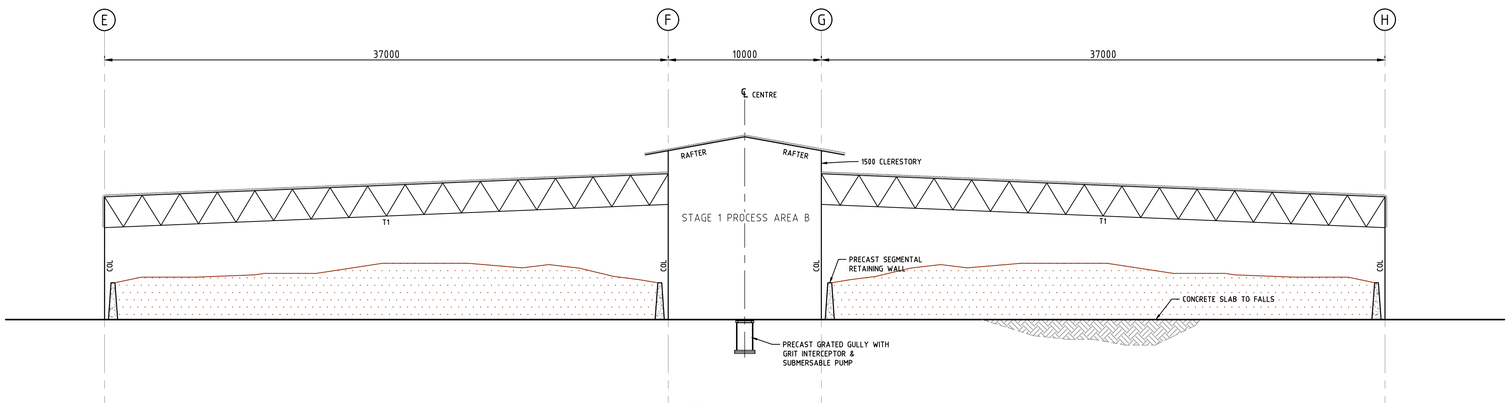


GROUND FLOOR PLAN - STAGE 1 PROCESS AREA B
SCALE: 1:500



ROOF PLAN - STAGE 1 PROCESS AREA B
SCALE: 1:500

1 2 3 4
ELEVATIONS



A - SECTION
SCALE: 1:200

8.0m 0m 8.0m 16.0m
1:200 @ A1

20m 0m 20m 40m
1:500 @ A1

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VERTICAL DATUM: AUSTRALIAN HEIGHT DATUM
HORIZONTAL DATUM: MGA 94 ZONE 50

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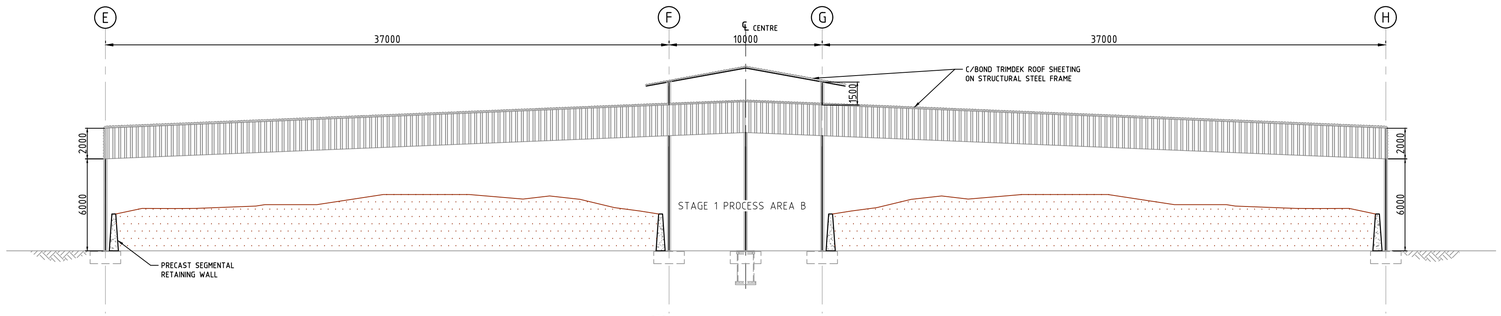
No.	Date	Dr	Ch	Amendment / Issue	App.
B	04.12.2023	YJ	AB	ISSUED FOR DEVELOPMENT APPROVAL	SH
A	08.09.2022	YJ	SH	PRELIMINARY ISSUE	SH

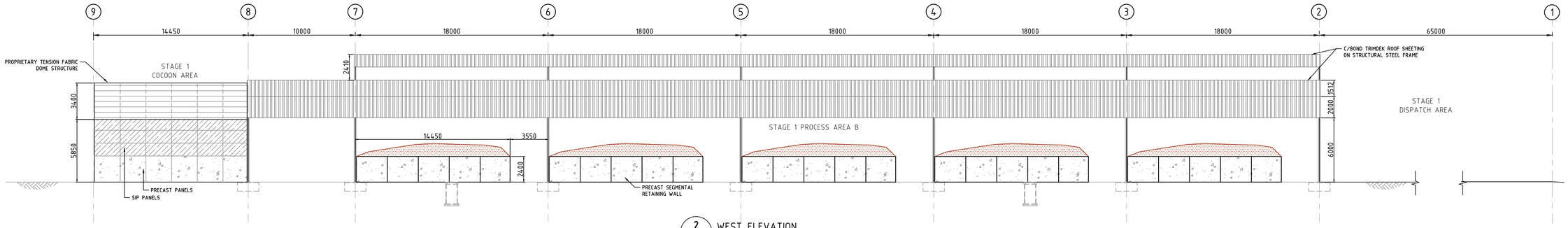
Project: C-WISE DUE DILIGENCE AND APPROVALS

Title: STAGE 1 PROCESS AREA B - FLOOR PLAN, ROOF LAYOUT & TYPICAL SECTION

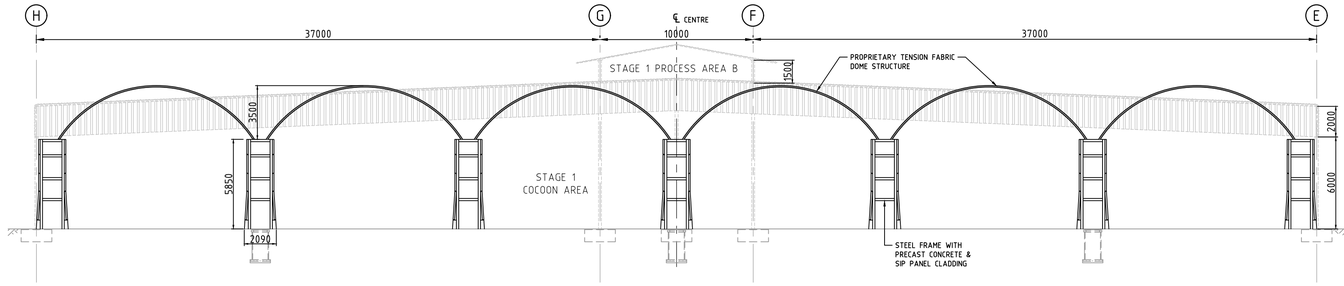
Scale: AS SHOWN @ A1 | Date: 08.09.2022
Drawn: YJ | Checked: SH | Approved:
Job No: TW21124 | Drg. No: S-201 | Rev: B
Filename: TW21124-STRUC-DA-SET.DWG



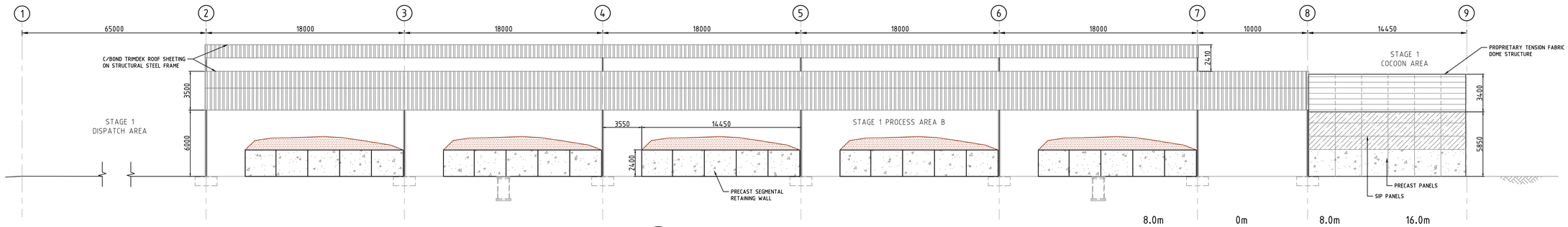
1 S-201 SOUTH ELEVATION
SCALE: 1:200



2 S-201 WEST ELEVATION
SCALE: 1:200



3 S-201 NORTH ELEVATION
SCALE: 1:200



4 S-201 EAST ELEVATION
SCALE: 1:200

8.0m 0m 8.0m 16.0m
1:200 @ A1

VERTICAL DATUM: AUSTRALIAN HEIGHT DATUM
HORIZONTAL DATUM: MGA 94 ZONE 50

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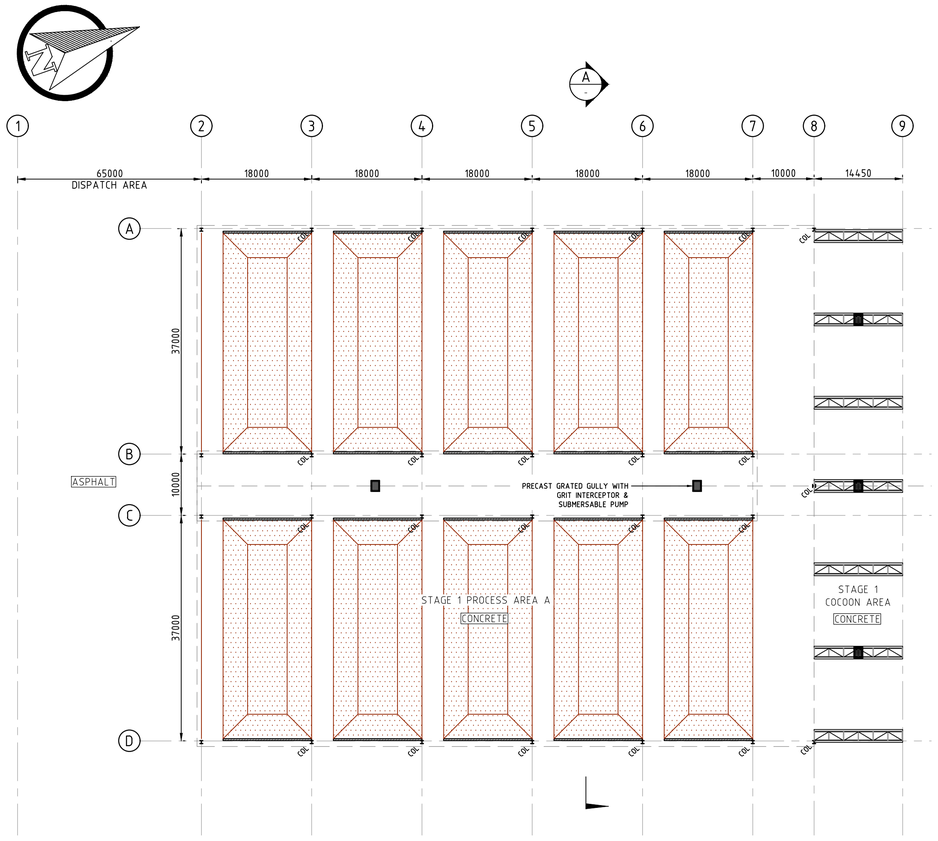
No.	Date	by	ch	Amendment / Issue	App.
B	04.12.2023	YJ	AB	ISSUED FOR DEVELOPMENT APPROVAL	SH
A	08.09.2022	YJ	SH	PRELIMINARY ISSUE	SH

Project: C-WISE DUE DILIGENCE AND APPROVALS

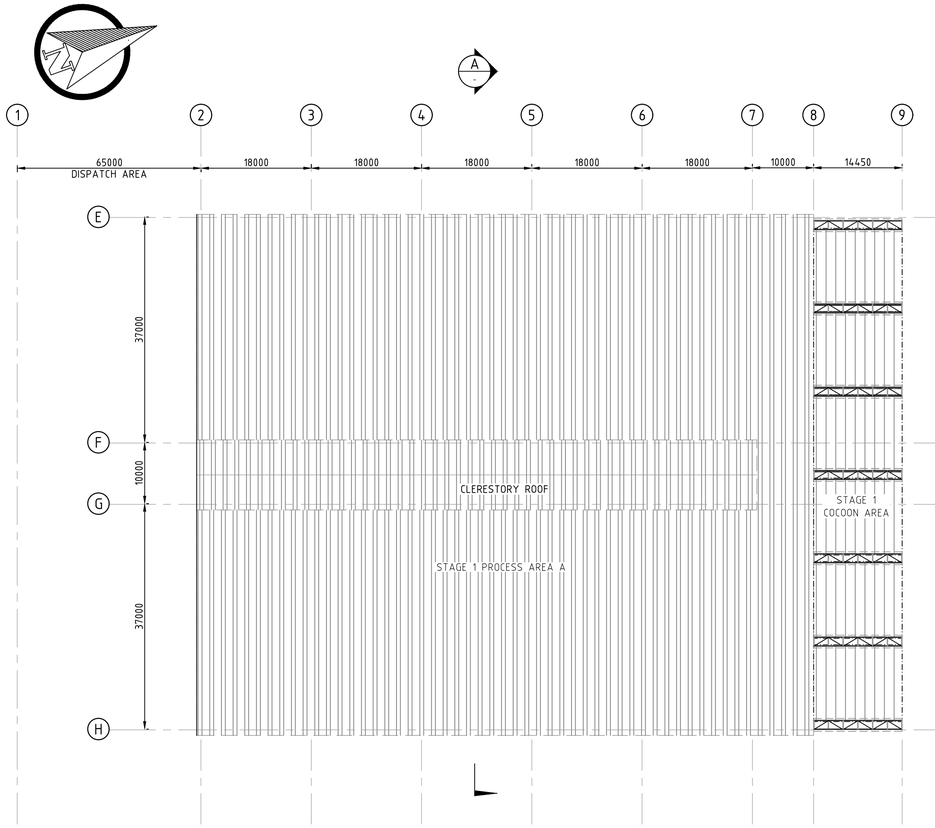
Title: STAGE 1 PROCESS AREA B - ELEVATIONS

Scale: 1:200 @ A1 | Date: 08.09.2022
Drawn: YJ | Checked: SH | Approved:
Job No: TW21124 | Drg. No: S-202 | Rev: B
Filename: TW21124-STRUC-DA-SET.DWG



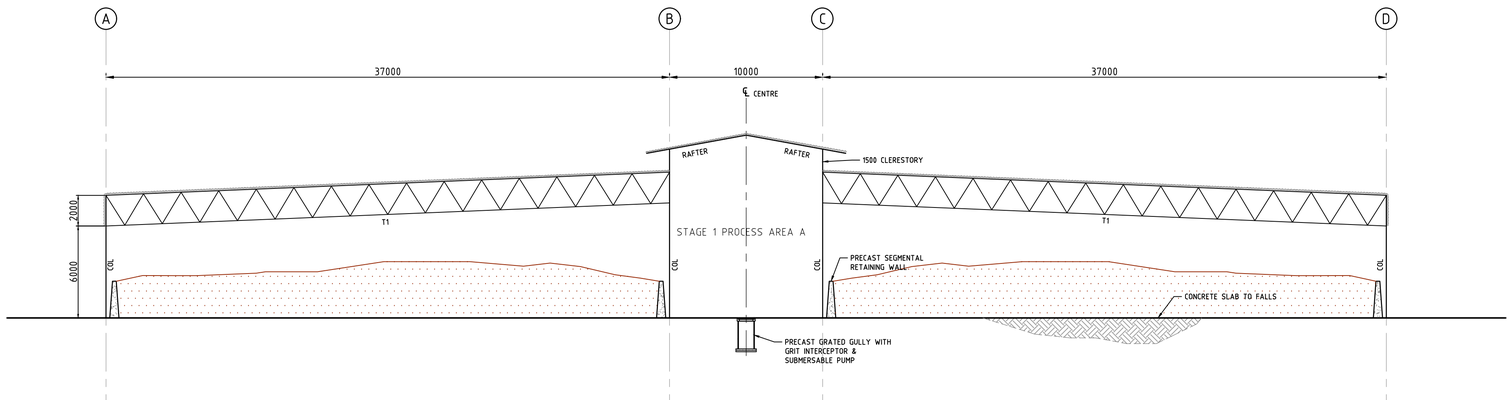
GROUND FLOOR PLAN - STAGE 1 PROCESS AREA A

SCALE: 1:500



ROOF PLAN - STAGE 1 PROCESS AREA A

SCALE: 1:500



A - SECTION

SCALE: 1:200

ELEVATIONS

8.0m 0m 8.0m 16.0m

1:200 @ A1

20m 0m 20m 40m

1:500 @ A1

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VERTICAL DATUM: AUSTRALIAN HEIGHT DATUM
HORIZONTAL DATUM: MGA 94 ZONE 50

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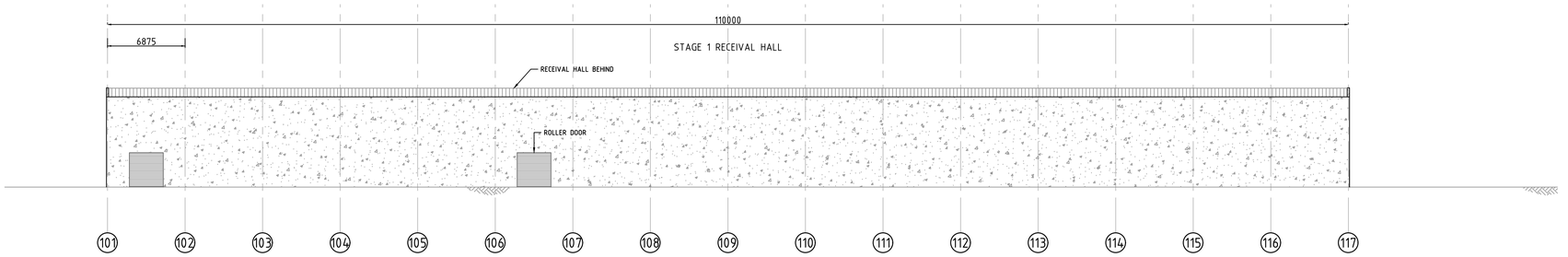
No.	Date	By	Ch	Amendment / Issue	App.
B	04.12.2023	YJ	AB	ISSUED FOR DEVELOPMENT APPROVAL	SH
A	08.09.2022	YJ	SH	PRELIMINARY ISSUE	SH

Project: C-WISE DUE DILIGENCE AND APPROVALS

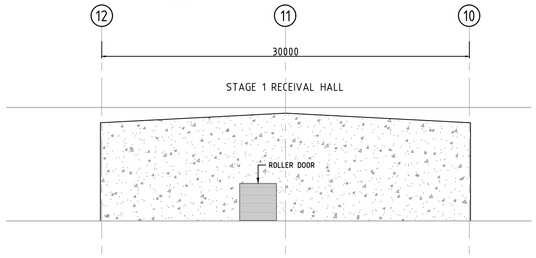
Title: STAGE 1 PROCESS AREA A - FLOOR PLAN, ROOF LAYOUT & TYPICAL SECTION

Scale: AS SHOWN @ A1	Date: 08.09.2022		
Drawn: YJ	Checked: SH	Approved:	
Job No: TW21124	Drg. No: S-101	Rev: B	

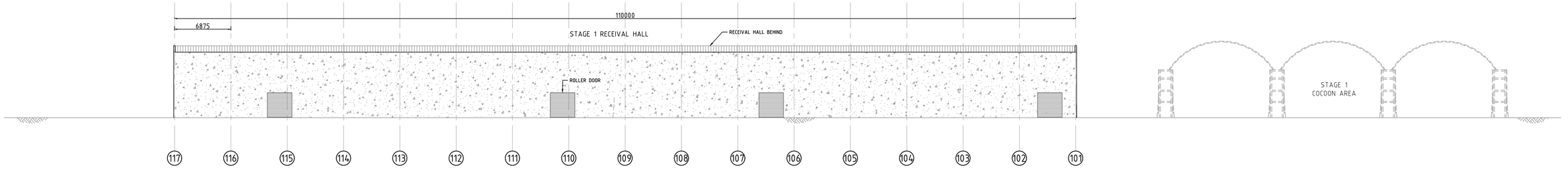
Filename: TW21124-STRUC-DA-SET.DWG



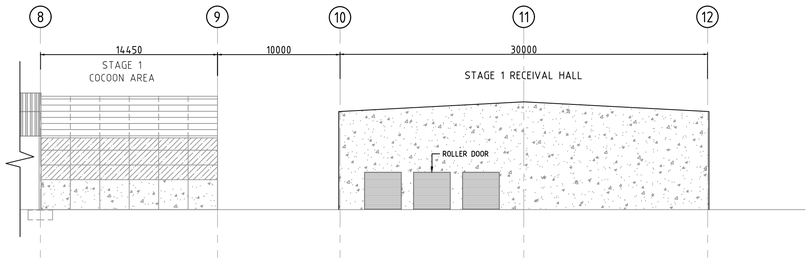
1 / S-301 SOUTH ELEVATION
SCALE: 1:250



2 / S-301 WEST ELEVATION
SCALE: 1:250



3 / S-301 NORTH ELEVATION
SCALE: 1:250



4 / S-301 EAST ELEVATION
SCALE: 1:250

PRELIMINARY ONLY
NOT FOR CONSTRUCTION

10m 0m 10m 20m

1:250 @ A1

VERTICAL DATUM: AUSTRALIAN HEIGHT DATUM
HORIZONTAL DATUM: MGA 94 ZONE 50

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Client: C·WISE™ Soil Carbon Solutions

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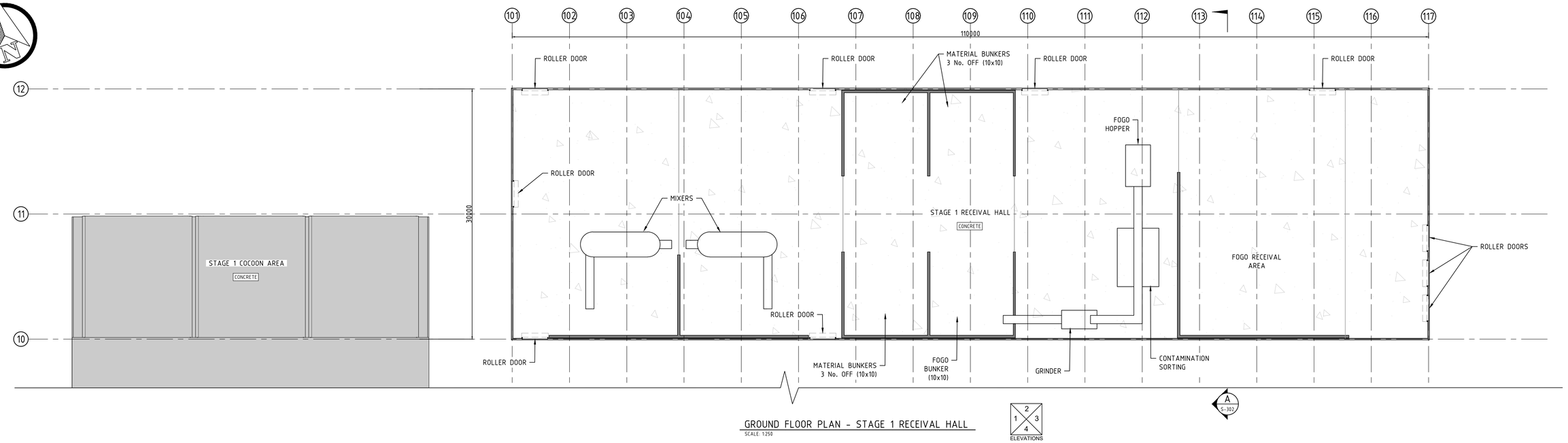
No.	Date	Dft	Ch	Amendment / Issue	App.
B	04.12.2023	YJ	AB	ISSUED FOR DEVELOPMENT APPROVAL	SH
A	08.09.2022	YJ	SH	PRELIMINARY ISSUE	SH

Project: C-WISE DUE DILIGENCE AND APPROVALS

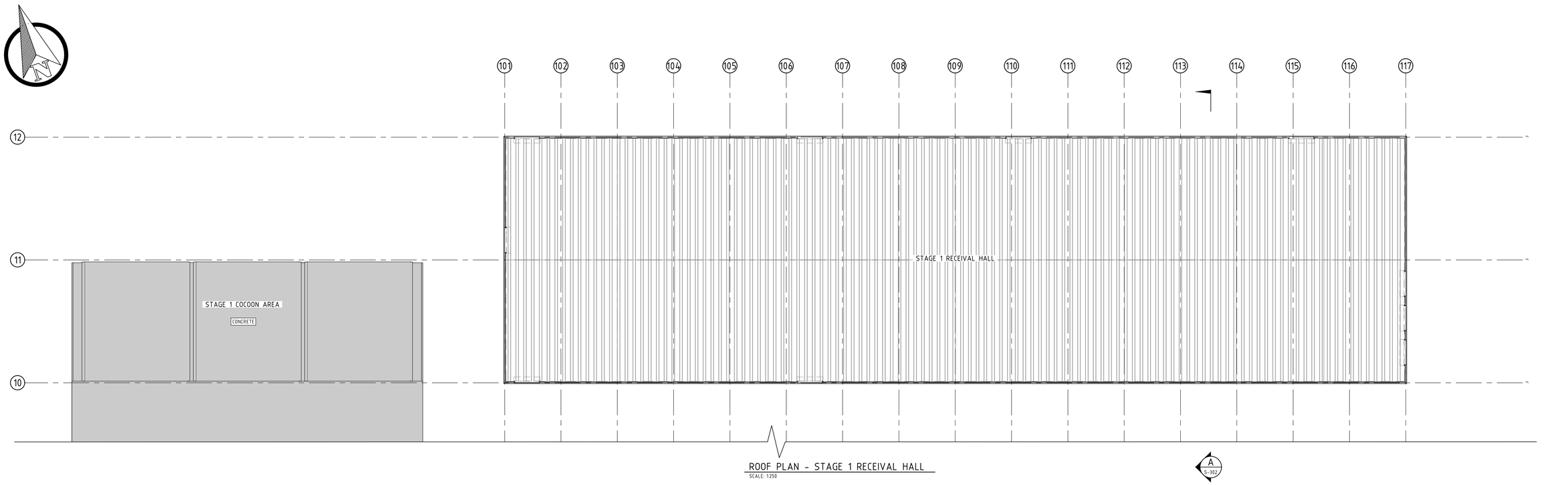
Title: STAGE 1 RECEIVAL HALL - ELEVATIONS

Scale: 1:250 @ A1 | Date: 08.09.2022
Drawn: YJ | Checked: SH | Approved:
Job No: TW21124 | Drg. No: S-303 | Rev: B
Filename: TW21124-STRUC-DA-SET.DWG



GROUND FLOOR PLAN - STAGE 1 RECEIVAL HALL
SCALE: 1:250

ELEVATIONS: 1 2 3 4



ROOF PLAN - STAGE 1 RECEIVAL HALL
SCALE: 1:250

PRELIMINARY ONLY
NOT FOR CONSTRUCTION

10m 0m 10m 20m
1:250 @ A1

VERTICAL DATUM: AUSTRALIAN HEIGHT DATUM
HORIZONTAL DATUM: MGA 94 ZONE 50

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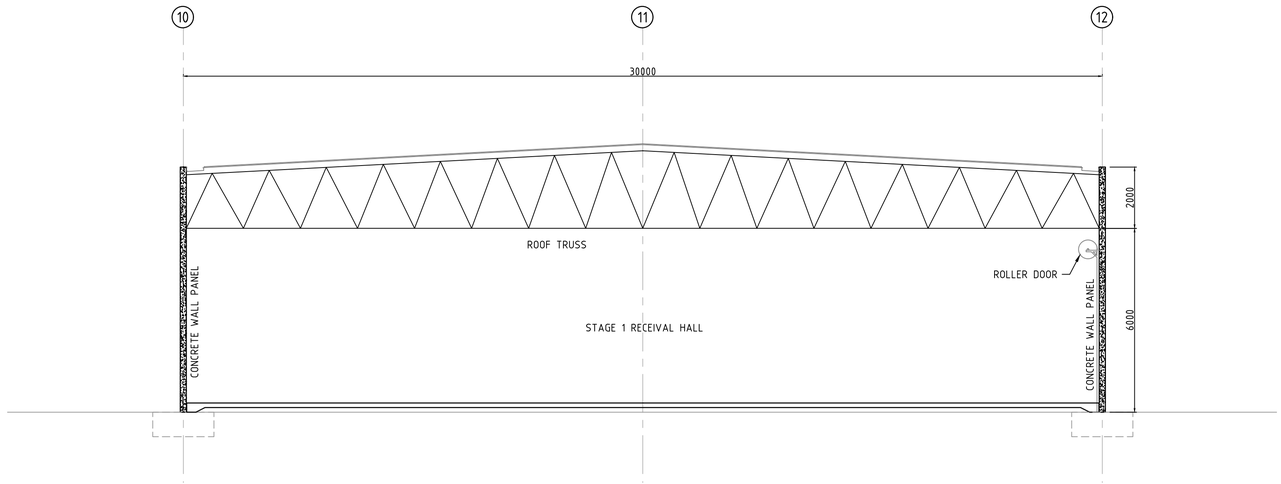
No.	Date	Drn	Ch	Amendment / Issue	App.
B	04.12.2023	YJ	AB	ISSUED FOR DEVELOPMENT APPROVAL	SH
A	08.09.2022	YJ	SH	PRELIMINARY ISSUE	SH

Project: C-WISE DUE DILIGENCE AND APPROVALS

Title: STAGE 1 RECEIVAL HALL - FLOOR PLAN, ROOF LAYOUT

Scale: 1:250 @ A1 | Date: 08.09.2022
Drawn: YJ | Checked: SH | Approved:
Job No: TW21124 | Drg. No: S-301 | Rev: B
Filename: TW21124-STRUC-DA-SET.DWG



A S-301 SECTION
SCALE: 1:100

PRELIMINARY ONLY
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4.0m 0m 4.0m 8.0m
1:100 @ A1

VERTICAL DATUM: AUSTRALIAN HEIGHT DATUM
HORIZONTAL DATUM: MGA 94 ZONE 50

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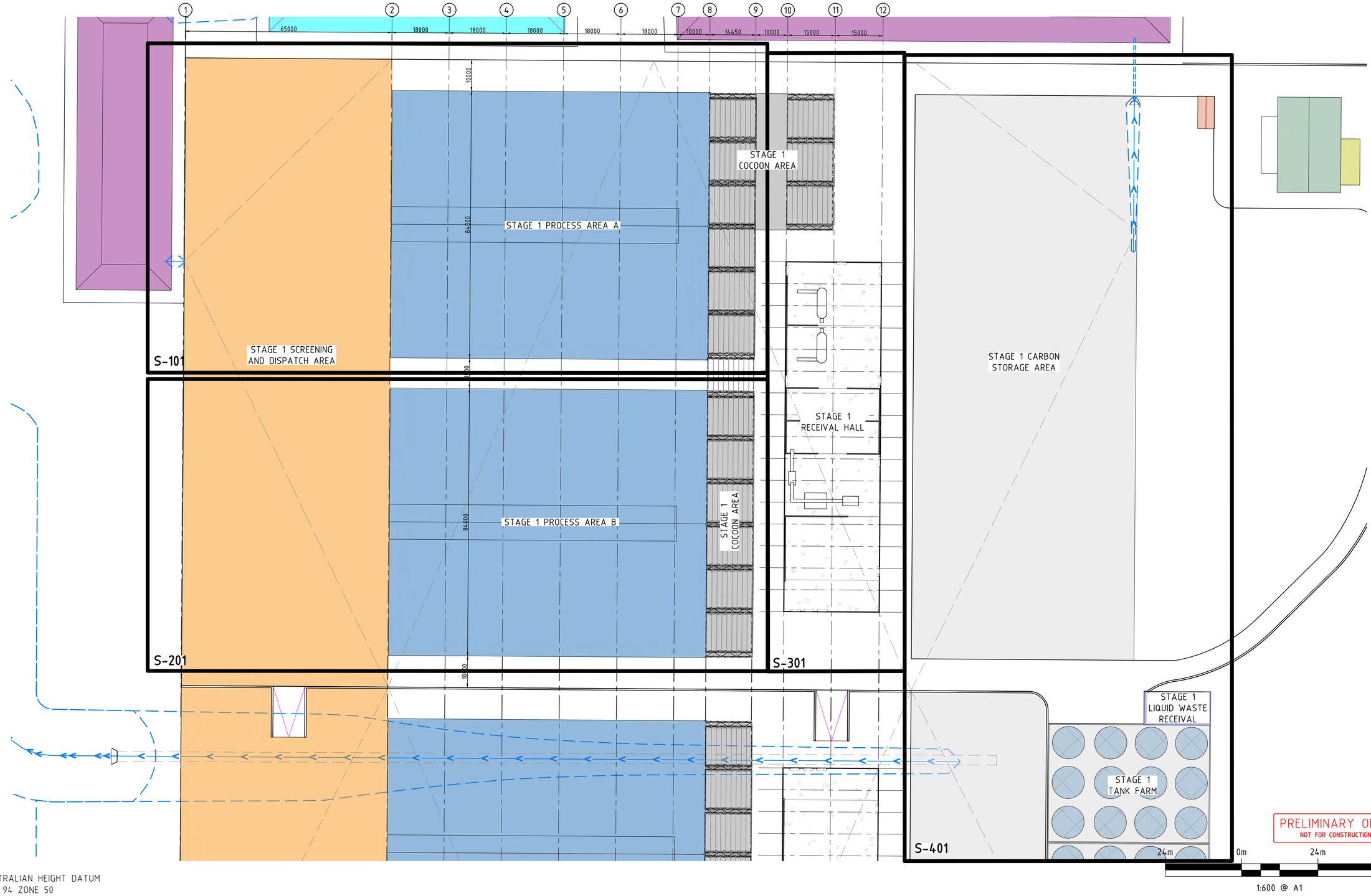
No.	Date	Drn	Chk	Amendment / Issue	App.
B	04.12.2023	YJ	AB	ISSUED FOR DEVELOPMENT APPROVAL	SH
A	08.09.2022	YJ	SH	PRELIMINARY ISSUE	SH

Project: C-WISE DUE DILIGENCE AND APPROVALS

Title: STAGE 1 RECEIVAL HALL - TYPICAL SECTION

Scale: 1:100 @ A1 | Date: 08.09.2022
Drawn: YJ | Checked: SH | Approved:
Job No: TW21124 | Drg. No: S-302 | Rev: B
Filename: TW21124-STRUC-DA-SET.DWG



PRELIMINARY ONLY
NOT FOR CONSTRUCTION

0m 24m 48m

1:600 @ A1

VERTICAL DATUM: AUSTRALIAN HEIGHT DATUM
HORIZONTAL DATUM: MGA 94 ZONE 50

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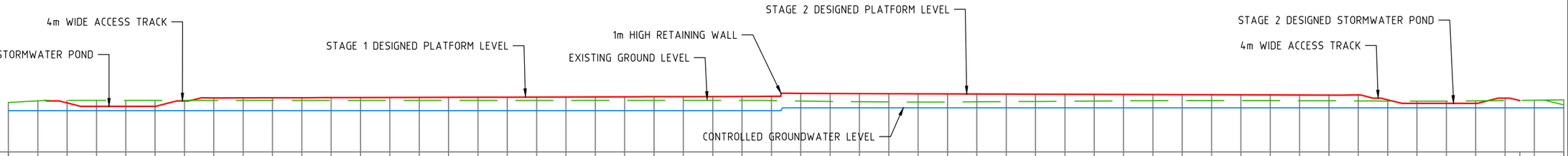
No.	Date			Amendment / Issue	App.
B	04.12.2023	YJ	AB	ISSUED FOR DEVELOPMENT APPROVAL	SH
A	08.09.2022	YJ	SH	PRELIMINARY ISSUE	SH

Project: C-WISE DUE DILIGENCE AND APPROVALS

Title: STAGE 1 SITE KEY PLAN

Scale: 1:600 @ A1 | Date: 08.09.2022
Drawn: YJ | Checked: SH | Approved:
Job No: TW21124 | Drg. No: S-100 | Rev: B
Filename: TW21124-STRUC-DA-SET.DWG



Printed by Yulha Jeong on 24.10.2023 10:29 AM

VERT EXAG 1:1
Datum 0.000

DESIGN LEVELS			16.640	15.500	15.500	15.500	17.300	18.341	18.367	18.395	18.423	18.452	18.480
EXISTING LEVELS	16.786	17.365	17.500	17.500	17.500	17.500	17.500	17.500	17.500	17.500	17.500	17.500	17.500
DEPTH TO EXISTING GROUND			-0.860	-2.000	-2.000	-2.000	-0.200	0.841	0.867	0.895	0.923	0.952	0.980
CONTROLLED GROUNDWATER LEVELS		14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000
DEPTH TO CONTROLLED GROUNDWATER			2.640	1.500	1.500	1.500	3.300	4.341	4.367	4.395	4.423	4.452	4.480
CHAINAGE	0.000	10.000	20.000	30.000	40.000	50.000	60.000	70.000	80.000	90.000	100.000	110.000	120.000

DESIGN LEVELS	18.508	18.537	18.565	18.593	18.621	18.650	18.678	18.706	18.735	18.763	18.791	18.820	18.848
EXISTING LEVELS	17.500	17.500	17.500	17.500	17.500	17.500	17.500	17.500	17.500	17.500	17.500	17.500	17.500
DEPTH TO EXISTING GROUND	1.008	1.037	1.065	1.093	1.121	1.150	1.178	1.206	1.235	1.263	1.291	1.320	1.348
CONTROLLED GROUNDWATER LEVELS	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000
DEPTH TO CONTROLLED GROUNDWATER	4.508	4.537	4.565	4.593	4.621	4.650	4.678	4.706	4.735	4.763	4.791	4.820	4.848
CHAINAGE	130.000	140.000	150.000	160.000	170.000	180.000	190.000	200.000	210.000	220.000	230.000	240.000	250.000

DESIGN LEVELS	18.911	19.884	19.836	19.806	19.777	19.747	19.718	19.688	19.659	19.629	19.600	19.570	19.541
EXISTING LEVELS	17.451	17.295	17.152	17.051	16.989	16.952	16.974	17.026	17.082	17.137	17.216	17.292	17.362
DEPTH TO EXISTING GROUND	1.460	2.589	2.684	2.756	2.788	2.796	2.743	2.662	2.576	2.493	2.384	2.278	2.179
CONTROLLED GROUNDWATER LEVELS	14.000	15.000	15.000	15.000	15.000	15.000	15.000	15.000	15.000	15.000	15.000	15.000	15.000
DEPTH TO CONTROLLED GROUNDWATER	4.911	4.884	4.836	4.806	4.777	4.747	4.718	4.688	4.659	4.629	4.600	4.570	4.541
CHAINAGE	260.000	270.000	280.000	290.000	300.000	310.000	320.000	330.000	340.000	350.000	360.000	370.000	380.000

DESIGN LEVELS	19.511	19.481	19.452	19.422	19.393	19.363	19.334	19.356	17.724	16.500	16.500	16.500	18.300	17.472		
EXISTING LEVELS	17.405	17.427	17.452	17.442	17.434	17.414	17.380	17.330	17.286	17.261	17.283	17.341	17.424	17.472	17.539	17.690
DEPTH TO EXISTING GROUND	2.106	2.054	2.000	1.980	1.959	1.949	1.954	2.026	0.438	-0.761	-0.783	-0.841	0.876	0.000		
CONTROLLED GROUNDWATER LEVELS	15.000	15.000	15.000	15.000	15.000	15.000	15.000	15.000	15.000	15.000	15.000	15.000	15.000		15.000	15.000
DEPTH TO CONTROLLED GROUNDWATER	4.511	4.481	4.452	4.422	4.393	4.363	4.334	4.356	2.724	1.500	1.500	1.500	3.300	2.472		
CHAINAGE	390.000	400.000	410.000	420.000	430.000	440.000	450.000	460.000	470.000	480.000	490.000	500.000	510.000	515.006	520.000	530.000

A C-101 LONG SECTION THROUGH STAGE 1 AND STAGE 2

SCALE: 1:1500

VERT EXAG 1:1
Datum 0.000

DESIGN LEVELS						17.195	15.500	15.500	17.500	17.761	17.832	17.902	18.030	18.199	18.368
EXISTING LEVELS	16.278	16.719	17.179	17.500	17.500	17.500	17.500	17.500	17.500	17.500	17.500	17.500	17.500	17.500	17.500
DEPTH TO EXISTING GROUND						-0.305	-2.000	-2.000	0.000	0.261	0.332	0.402	0.530	0.699	0.868
CONTROLLED GROUNDWATER LEVELS		14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000
DEPTH TO CONTROLLED GROUNDWATER						3.195	1.500	1.500	3.500	3.761	3.832	3.902	4.030	4.199	4.368
CHAINAGE	0.000	10.000	20.000	30.000	40.000	50.000	60.000	70.000	80.000	90.000	100.000	110.000	120.000	130.000	140.000

DESIGN LEVELS	18.975	18.975	18.975	18.975	18.975	18.975	18.975	18.975	18.975	18.975	18.975	18.975	18.975	18.975	18.975
EXISTING LEVELS	17.500	17.500	17.500	17.500	17.500	17.500	17.500	17.500	17.258	16.968	16.694	16.439	16.208	15.999	15.825
DEPTH TO EXISTING GROUND	1.475	1.475	1.475	1.475	1.475	1.475	1.475	1.475	1.717	2.007	2.281	2.536	2.767	2.976	3.150
CONTROLLED GROUNDWATER LEVELS	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000
DEPTH TO CONTROLLED GROUNDWATER	4.975	4.975	4.975	4.975	4.975	4.975	4.975	4.975	4.975	4.975	4.975	4.975	4.975	4.975	4.975
CHAINAGE	150.000	160.000	170.000	180.000	190.000	200.000	210.000	220.000	230.000	240.000	250.000	260.000	270.000	280.000	290.000

DESIGN LEVELS	18.975	18.975	18.385	18.233	18.082	17.930	17.788	17.713	17.638	15.683	15.430				
EXISTING LEVELS	15.668	15.516	15.390	15.280	15.190	15.143	15.141	15.202	15.322	15.420	15.430	15.514	15.611	15.712	15.811
DEPTH TO EXISTING GROUND	3.307	3.459	2.995	2.953	2.891	2.787	2.647	2.511	2.316	0.263	0.000				
CONTROLLED GROUNDWATER LEVELS	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000		14.000	14.000	14.000	14.000
DEPTH TO CONTROLLED GROUNDWATER	4.975	4.975	4.385	4.233	4.082	3.930	3.788	3.713	3.638	1.683	1.430				
CHAINAGE	300.000	310.000	320.000	330.000	340.000	350.000	360.000	370.000	380.000	390.000	391.012	400.000	410.000	420.000	430.000

B C-101 LONG SECTION THROUGH STAGE 1

SCALE: 1:1500

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1:1500 @ A3 VERT
1:1500 @ A3 HORIZ

VERTICAL DATUM: AUSTRALIAN HEIGHT DATUM
HORIZONTAL DATUM: MGA 94 ZONE 50

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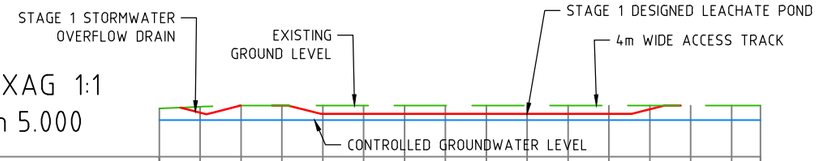
No.	Date	Drwn.	Chk.	Amendment / Issue	App.
C	26.09.2023	YJ	AB	EARTH WORK VOLUME UPDATED	MH
B	16.01.2023	MM	AB	SITE LAYOUT UPDATED	MH
A	02.03.2022	YJ	AB	SECTIONS AND ISOPACHYTE LAYOUT ADDED	MH

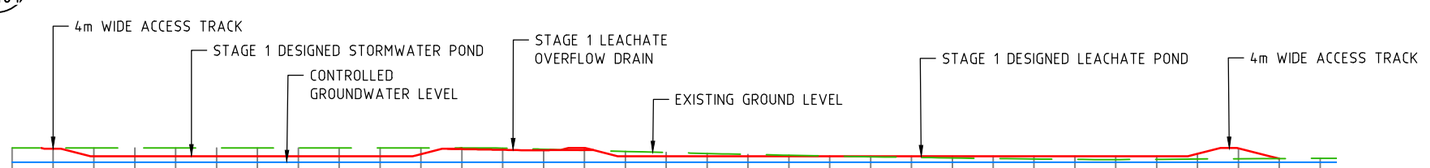
Project:
C-WISE DUE DILIGENCE AND APPROVALS

Title:
LONG SECTIONS 1 OF 4

Scale: 1:1500 @ A3
Date: 02.03.2022
Drawn: YJ
Checked: AB
Approved: MH
Job No: TW21124
Drg. No: C-201
Rev: C
Filename: TW21124-SET.DWG

FILENAME: \\SERVER\TALIS\SECTIONS\WASTE\PROJECTS\TW2021\TW21124 - C-WISE DUE DILIGENCE AND APPROVALS\DRAWINGS\DRAWINGS\TW21124-SET.DWG





Printed by Yulha Jeong on 24.10.2023 10:29 AM

VERT EXAG 1:1
Datum 5.000

DESIGN LEVELS				17.500	15.500	15.500	15.500	15.500	15.500	15.500	15.500	15.500	16.609			
EXISTING LEVELS	16.810	17.229	17.500	17.500	17.500	17.500	17.500	17.500	17.500	17.500	17.500	17.500	17.500	17.500	17.500	17.500
DEPTH TO EXISTING GROUND				0.000	-2.000	-2.000	-2.000	-2.000	-2.000	-2.000	-2.000	-2.000	-0.891			
CONTROLLED GROUNDWATER LEVELS		14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000	
DEPTH TO CONTROLLED GROUNDWATER				3.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	2.609			
CHAINAGE	0.000	10.000	20.000	30.000	40.000	50.000	60.000	70.000	80.000	90.000	100.000	110.000	120.000	130.000	140.000	147.054

C C-101 LONG SECTION THROUGH STAGE 1 NORTH LEACHATE POND

SCALE: 1:1500

VERT EXAG 1:1
Datum 5.000

DESIGN LEVELS		17.300	15.500	15.500	15.500	15.500	15.500	15.500	15.500	15.500	16.012					17.500
EXISTING LEVELS	17.500	17.500	17.500	17.500	17.500	17.500	17.500	17.500	17.500	17.500	17.500	17.500	17.460	17.287	17.198	16.925
DEPTH TO EXISTING GROUND		-0.200	-2.000	-2.000	-2.000	-2.000	-2.000	-2.000	-2.000	-2.000	-1.488					0.575
CONTROLLED GROUNDWATER LEVELS		14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000		14.000
DEPTH TO CONTROLLED GROUNDWATER		3.300	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	2.012					3.500
CHAINAGE	0.000	10.000	20.000	30.000	40.000	50.000	60.000	70.000	80.000	90.000	100.000	110.000	120.000	126.707	130.000	140.000

DESIGN LEVELS	15.500	15.500	15.500	15.500	15.500	15.500	15.500	15.500	15.500	15.500	15.500	15.500	15.500	15.500	16.102	17.398	14.911		
EXISTING LEVELS	16.667	16.419	16.164	15.930	15.723	15.534	15.369	15.218	15.068	14.942	14.820	14.720	14.674	14.727	14.805	14.862	14.911	14.912	14.974
DEPTH TO EXISTING GROUND	-1.167	-0.919	-0.664	-0.430	-0.223	-0.034	0.131	0.282	0.432	0.558	0.680	0.780	0.826	0.773	1.297	2.537	0.000		
CONTROLLED GROUNDWATER LEVELS	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000
DEPTH TO CONTROLLED GROUNDWATER	1.500	1.500 1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	2.102	3.398	0.911		
CHAINAGE	150.000	160.000	170.000	180.000	190.000	200.000	210.000	220.000	230.000	240.000	250.000	260.000	270.000	280.000	290.000	300.000	309.948	310.000	320.000

D C-101 LONG SECTION THROUGH STAGE 1 STORMWATER POND AND SOUTH LEACHATE POND

SCALE: 1:1500

PRELIMINARY ONLY
NOT FOR CONSTRUCTION

1:1500 @ A3 VERT
1:1500 @ A3 HORIZ

30m 0m 30m 60m

VERTICAL DATUM: AUSTRALIAN HEIGHT DATUM
HORIZONTAL DATUM: MGA 94 ZONE 50

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Client:
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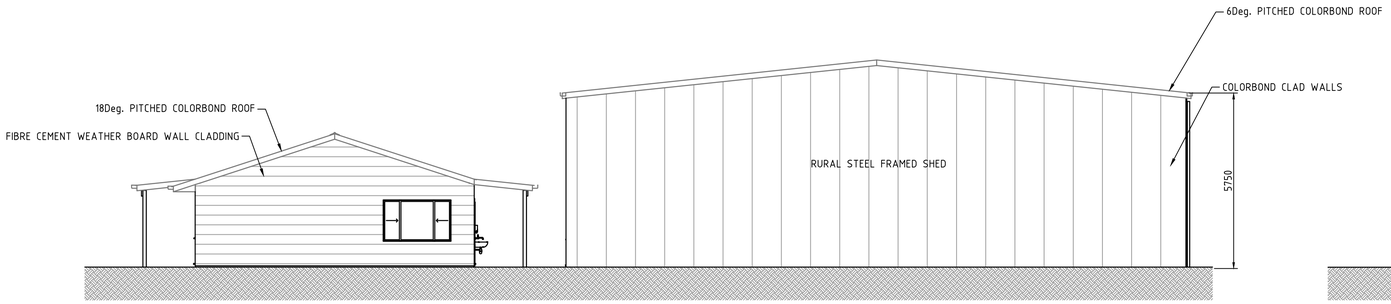
No.	Date	Drwn.	Chk.	Amendment / Issue	App.
C	26.09.2023	YJ	AB	EARTH WORK VOLUME UPDATED	MH
B	16.01.2023	MM	AB	SITE LAYOUT UPDATED	MH
A	02.03.2022	YJ	AB	SECTIONS AND ISOPACHYTE LAYOUT ADDED	MH

Project:
C-WISE DUE DILIGENCE AND APPROVALS

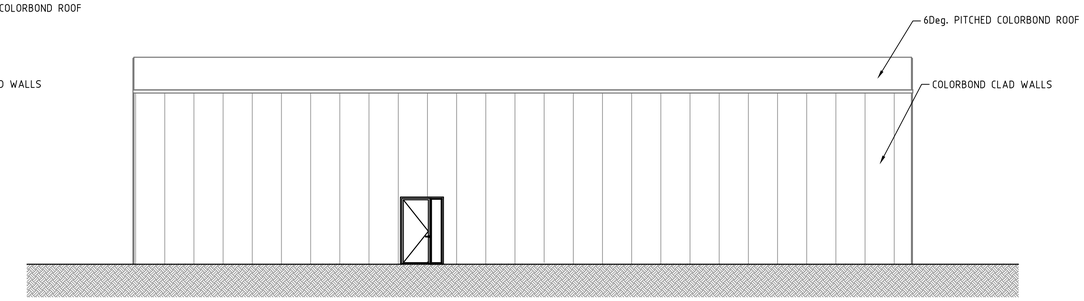
Title:
LONG SECTIONS 2 OF 4

Scale: 1:1500 **@ A3**
Date: 02.03.2022
Drawn: YJ
Checked: AB
Approved: MH
Job No: TW21124
Drg. No: C-202
Rev: C
Filename: TW21124-SET.DWG

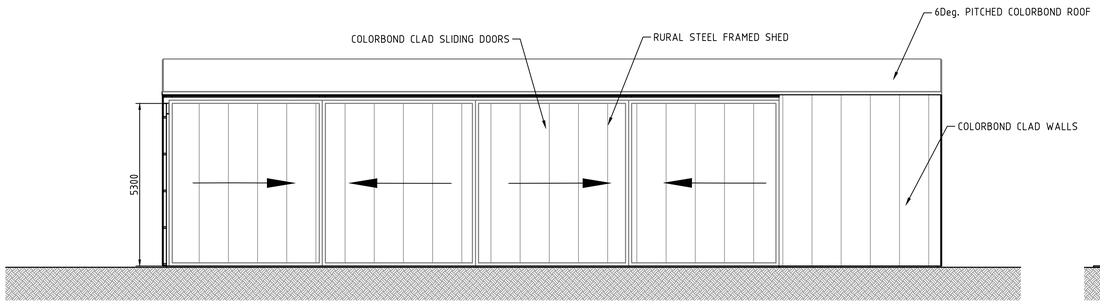
FILENAME: \\SERVER\TALIS\SECTIONS\WASTE\PROJECTS\TW2021\TW21124 - C-WISE DUE DILIGENCE AND APPROVALS\DRAWINGS\DRAWINGS\TW21124-SET.DWG

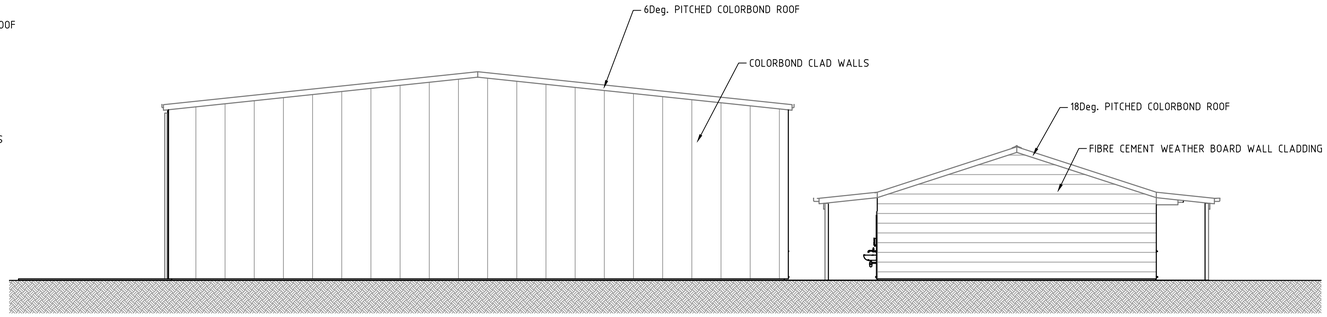


1 C-602 WEST ELEVATION
SCALE: 1:100



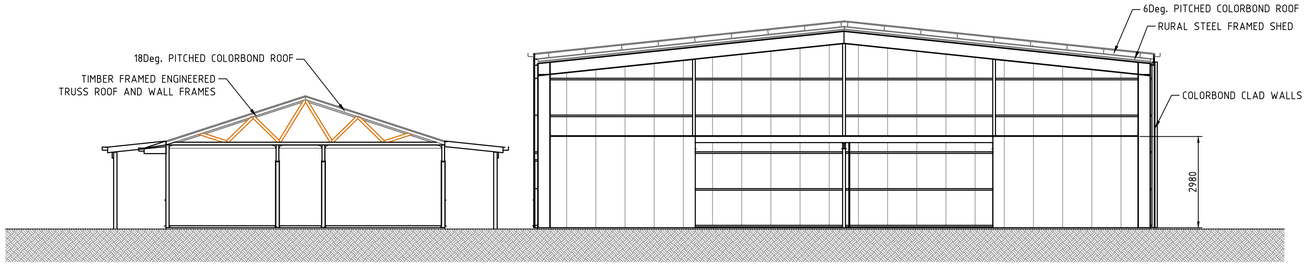
2 C-602 NORTH ELEVATION
SCALE: 1:100





3 C-602 SOUTH ELEVATION
SCALE: 1:100

4 C-602 EAST ELEVATION
SCALE: 1:100



B C-602 SECTION
SCALE: 1:100

CONCEPT ONLY
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SURVEY REFERENCE: ABCD
DATE: DD.MM.YYYY
VERTICAL DATUM: AUSTRALIAN HEIGHT DATUM
HORIZONTAL DATUM: MGA 2020 ZONE 50

4.0m 0m 4.0m 8.0m
1:100 @ A1

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Client: C•WISE™ Soil Carbon Solutions

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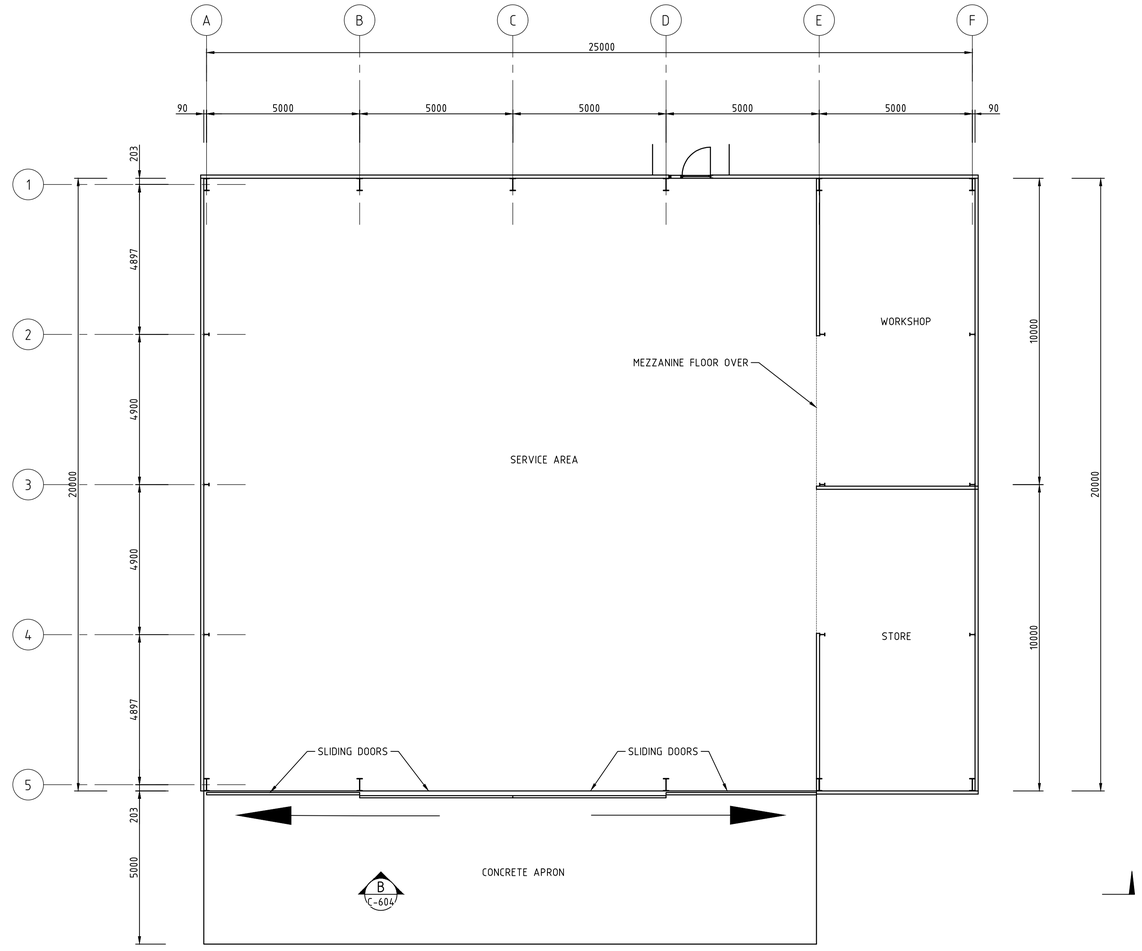
No.	Date	dr	ch	Amendment / Issue	App.
B	04.12.2023	YJ	AB	ISSUED FOR DEVELOPMENT APPROVAL	SH
A	16.11.2023	JS	AB	PRELIMINARY ISSUE	SH

Project: C-WISE DUE DILIGENCE AND APPROVALS

Title: WORKSHOP ELEVATIONS

Scale: 1:200 @ A1 | Date: 16.11.2023
Drawn: JS | Checked: AB | Approved: SH
Job No: TW21124 | Drg. No: C-604 | Rev: B
Filename: TW21124-BLDG.DWG



SURVEY REFERENCE: ABCD
DATE: DD.MM.YYYY
VERTICAL DATUM: AUSTRALIAN HEIGHT DATUM
HORIZONTAL DATUM: MGA 2020 ZONE 50

CONCEPT ONLY
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4.0m 0m 4.0m 8.0m
1:100 @ A1

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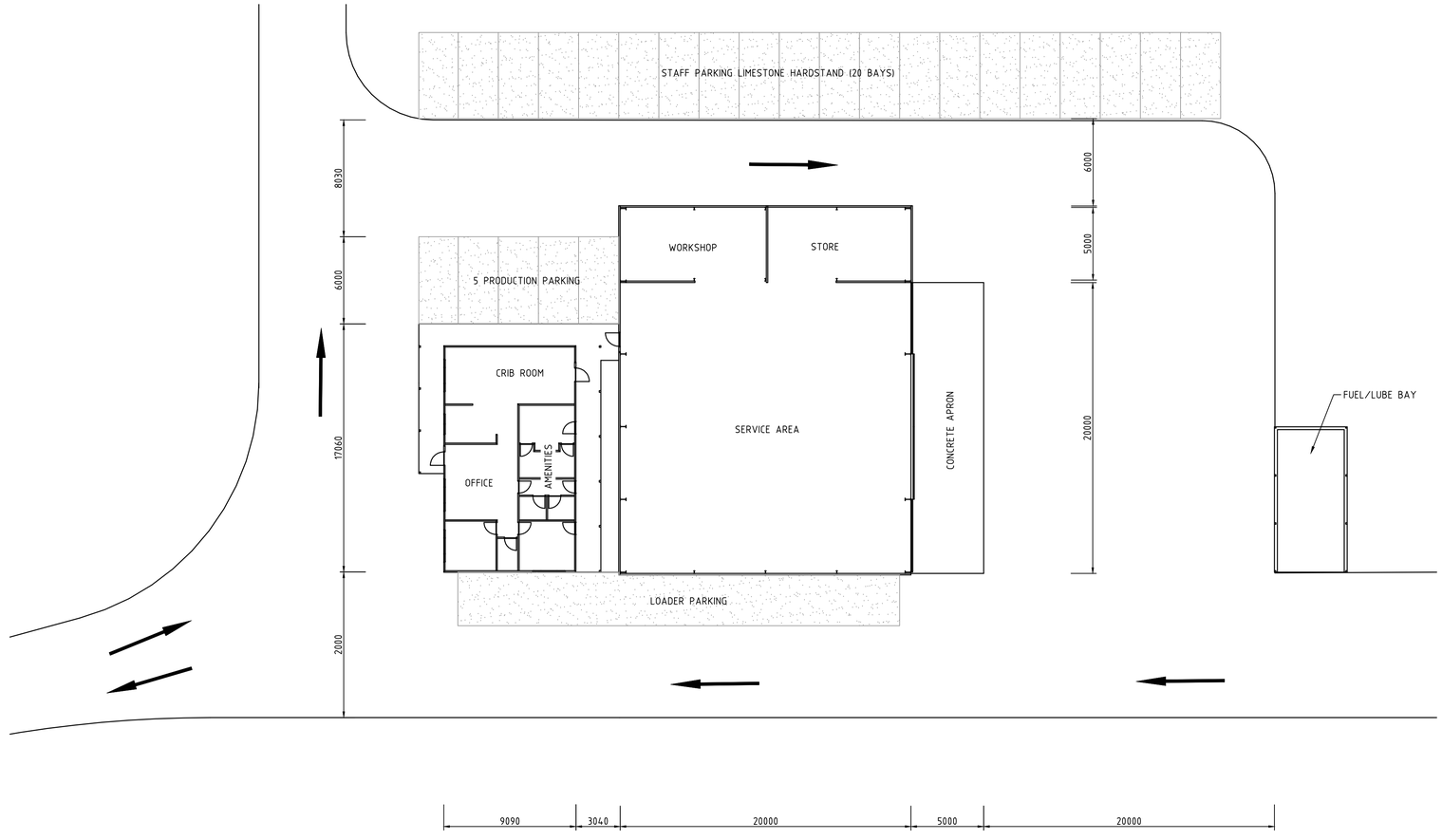
No.	Date	Dr	Ch	Amendment / Issue	App.
B	04.12.2023	YJ	AB	ISSUED FOR DEVELOPMENT APPROVAL	SH
A	16.11.2023	JS	AB	PRELIMINARY ISSUE	SH

Project: C-WISE DUE DILIGENCE AND APPROVALS

Title: STAGE 1 WORKSHOP FLOOR PLAN

Scale: 1:200 @ A1 | Date: 16.11.2023
Drawn: JS | Checked: AB | Approved: SH
Job No: TW21124 | Drg. No: C-602 | Rev: B
Filename: TW21124-BLDG.DWG



SURVEY REFERENCE: ABCD
DATE: DD.MM.YYYY
VERTICAL DATUM: AUSTRALIAN HEIGHT DATUM
HORIZONTAL DATUM: MGA 2020 ZONE 50

CONCEPT ONLY
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8.0m 0m 8.0m 16.0m
1:200 @ A1

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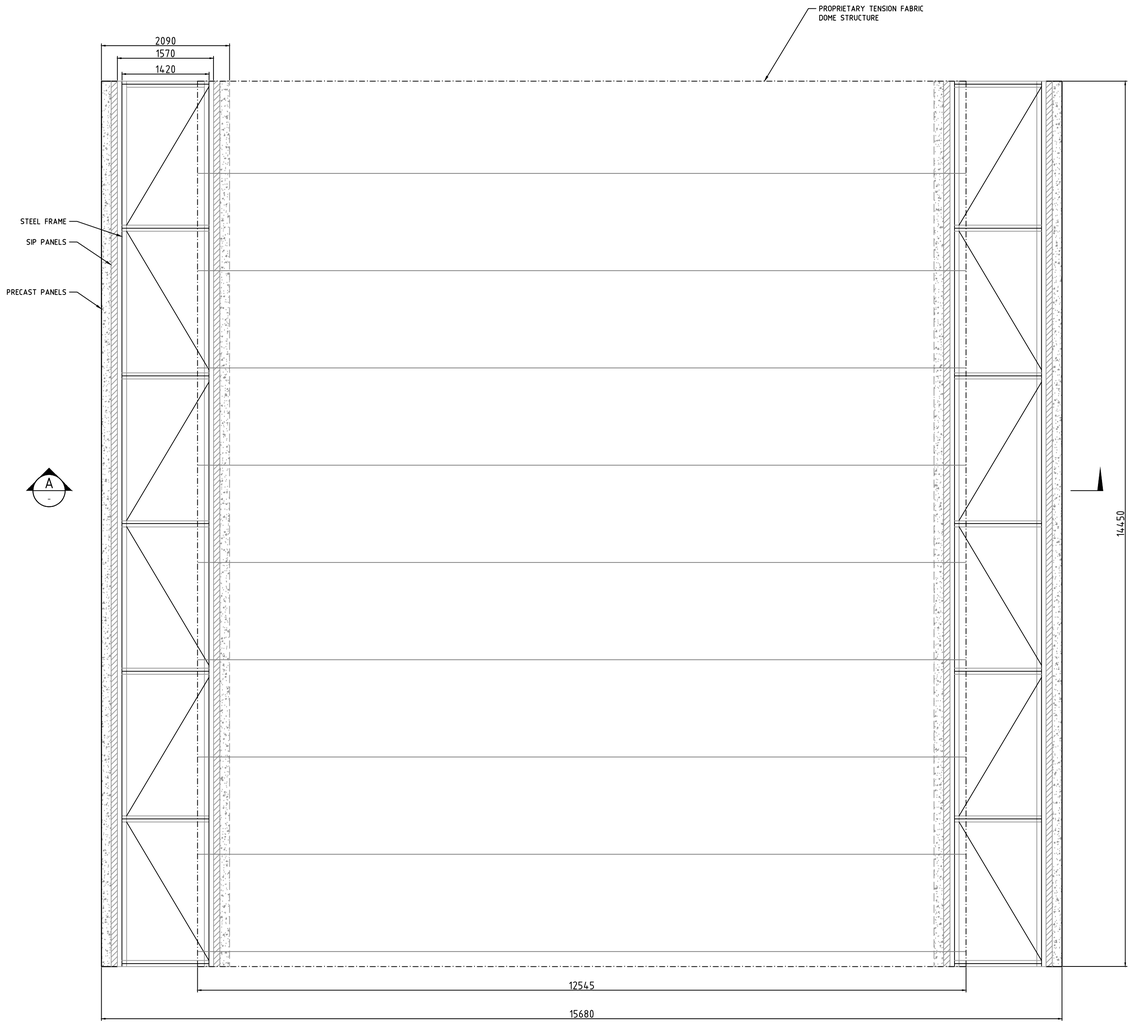
No.	Date	Dr	Ch	Amendment / Issue	App.
B	04.12.2023	YJ	AB	ISSUED FOR DEVELOPMENT APPROVAL	SH
A	16.11.2023	JS	AB	PRELIMINARY ISSUE	SH

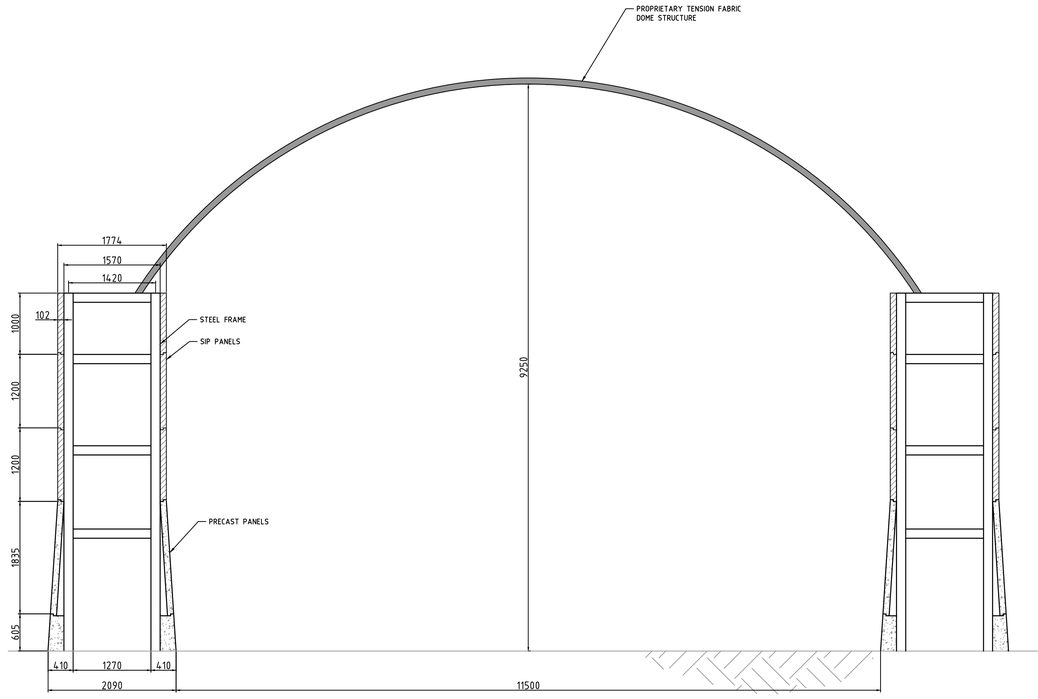
Project: C-WISE DUE DILIGENCE AND APPROVALS

Title: STAGE 1 WORKSHOP, OFFICE & CRIB ROOM SITE PLAN

Scale: 1:200 @ A1 | Date: 16.11.2023
Drawn: JS | Checked: AB | Approved: SH
Job No: TW21124 | Drg. No: C-600 | Rev: B
Filename: TW21124-BLDG.DWG



TYPICAL BUNKER PLAN
SCALE: 1:50



A BUNKER TYPICAL SECTION
SCALE: 1:50

2.0m 0m 2.0m 4.0m
1:50 @ A1

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HORIZONTAL DATUM: MGA 94 ZONE 50

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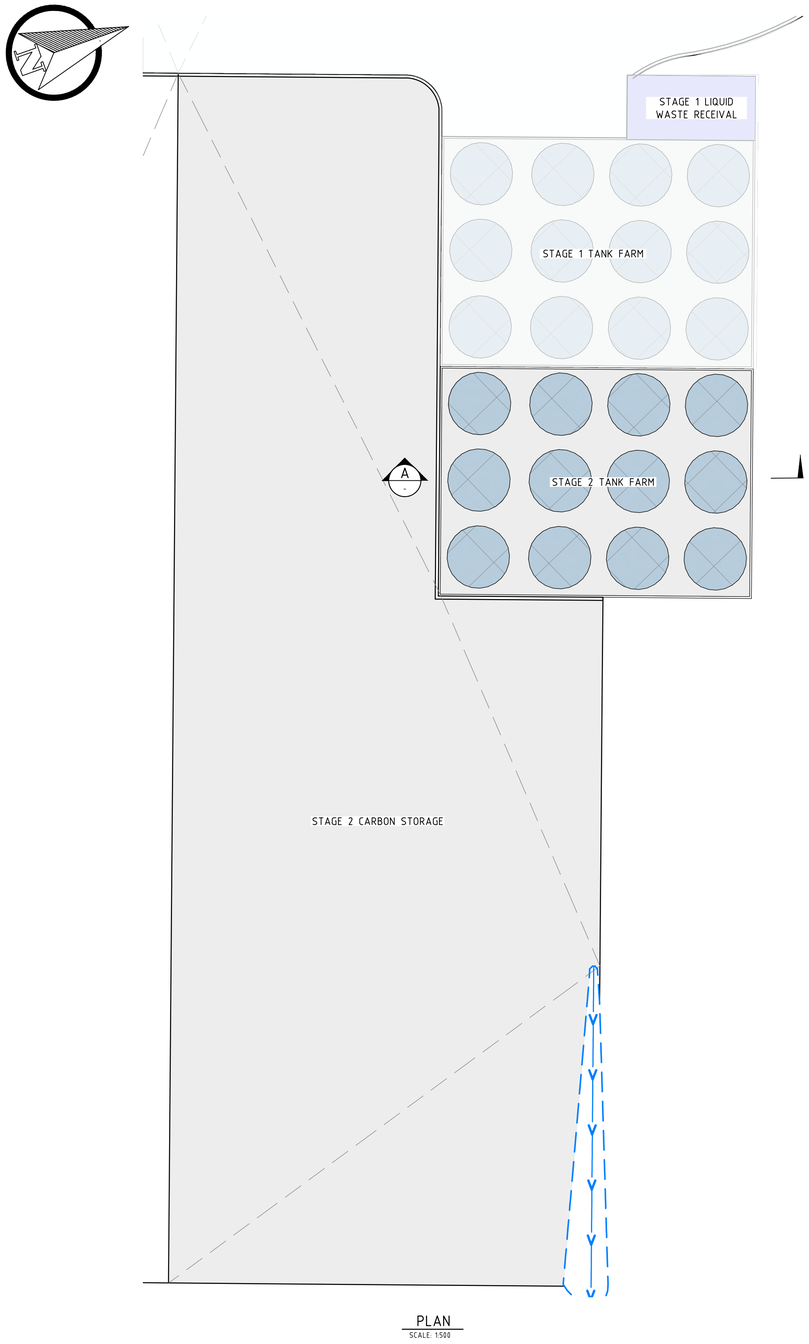
No.	Date	By	Ch	Amendment / Issue	App.
A	04.12.2023	YJ	SH	ISSUED FOR DEVELOPMENT APPROVAL	SH

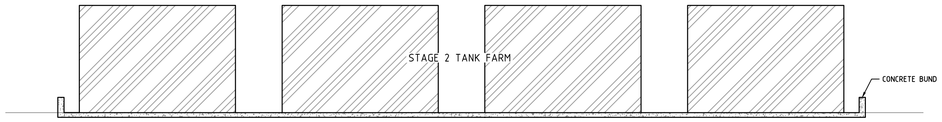
Project: C-WISE DUE DILIGENCE AND APPROVALS

Title: STAGE 2 BUNKER PLAN AND TYPICAL SECTION

Scale: 1:50 @ A1 | Date: 08.09.2022
Drawn: YJ | Checked: SH | Approved:
Job No: TW21124 | Drg. No: S-503 | Rev: A
Filename: TW21124-STRUC-DA-SET.DWG



PLAN
SCALE: 1:500



A
-
SECTION
SCALE: 1:200

PRELIMINARY ONLY
NOT FOR CONSTRUCTION

8.0m 0m 8.0m 16.0m
1:200 @ A1

20m 0m 20m 40m
1:500 @ A1

VERTICAL DATUM: AUSTRALIAN HEIGHT DATUM
HORIZONTAL DATUM: MGA 94 ZONE 50

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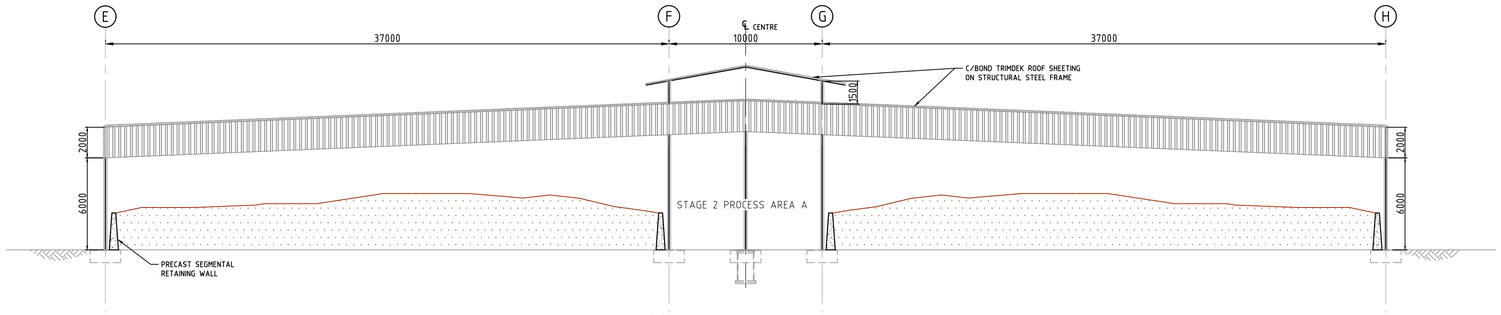
No.	Date	by	ch	Amendment / Issue	App.
A	04.12.2023	YJ	SH	ISSUED FOR DEVELOPMENT APPROVAL	SH

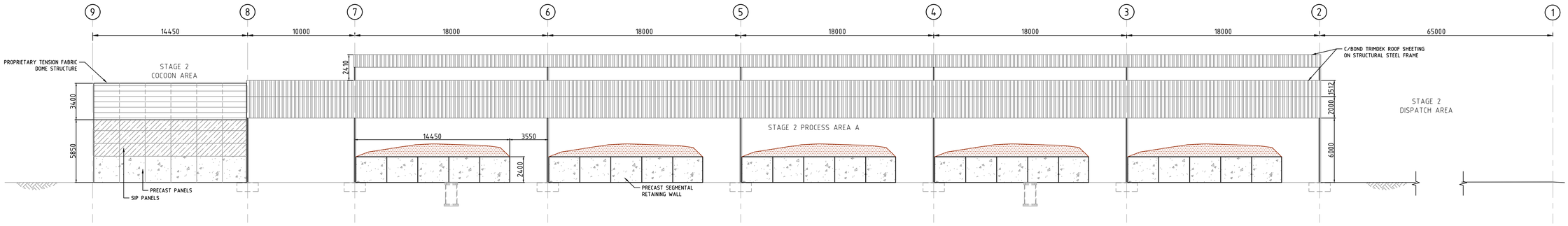
Project: C-WISE DUE DILIGENCE AND APPROVALS

Title: STAGE 2 CARBON STORAGE AREA AND TANK FARM - PLAN AND SECTION

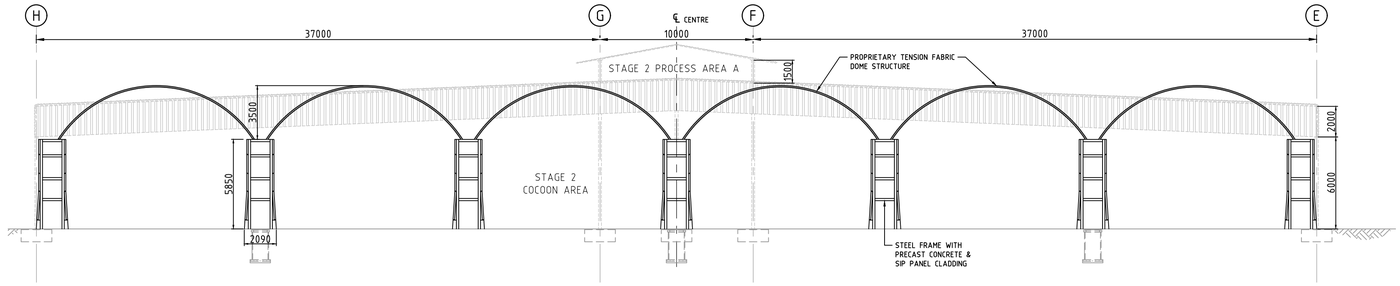
Scale: AS SHOWN @ A1 | Date: 08.09.2022
Drawn: YJ | Checked: SH | Approved:
Job No: TW21124 | Drg. No: S-801 | Rev: A
Filename: TW21124-STRUC-DA-SET.DWG



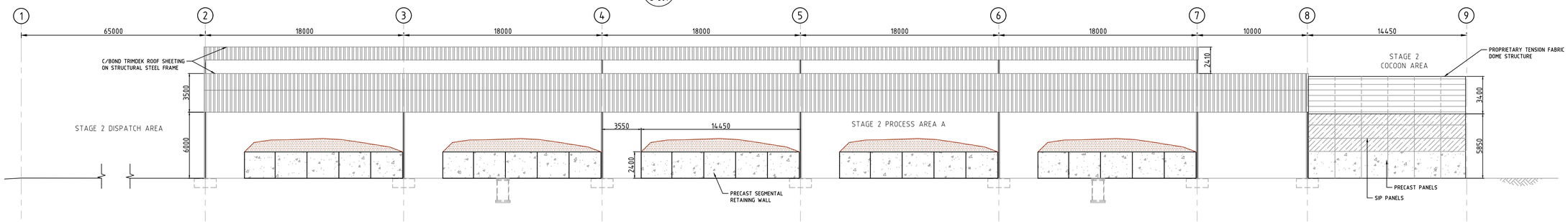
1 S-501 SOUTH ELEVATION
SCALE: 1:200



2 S-501 WEST ELEVATION
SCALE: 1:250



3 S-501 NORTH ELEVATION
SCALE: 1:200



4 S-501 EAST ELEVATION
SCALE: 1:200

8.0m 0m 8.0m 16.0m

1:200 @ A1

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HORIZONTAL DATUM: MGA 94 ZONE 50

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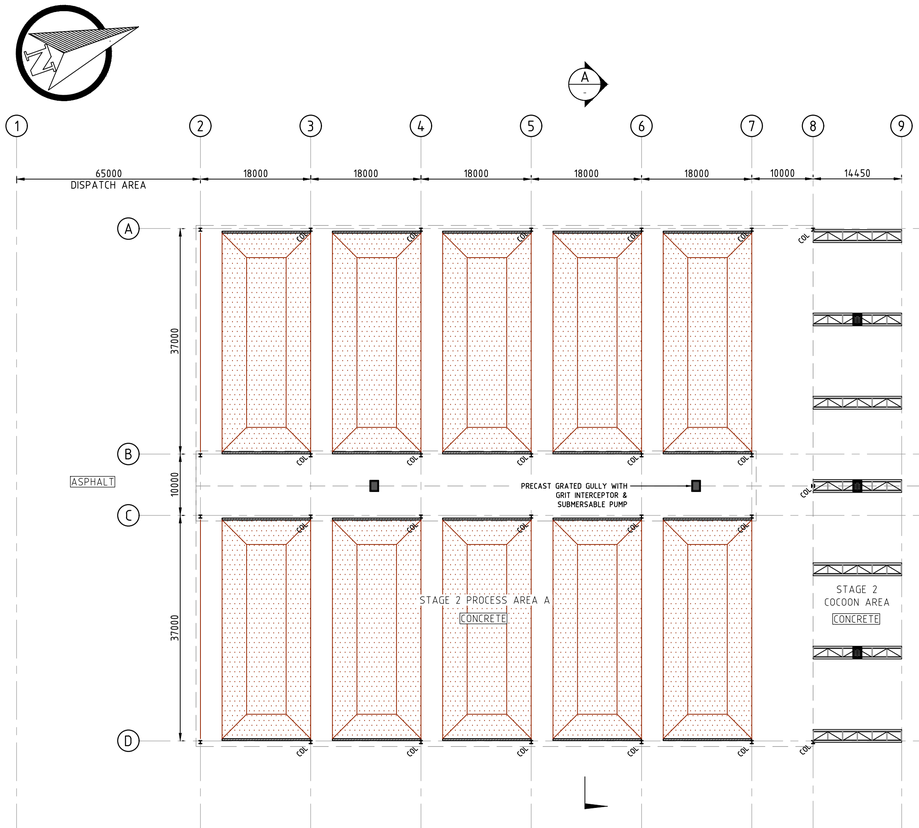
No.	Date	by	ch	Amendment / Issue	App.
A	04.12.2023	YJ	SH	ISSUED FOR DEVELOPMENT APPROVAL	SH

Project: C-WISE DUE DILIGENCE AND APPROVALS

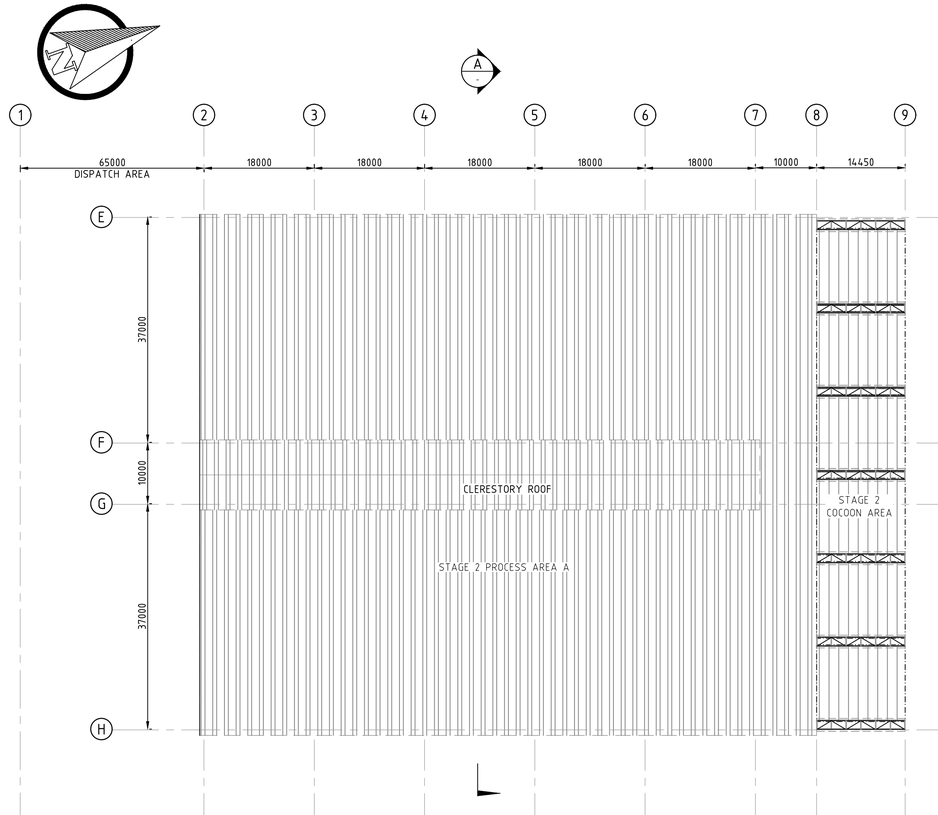
Title: STAGE 2 PROCESS AREA A - ELEVATIONS

Scale: 1:200 @ A1 | Date: 08.09.2022
Drawn: YJ | Checked: SH | Approved:
Job No: TW21124 | Drg. No: S-502 | Rev: A
Filename: TW21124-STRUC-DA-SET.DWG



GROUND FLOOR PLAN - STAGE 2 PROCESS AREA A

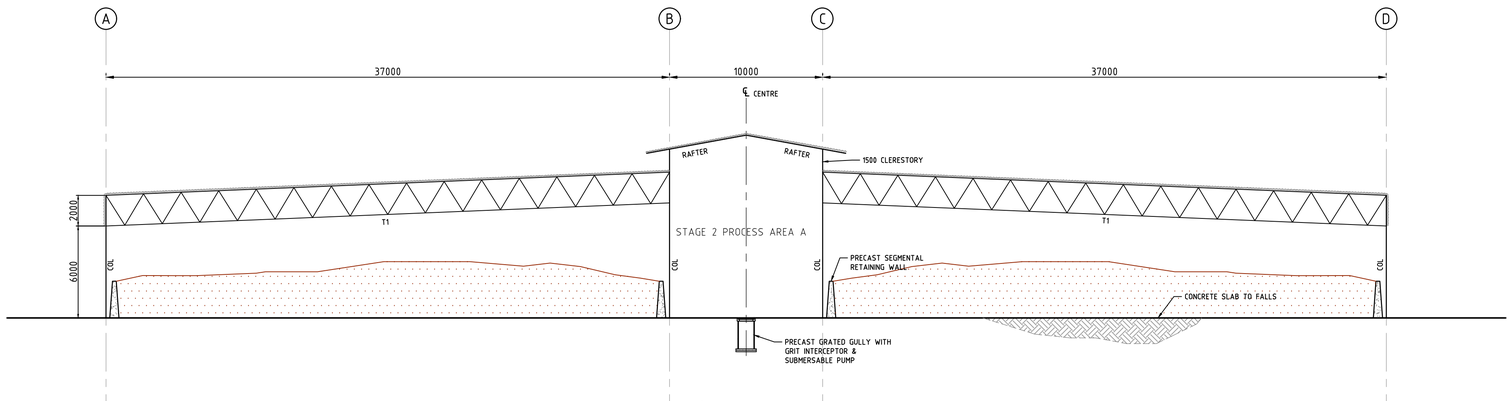
SCALE: 1:500



ROOF PLAN - STAGE 2 PROCESS AREA A

SCALE: 1:500

ELEVATIONS



A SECTION

SCALE: 1:200

8.0m 0m 8.0m 16.0m

1:200 @ A1

20m 0m 20m 40m

1:500 @ A1

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VERTICAL DATUM: AUSTRALIAN HEIGHT DATUM
HORIZONTAL DATUM: MGA 94 ZONE 50

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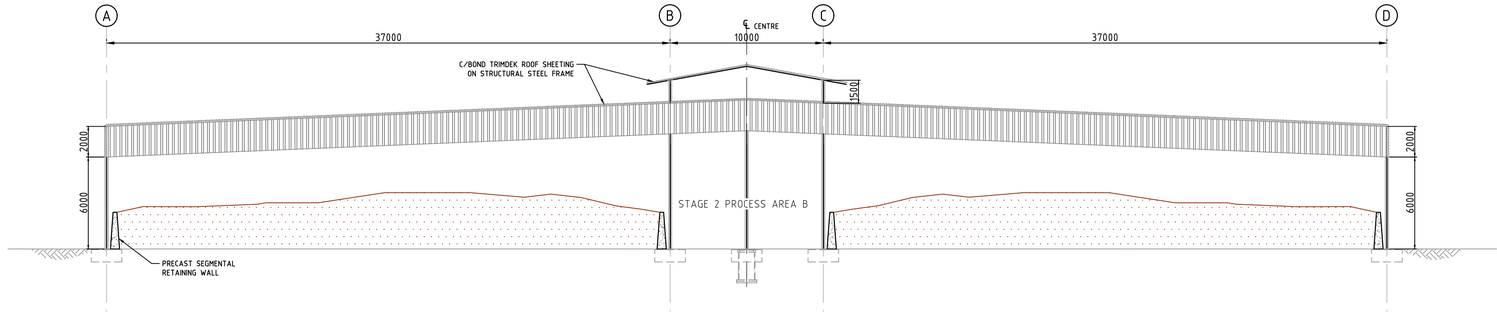
No.	Date	Dr	Ch	Amendment / Issue	App.
A	04.12.2023	YJ	SH	ISSUED FOR DEVELOPMENT APPROVAL	SH

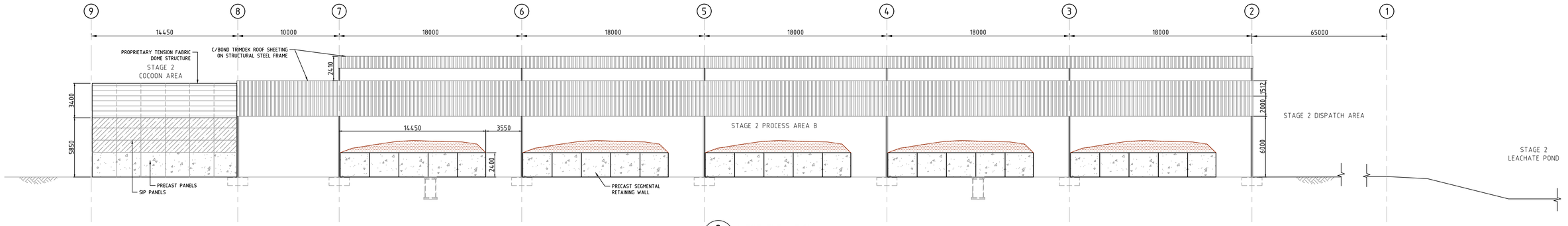
Project: C-WISE DUE DILIGENCE AND APPROVALS

Title: STAGE 2 PROCESS AREA A - FLOOR PLAN, ROOF LAYOUT & TYPICAL SECTION

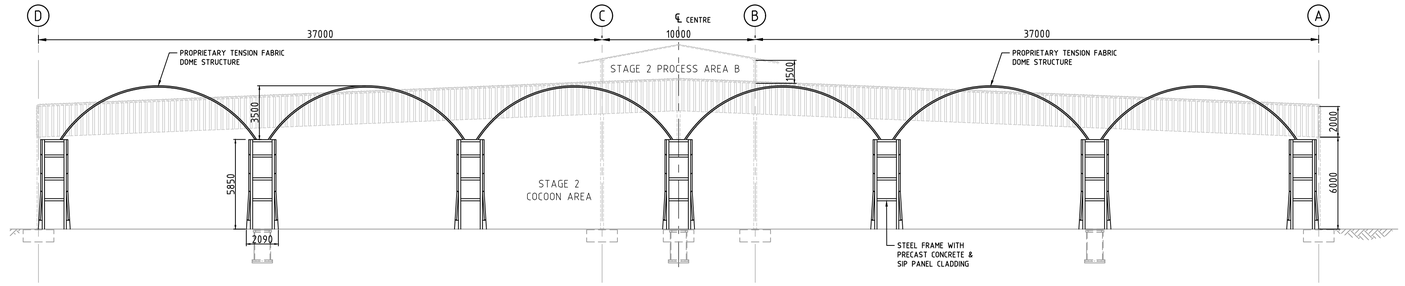
Scale: AS SHOWN @ A1 | Date: 08.09.2022
Drawn: YJ | Checked: SH | Approved:
Job No: TW21124 | Drg. No: S-501 | Rev: A
Filename: TW21124-STRUC-DA-SET.DWG



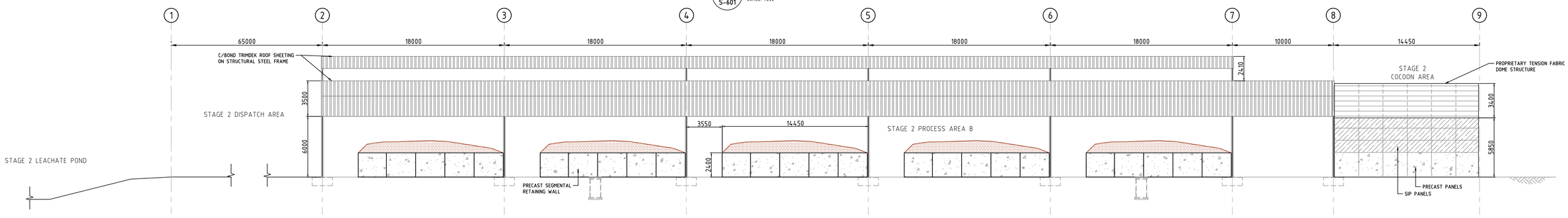
1 / S-601 SOUTH ELEVATION
SCALE: 1:200



2 / S-601 WEST ELEVATION
SCALE: 1:200



3 / S-601 NORTH ELEVATION
SCALE: 1:200



4 / S-601 EAST ELEVATION
SCALE: 1:200

PRELIMINARY ONLY
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8.0m 0m 8.0m 16.0m
1:200 @ A1

VERTICAL DATUM: AUSTRALIAN HEIGHT DATUM
HORIZONTAL DATUM: MGA 94 ZONE 50

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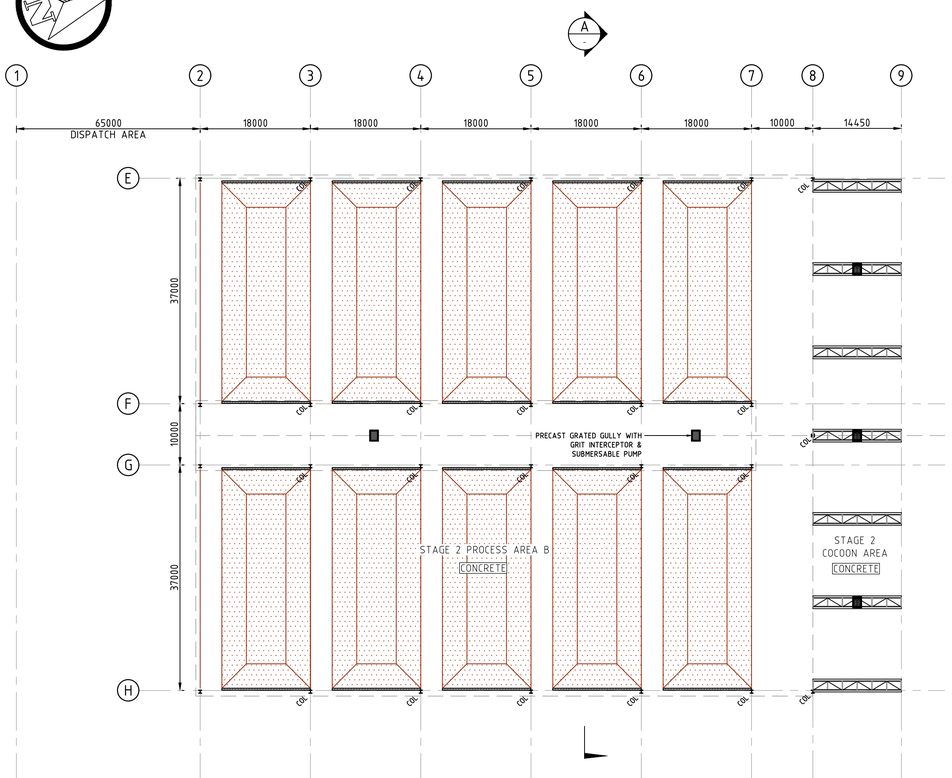
No.	Date	Dr.	Ch.	Amendment / Issue	App.
A	04.12.2023	YJ	SH	ISSUED FOR DEVELOPMENT APPROVAL	SH

Project: C-WISE DUE DILIGENCE AND APPROVALS

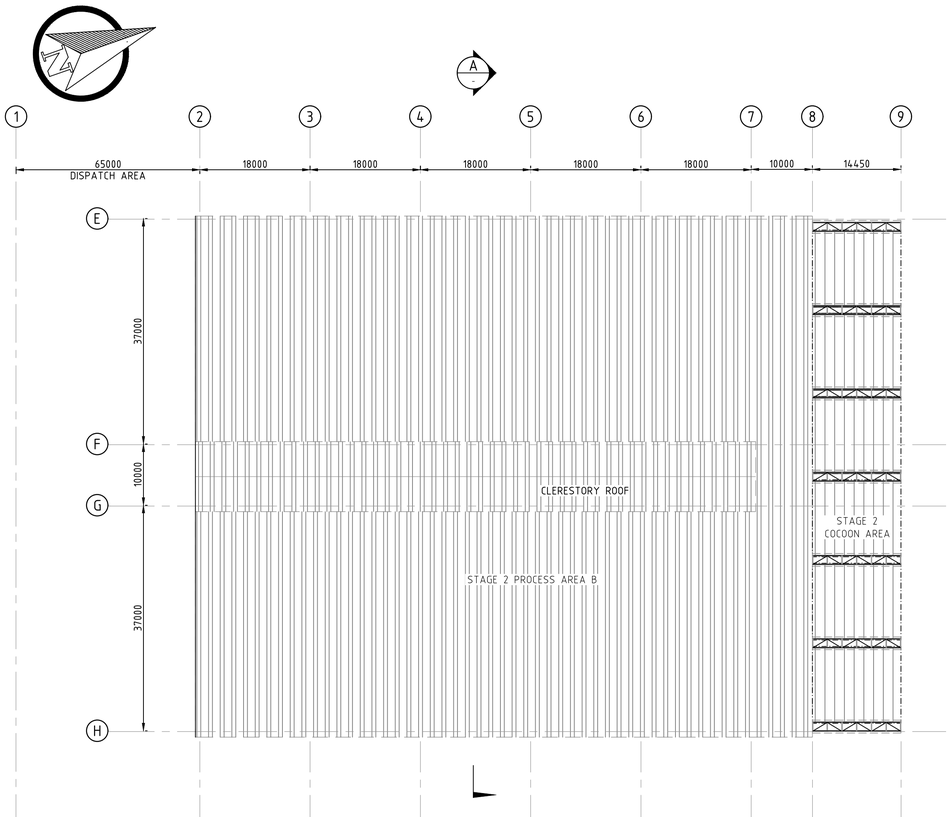
Title: STAGE 2 PROCESS AREA B - ELEVATIONS

Scale: 1:200 @ A1 | Date: 08.09.2022
Drawn: YJ | Checked: SH | Approved:
Job No: TW21124 | Drg. No: S-602 | Rev: A
Filename: TW21124-STRUC-DA-SET.DWG

FILENAME \\SERVER\TALIS\SECTIONS\WASTE\PROJECTS\TW2021\TW21124 - C-WISE DUE DILIGENCE AND APPROVALS\DRAWINGS\DRAWINGS\TW21124-STRUC-DA-SET.DWG

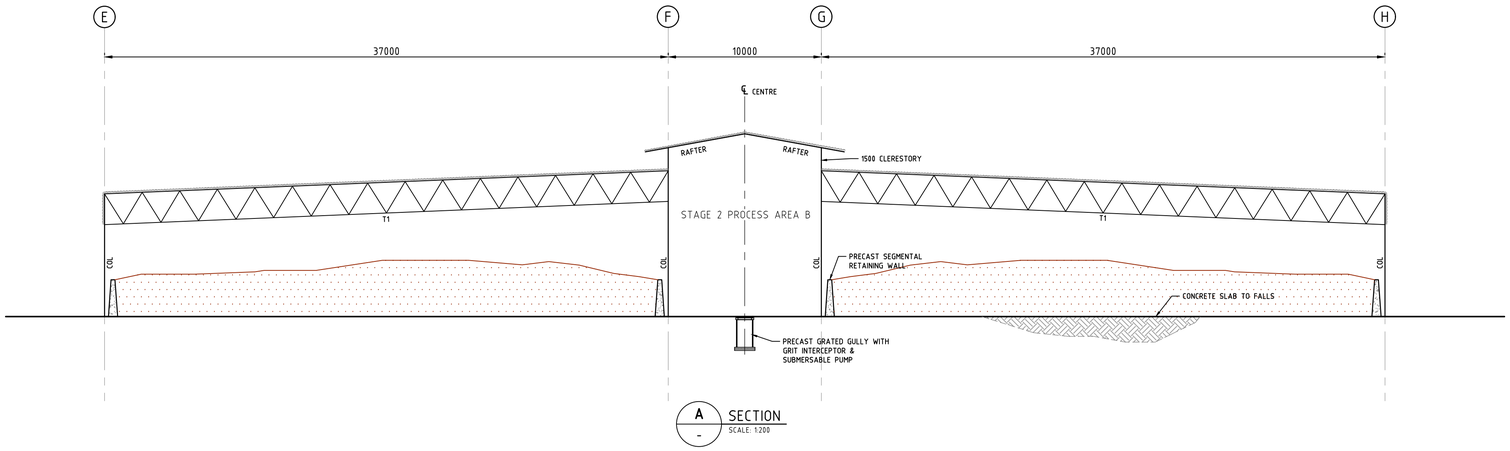


GROUND FLOOR PLAN - STAGE 1 PROCESS AREA B
SCALE: 1:500



ROOF PLAN - STAGE 1 PROCESS AREA B
SCALE: 1:500

ELEVATIONS



A SECTION
SCALE: 1:200

PRELIMINARY ONLY
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8.0m 0m 8.0m 16.0m
1:200 @ A1

20m 0m 20m 40m
1:500 @ A1

VERTICAL DATUM: AUSTRALIAN HEIGHT DATUM
HORIZONTAL DATUM: MGA 94 ZONE 50

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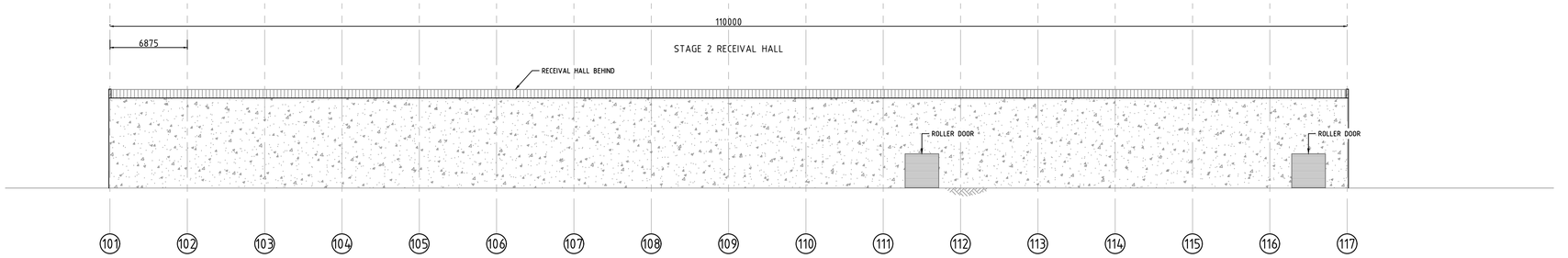
No.	Date	Dr.	Ch.	Amendment / Issue	App.
A	04.12.2023	YJ	SH	ISSUED FOR DEVELOPMENT APPROVAL	SH

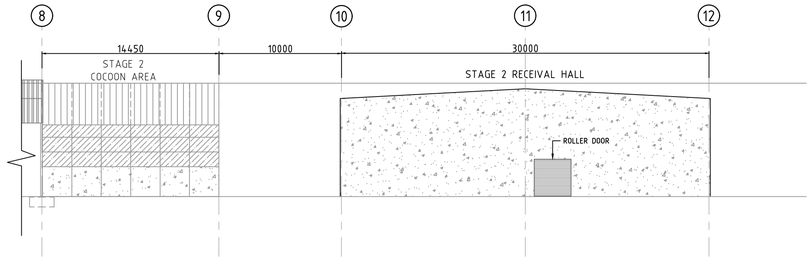
Project: C-WISE DUE DILIGENCE AND APPROVALS

Title: STAGE 2 PROCESS AREA B - FLOOR PLAN, ROOF LAYOUT & TYPICAL SECTION

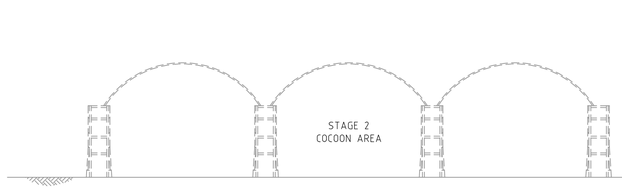
Scale: AS SHOWN @ A1 | Date: 08.09.2022
Drawn: YJ | Checked: SH | Approved:
Job No: TW21124 | Drg. No: S-601 | Rev: A
Filename: TW21124-STRUC-DA-SET.DWG

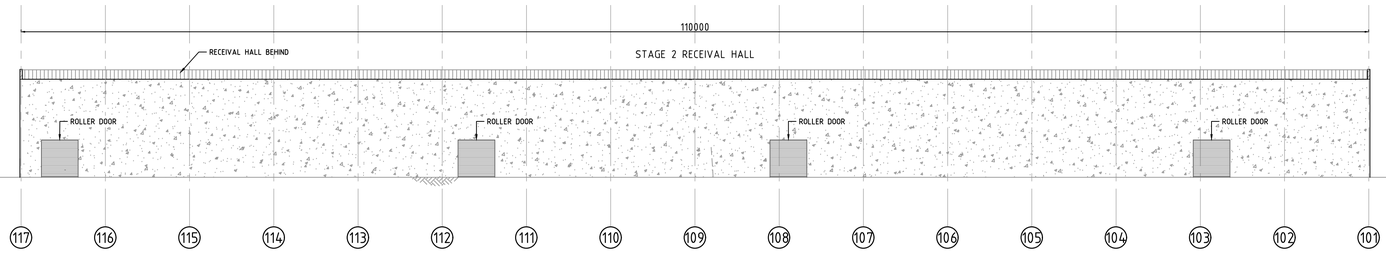


1 S-701 SOUTH ELEVATION
SCALE: 1:250

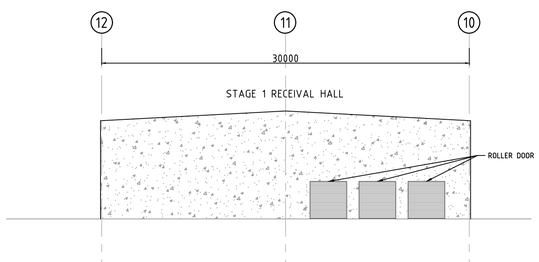


2 S-701 EAST ELEVATION
SCALE: 1:250





3 S-701 NORTH ELEVATION
SCALE: 1:250



4 S-701 WEST ELEVATION
SCALE: 1:250

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10m 0m 10m 20m
1:250 @ A1

VERTICAL DATUM: AUSTRALIAN HEIGHT DATUM
HORIZONTAL DATUM: MGA 94 ZONE 50

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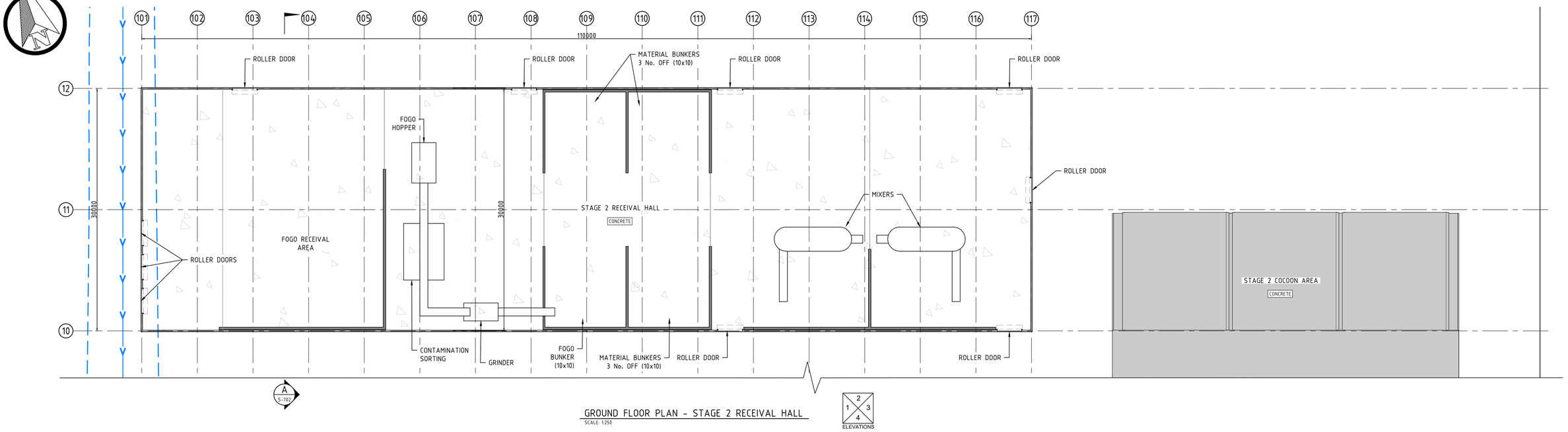
No.	Date	Drn	Chk	Amendment / Issue	App.
A	04.12.2023	YJ	SH	ISSUED FOR DEVELOPMENT APPROVAL	SH

Project: C-WISE DUE DILIGENCE AND APPROVALS

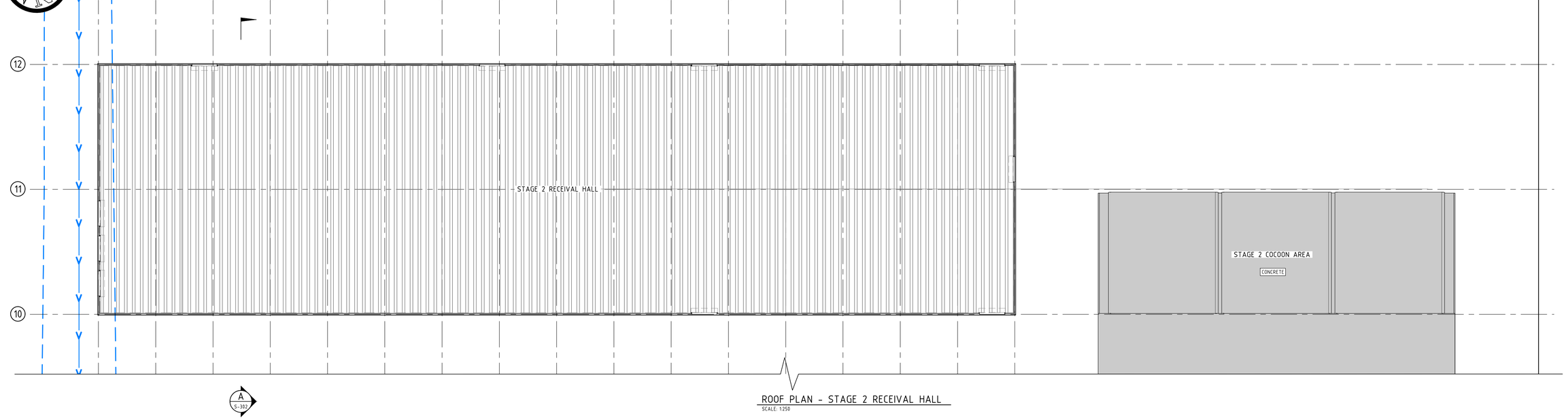
Title: STAGE 2 RECEIVAL HALL - ELEVATIONS

Scale: 1:250 @ A1 | Date: 08.09.2022
Drawn: YJ | Checked: SH | Approved:
Job No: TW21124 | Drg. No: S-703 | Rev: A
Filename: TW21124-STRUC-DA-SET.DWG



GROUND FLOOR PLAN - STAGE 2 RECEIVAL HALL
SCALE: 1:250

ELEVATIONS: 1 2 3 4



ROOF PLAN - STAGE 2 RECEIVAL HALL
SCALE: 1:250

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10m 0m 10m 20m
1:250 @ A1

VERTICAL DATUM: AUSTRALIAN HEIGHT DATUM
HORIZONTAL DATUM: MGA 94 ZONE 50

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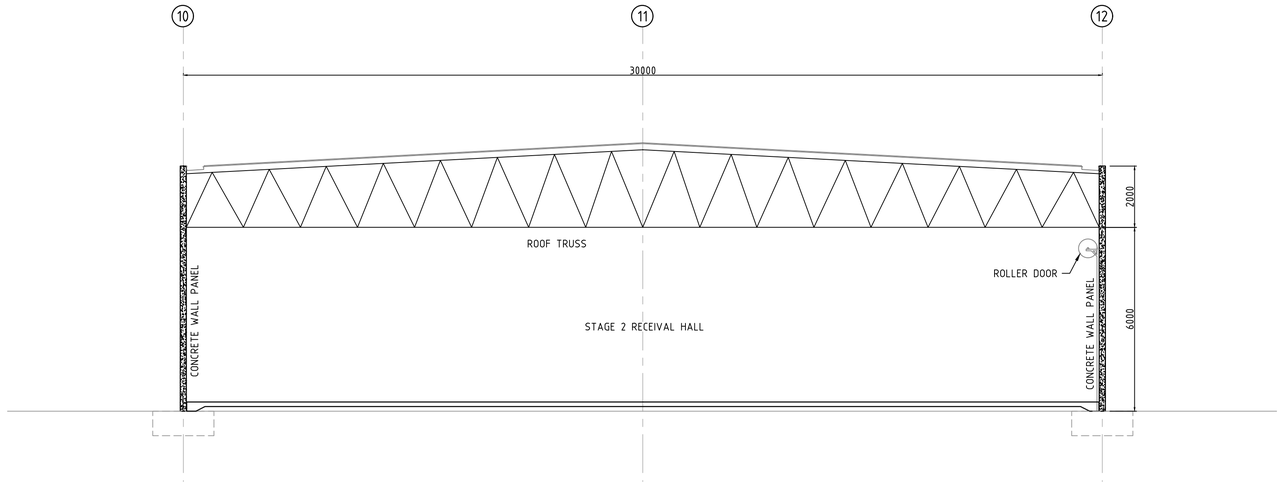
No.	Date	By	Chk	Amendment / Issue	App.
A	04.12.2023	YJ	SH	ISSUED FOR DEVELOPMENT APPROVAL	SH

Project: C-WISE DUE DILIGENCE AND APPROVALS

Title: STAGE 2 RECEIVAL HALL - FLOOR PLAN, ROOF LAYOUT

Scale: 1:250 @ A1 | Date: 08.09.2022
Drawn: YJ | Checked: SH | Approved:
Job No: TW21124 | Drg. No: S-701 | Rev: A
Filename: TW21124-STRUC-DA-SET.DWG



A / S-701 SECTION
SCALE: 1:100

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4.0m 0m 4.0m 8.0m
1:100 @ A1

VERTICAL DATUM: AUSTRALIAN HEIGHT DATUM
HORIZONTAL DATUM: MGA 94 ZONE 50

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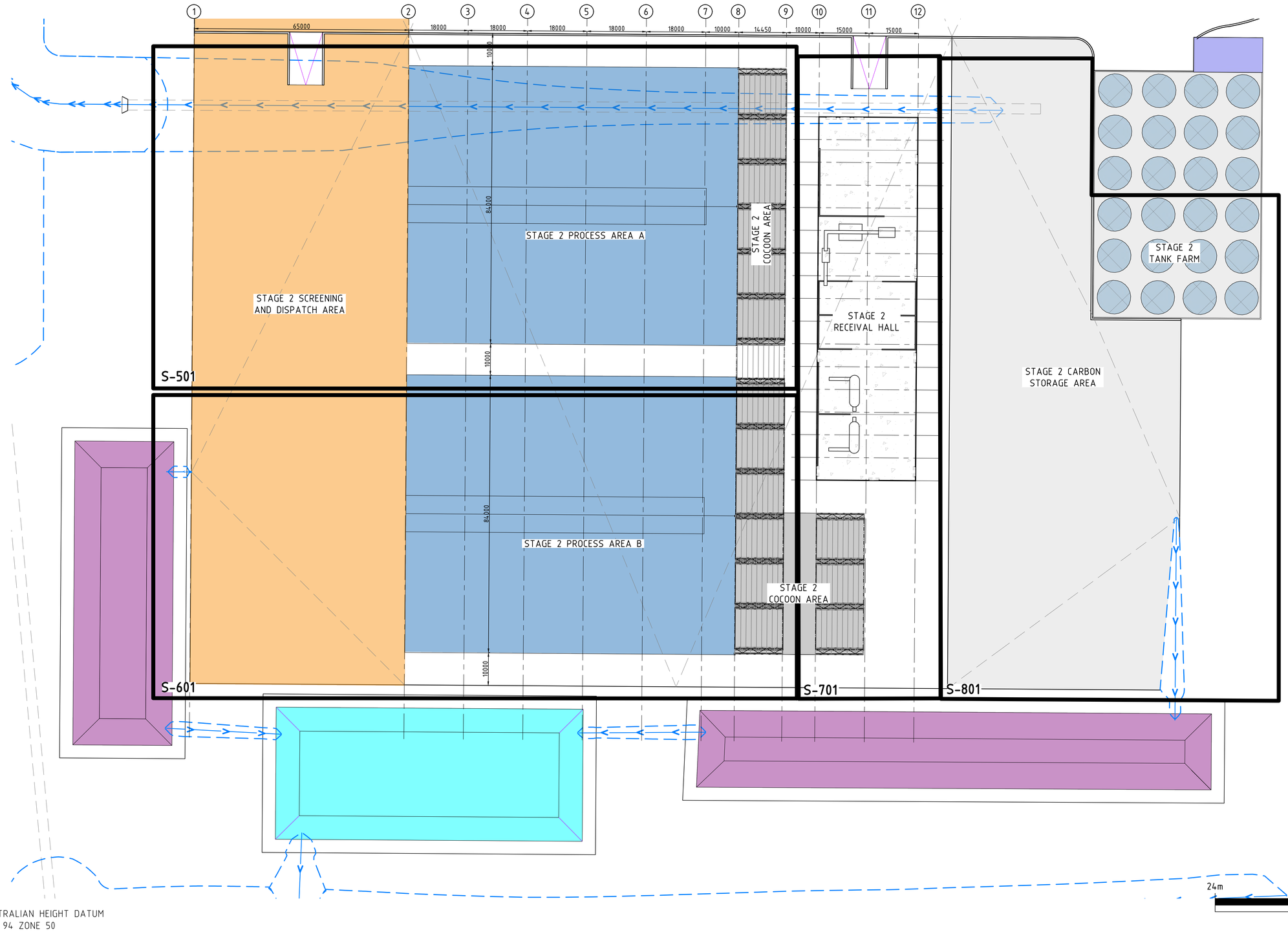
A	04.12.2023	YJ	SH	ISSUED FOR DEVELOPMENT APPROVAL	SH

Project: C-WISE DUE DILIGENCE AND APPROVALS

Title: STAGE 2 RECEIVAL HALL - TYPICAL SECTION

Scale: 1:100 @ A1 | Date: 08.09.2022
Drawn: YJ | Checked: SH | Approved:
Job No: TW21124 | Drg. No: S-702 | Rev: A
Filename: TW21124-STRUC-DA-SET.DWG



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24m 0m 24m 48m

1:600 @ A1

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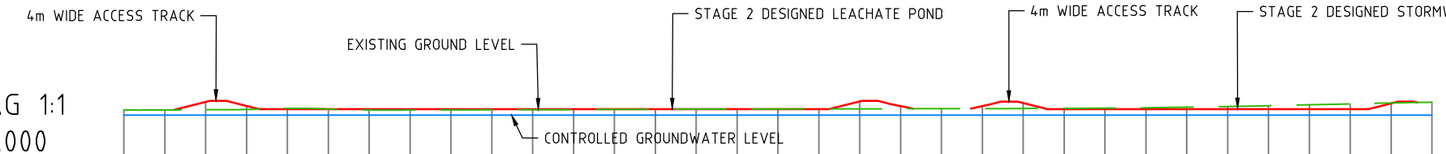
A	04.12.2023	YJ	SH	ISSUED FOR DEVELOPMENT APPROVAL	SH

Project: C-WISE DUE DILIGENCE AND APPROVALS

Title: STAGE 2 SITE KEY PLAN

Scale: 1:600 @ A1 | Date: 08.09.2022
Drawn: YJ | Checked: SH | Approved:
Job No: TW21124 | Drg. No: S-500 | Rev: A
Filename: TW21124-STRUC-DA-SET.DWG



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DESIGN LEVELS			18.236	17.264	16.500	16.500	16.500	16.500	16.500	16.500	16.500	16.500	16.500	16.500	16.500	16.500	16.500	16.500	18.384	17.206		17.201	17.950	16.500	16.500	16.500	16.500	16.500	16.500	16.500	16.500	17.888	16.574	
EXISTING LEVELS	16.265	16.277	16.335	16.402	16.650	16.490	16.253	16.256	16.284	16.327	16.352	16.373	16.400	16.438	16.474	16.500	16.511	16.533	16.550	16.568	16.589	16.610	16.629	16.649	16.713	16.808	16.942	17.116	17.321	17.539	17.758	17.973	16.574	18.170
DEPTH TO EXISTING GROUND			1.902	0.862	-0.150	0.010	0.247	0.244	0.216	0.173	0.148	0.127	0.100	0.062	0.026	0.000	-0.011	-0.033	1.834	0.638		0.590	1.320	-0.149	-0.213	-0.308	-0.442	-0.616	-0.821	-1.039	-1.258	-0.085	0.000	
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DEPTH TO CONTROLLED GROUNDWATER			3.236	2.264	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	3.384	2.206		2.201	2.950	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	2.888	1.574	
CHAINAGE	0.000	10.000	20.000	30.000	40.000	50.000	60.000	70.000	80.000	90.000	100.000	110.000	120.000	130.000	140.000	150.000	160.000	170.000	180.000	190.000	200.000	210.000	220.000	230.000	240.000	250.000	260.000	270.000	280.000	290.000	300.000	310.000	192.982	320.000

E C-101 LONG SECTION THROUGH STAGE 2 STORMWATER POND AND NORTH LEACHATE POND

SCALE: 1:1500

DESIGN LEVELS										17.264	16.500	16.500	16.500	16.500	16.500	16.500	16.500	16.730	18.500	17.500			
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DEPTH TO EXISTING GROUND										-0.236	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-0.770	1.000	0.000			
CONTROLLED GROUNDWATER LEVELS		15.000	15.000	15.000	15.000	15.000	15.000	15.000	15.000	15.000	15.000	15.000	15.000	15.000	15.000	15.000	15.000	15.000	15.000	15.000		15.000	15.000
DEPTH TO CONTROLLED GROUNDWATER										2.264	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.730	3.500	2.500			
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F C-101 LONG SECTION THROUGH STAGE 2 SOUTH LEACHATE POND

SCALE: 1:1500

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1:1500 @ A3 VERT
1:1500 @ A3 HORIZ
30m 0m 30m 60m

VERTICAL DATUM: AUSTRALIAN HEIGHT DATUM
HORIZONTAL DATUM: MGA 94 ZONE 50

FILENAME: \\SERVER\TALIS\SECTIONS\WASTE\PROJECTS\TW2021\TW21124 - C-WISE DUE DILIGENCE AND APPROVALS\DRAWINGS\DRAWINGS\TW21124-SET.DWG

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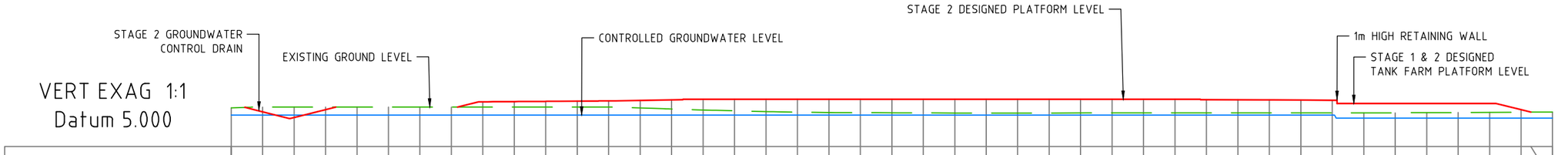
B	26.09.2023	YJ	AB	EARTH WORK VOLUME UPDATED	MH
A	29.08.2023	YJ	AB	EARTH WORK UPDATED	MH

Project:
C-WISE DUE DILIGENCE AND APPROVALS

Title:
LONG SECTIONS 3 OF 4

Scale: AS SHOWN @ A3	Date: 02.03.2022	
Drawn: YJ	Checked: AB	Approved: MH
Job No: TW21124	Drg. No: C-203	Rev: B
Filename: TW21124-SET.DWG		



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EXISTING LEVELS	17.245	17.500	17.500	17.500	17.500	17.500	17.500	17.500	17.500	17.500	17.500	17.500	17.500	17.222
DEPTH TO EXISTING GROUND									1.672	1.746	1.820	1.895	1.969	2.395
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DESIGN LEVELS	19.786	19.975	19.975	19.975	19.975	19.975	19.975	19.975	19.975	19.975	19.975	19.975	19.975	19.975	19.975
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CHAINAGE	140.000	150.000	160.000	170.000	180.000	190.000	200.000	210.000	220.000	230.000	240.000	250.000	260.000	270.000	280.000

DESIGN LEVELS	19.975	19.975	19.845	19.834	19.822	19.759	19.690	18.680	18.680	18.680	18.680	18.680	16.685	19.680	
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DEPTH TO EXISTING GROUND	4.301	4.307	4.195	4.178	4.164	4.115	4.045	3.014	2.990	2.956	2.909	2.846	0.788	4.032	
CONTROLLED GROUNDWATER LEVELS	15.000	15.000	15.000	15.000	15.000	15.000	15.000	14.000	14.000	14.000	14.000	14.000	14.000	14.000	
DEPTH TO CONTROLLED GROUNDWATER	4.975	4.975	4.845	4.834	4.822	4.759	4.690	4.680	4.680	4.680	4.680	4.680	2.685	5.680	
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G C-101 LONG SECTION THROUGH STAGE 2

SCALE: 1:1500

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1:1500 @ A3 HORIZ

VERTICAL DATUM: AUSTRALIAN HEIGHT DATUM
HORIZONTAL DATUM: MGA 94 ZONE 50

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A	17.10.2023	YJ	AB	LONG SECTION ADDED	MH

Project: C-WISE DUE DILIGENCE AND APPROVALS

Title: LONG SECTIONS 4 OF 4

Scale: AS SHOWN @ A3
Date: 02.03.2022
Drawn: YJ
Checked: AB
Approved: MH
Job No: TW21124
Drg. No: C-204
Rev: A
Filename: TW21124-SET.DWG

ALTUS PLANNING

Development Application for Noxious Industry (Carbon Recycling Facility)

Lot 9500 (No. 320) Gull Road, Keralup

December 2023

TOWN PLANNING | MEDIATION | ADVOCACY

Disclaimer:

Prepared for:

C-Wise Holdings Pty Ltd

Prepared by:

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SOUTH PERTH, WA 6151
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Document Version Control

Ver.	Date	Description	Author	Approved
1	13/12/2023	Initial draft for client review	JP	JA
2	13/12/2023	Draft for client review	JP	JA
3	14/12/2023	Lodgement Version	JP	BL

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1.0 Executive Summary

The following application seeks planning approval for the introduction of a Carbon Recycling Facility for a leased portion at Lot 9500 (No. 320) Gull Road, Keralup. The current landowner (DevelopmentWA) has leased this section of land, to which the lease area is currently vacant.

The land use is classified as 'Noxious Industry' which is a 'SA' use within the 'Rural' zone pursuant to the Shire of Murray's Local Planning Scheme No. 4.

This Report has determined that the most relevant planning matters to this proposal are as follows:

- Bushfire
- Environmental impacts
- Traffic
- Strategic Minerals and Basic Raw Materials impacts

The proposal has been assessed as complying with the applicable State and local planning frameworks and is considered compatible with both the existing rural activities being conducted on-site, as well as those rural and industrial developments within the broader locality.

It is therefore considered that the proposal warrants approval.

2.0 Background

2.1 Purpose

This submission has been prepared by Altus Planning on behalf of C-Wise Holdings Pty Ltd (**Applicant**) to provide justification for a Development Application (**DA**) for a 'Noxious Industry' (**proposed development** or **proposal**) at Lot 9500 (No. 320) Gull Road, Keralup (**subject land** or **site**) under the relevant planning framework.

In accordance with the Shire of Murray's (**Shire**) and the Development Assessment Panel's (**DAP**) requirements, the following are included with this application:

(1) DAP Application Form 1;

(2) Shire of Murray Development Application Form;

(3) Peel Region Scheme Form 1 Application for Planning Approval;

(4) ASIC Company Extract;

(5) Certificate of Title (refer **Attachment 1** of this Report);

(6) Development Plans (refer **Attachment 2** of this Report); and

(7) Technical Documents (refer **Attachments 3-8** of this Report).

2.2 Property Description

The subject land measures approximately 1,608.9031 hectares (**ha**), with the lease area being approximately 269ha. The subject land is located on the eastern side of the Kwinana Freeway and Serpentine River, with the lease area approximately 3km to the north of the Gull Road and Lakes Road intersection.

The subject land is currently owned by DevelopmentWA, with DevelopmentWA leasing a section of the subject land to the Applicant. The lease area is vacant with scattered areas of cleared land and remnant vegetation. Specifically, this vegetation consists of Conservation Category Wetlands, Resource Enhancement Wetlands and also Multiple Use Wetlands.

Vehicular access to the site is currently obtained via the sealed extension of Gull Road. The proposal will obtain access to this section of road via an unsealed internal access road. It is the intention of the Applicant to seal this access road at some stage, however this will be investigated with regard to budget requirements.

The immediate surrounding locality comprises of various sized rural allotments as zoned under the Shire's Local Planning Scheme No. 4. However, the southern boundary is adjacent to the Nambeelup Industrial Area District Structure Plan (**Structure Plan**). This Structure Plan proposes that the adjacent properties to the subject land of Lot 92 (No. 231), Lot 109, and Lot 89 (No. 230) Gull Road are to be Industrial (with a small section of Open Space on Lot 89). Additionally, Lot 109, and Lot 89 (No. 230) Gull Road are zoned 'Industrial' under the Peel Region Scheme (**PRS**).

An aerial image of the subject site and immediate surrounds is provided in Figure 1.

Figure 1: Aerial of subject site and surrounds (Source: Shire of Murray Intramaps 2023)

3.0 Proposal

3.1 Description of Activities

3.1.1 General Context

The proposed development is for the acceptance and processing of a range of solid and liquid organic wastes to produce compost and similar products. These products are listed below:

a) Liquid wastes, consisting mainly of fertiliser wash waters;

b) Mixed source separated kerbside food organic garden organic (**FOGO**) wastes;

c) Commercial food waste; and

d) Natural fibrous organics.

The Applicant currently operates at 230 Gull Road, Nambeelup (**current site**). This application seeks to relocate those operations to the subject land due to its proximity to the existing site, as well as the vast amount of cleared land to allow for expansion of the operation.

The proposal, when fully operational under this current proposal, will have the capacity to process 200,000 tonnes of solid organic materials and 60,000 tonnes of liquid wastes for recycling per annum.

3.1.2 Staged Development

The proposed development will be constructed in two stages, referred to as Stage 1 and as Stage 2. Approval is sought for both stages within this application.

Stage 1:

Development of Stage 1 is designed to support the State's transition to a 3-bin FOGO system, which is required in the Perth and Peel regions by 2025. The Applicant has gained funding from the State and Federal Governments to support this transition and must construct the FOGO facility by 2025 to meet the funding requirements. As the Applicant's current facility is co-located with a piggery, there are strict biosecurity conditions in place for the current site, which do not permit acceptance of FOGO wastes at that facility.

Therefore, the Applicants have been long aware of the requirement for a new, better practice facility to support FOGO processing, which represents Stage 1 development of the Site.

Stage 2:

The lease at the current site is due to end in the coming years and will not be renewed, which necessitates the development of Stage 2 of the facility to transfer the existing operations from the current site over to the new facility.

It is expected that the construction of the Stage 2 development will commence approximately 24-36 months after operations of the Stage 1 development begin. A more accurate timeframe for the delivery of the Stage 2 development will be known following completion of the Stage 1 construction works.

Given Stage 2 is nearly a mirror image of Stage 1, it is not considered necessary for each stage to be separately applied for. All of the relevant documentation for both stages have been referred to together within this report.

3.1.3 Composting Process

The composting process will involve several steps. Each of these process stages will be completely enclosed to minimise potential odour emissions and to assist in the management of leachate. The composting process will be in general accordance with the Organics Recycling Guidelines, with the composting process briefly discussed below:

(1) Receival.
   (a) The receival building will include a receival area for vehicles to place waste materials and internal processing equipment for pre-sorting and the removal of contamination.
   (b) High risk feedstocks such as FOGO will be delivered by waste vehicles to the receival building.
   (c) Low risk feedstocks such as green waste, forestry residues and natural fibrous organics (such as cereal waste) will be stored in the carbon storage area.
   (d) Liquid wastes will be accepted at the liquid waste receival area for blending into compost products, and then stored within the storage tanks. The liquid waste receival area will and bunded, which minimises

the risk of liquid wastes entering the environment in the event of a spill or leak.

(2) Cocoon system and Pasteurisation.

(a) The cocoons will be fully enclosed. The cocoons will be managed and operated individually.

(b) Each cocoon will have a capacity of 500m^3. The cocoons will be constructed a concrete bund to minimise the risk of leachate entering soils.

(c) The concrete floor of each cocoon will be graded towards a collection pit to allow for the extraction of high-risk leachate.

(d) Air exchanges will occur throughout the process to maintain aerobic conditions and minimise odour generation. The air removed from the process is pumped through the initial Mobile Air Floor (**MAF**) compost stack to act as a biofilter and further mitigate odour generation.

(e) This stage is expected to take between 10-14 days to complete. To ensure pasteurisation, the compost piles will be subject to temperatures in excess of 55°C.

(3) Maturation and Pasteurisation.

(a) Following the above process, the maturation phase of the composting process will take place in the MAF area.

(b) The MAF system comprises a perforated pipe which is laid on top of the processing floor prior to the placement of organic material. This will force air through the pile and achieve aeration without the need for turning.

(c) The number of MAF stages will vary depending on operational requirements. It is anticipated that a minimum of three stages will occur. Each stage is anticipated to take between 10-14 days to complete.

(d) The pasteurisation process is used to kill plant and animal pathogens, parasites and weeds/seeds within the compost.

(e) Pasteurisation via the MAF system will be completed across a minimum of three stages. Each stage is anticipated to take between 7-10 days to complete.

(4) Settling.

(a) This stage will see the final maturation of the compost product. The product will come from the MAF Area and be placed into stockpiles underneath the processing shed roof.

(b) The stockpiles will passively sit and settle on the concrete hardstand, where it is anticipated that each stage of this process will occur for a minimum 2-4 days.

(c) Upon completion, the compost will be moved to the screening and dispatch area.

(5) Screening and Dispatch.

(a) The screening and dispatch area is where the finished compost product will be stored prior to removal from Site.

(b) Any leachate generated in this area will be classified as low-risk in accordance with the Organics Recycling Guideline and will be directed towards the adjacent leachate management pond.

(c) Once the composting process has been completed, the compost product will be screened to grade the product according to size, as well as allow for the removal of any remaining physical contaminants.

(d) The final product will be tested and classified in accordance with the Organics Recycling Guideline to ensure that it is fit-for-purpose and of a sufficient quality.

(6) Distribution.

(a) It is anticipated that the products generated at the Facility will be supplied to a number of agricultural, commercial and household markets via a range of distribution channels.

(b) No distribution to members of the general public will occur from site.

Further information of this process can be found within section 5.6 of the Environmental Assessment and Management Plan (**EAMP**).

3.2 Operating Hours

The Applicant seeks to operate the overall facility 24 hours per day, 7 days a week (24/7).

The Applicant however only seeks to receive products five (5) days per week, being Monday to Friday from 7:00am to 5:00pm and does not seek to receive products on weekends.

3.3 Staff and Visitors

The Applicant anticipates that there will likely be 65 employees on-site at any one time.

In terms of visitors, given the subject site will operate as a processing and distribution facility, visitors are to be infrequent and limited to direct industrial/agricultural customers and supporting services or business-related functions only (e.g. suppliers, servicing and maintenance). It should be noted that as the selling of the product is in large bulk, collections by commercial and/or agricultural clients will only be using heavy vehicles to collect the product and depart from site. Therefore, there is no need for any dedicated visitor parking bays.

3.4 Traffic Movements and Access

A Transport Impact Statement (**TIS**) has been prepared in accordance with the Western Australian Planning Commission (**WAPC**) Transport Impact Assessment Guidelines for Developments: Volume 4 – Individual Development (2016). The TIS has been prepared due to the proposal consisting of 10-100 vehicle trips in the peak hour. The TIS can be found as at **Attachment 8**.

In summary, the TIS has identified that the approximate trip generation will be 83 vehicles per hour (**vph**) within the AM peak hour, this is equivalent to 78vph in (52 light vehicles and 26 heavy vehicles) and 5vph out (3 light vehicles and 2 heavy vehicles). Subsequently, the PM peak hour has a similar number with 83vph, which is equivalent to 5vph in (3 light vehicles and 2 heavy vehicles) and 78vph out (52 light vehicles and 26 heavy vehicles).

Considering the Nambeelup Industrial Area District Structure Plan, and despite increasing the total road volumes, the impact on the surrounding road network from the increase in traffic is considered to be minimal and therefore acceptable.

3.5 Parking and Loading/Unloading

Parking is proposed around the office and workshop for the convenience of staff members. There are also ample parking opportunities around the site if additional parking is required.

A future carpark and future administration are intended to be located at the northern end of the development, to ensure a close proximity to the access of Gull Road, however this is not subject to this application and will be conducted at a later date.

As for loading/unloading, this is proposed to occur within the receival hall, and the screening and dispatch areas only.

3.6 Waste Management

Given the nature of the proposal, waste management is a key priority for sustainable development. The proposal will have varying waste products including litter and wastewater. Consequently, the EAMP has prepared in detail the effective measures required for the management of physical and liquid waste. Should the determining authority require a separate Waste Management Plan (**WMP**), the Applicant agrees in principle to a condition of approval for the preparation of a WMP.

3.7 Water Licence

The Applicant currently holds a Licence to Take Water (**Water Licence**) granted by the Department of Water and Environmental Regulation (**DWER**) for an annual water entitlement of 350,000kL.

The Applicant is currently liaising with DWER for an amendment to the Water Licence to ensure that the existing site (230 Gull Road) and the subject land fall under the one licence.

4.0 Planning Framework

4.1 Shire of Murray Local Planning Scheme No. 4

The subject land is zoned 'Rural' under the Shire's Local Planning Scheme No. 4 (**LPS4** or **Scheme**). The subject site is not located within a structure plan or any other defined planning policy area.

LPS4 does not contain any zone objectives, rather it includes 'general' and 'specific' objectives for the Scheme. The specific objectives as set out in clauses 2.2 of LPS4 are as follows:

Clause 2.2 – Specific Objectives:

a) to protect and foster the agricultural industry within the Scheme Area;

b) to preserve and consolidate the individual identity of the urban settlements (villages) within the Scheme Area;

c) to consolidate the central business district of the Pinjarra townsite and to improve accessibility to and car parking within it;

d) to foster the recreational potential of the Scheme Area;

e) to encourage industrial uses to establish within the area set aside for that purpose; and

f) to preserve the special environment associated with the lakes and waterways within the Scheme Area.

The proposal is considered to meet the relevant objectives as listed above.

The proposed development is considered to protect and foster the agricultural industry in both the Scheme area and its surrounds due to the sustainable practices of processing and providing compost that can be used for agricultural purposes.

The proposal is a mixture of an industrial and rural development. Therefore, having the proposed development on rural land that directly abuts the Nambeelup Industrial Area, it is considered that the proposal is located in the ideal location.

Lastly, the proposal is supported several specialised management plans that have been prepared by a qualified environmental consultant. These management plans, in conjunction with the proposed development plans, will ensure that the development will not create any adverse environmental impacts with particular reference to water courses on the site.

4.1.1 Land Use

Having regard to the land use definitions contained within Appendix 1 of LPS4, the proposed development is best suited to the 'Noxious Industry' land use:

> ***Noxious Industry*** *– means an industry in which the process involved constitutes an offensive trade within the meaning of the Health Act, 1911 (as amended) but does not include fish shops or dry cleaning establishments.*

As per Table 1 – Zoning Table of LPS4, 'Noxious Industry' is a 'SA' use within the 'Rural' zone which means that the use can be permitted at the Shire's discretion, subject to the advertisement of the proposal.

4.1.2 Development Standards and Requirements

The following sections and series of tables provides assessment against the relevant development standards and requirements prescribed by LPS4.

Site Requirements

Table 1: Assessment of proposed development under LPS4 – Non-Residential Development Standards.

LPS4: Table 2 – Non-Residential Development Standards	
Requirement	**Proposed Development**
Minimum Setbacks • Front: 10m • Side: 5m • Rear: As determined by Council	The development will be setback more than 100m to any lease or lot boundary. Setbacks therefore comply.
Maximum Site Coverage • 75%	Due to the size of the land and lease area, the proposal is well under the maximum 75% requirement and therefore complies.
Landscaping • 10%	No additional landscaping is proposed and nor is it considered necessary having regard to the existing vegetation on-site and the rural and largely remote context of the site.
Car Parking • No Noxious Industry requirements*	25 bays provided.

**Note: Table 2 of LPS4 generally provides the minimum number of car parking spaces required per land use classification, however, does not include a minimum requirement for 'Noxious Industry'. Pursuant to the notes under Table 2, in such circumstances, the standard requirement to the zone can be applied at the discretion of the local government. In this instance, there is no standard 'Rural' car parking requirement and therefore, the closest land use requirement (Light, General and Service Industry) has a requirement of 1 space per 50m^2 + serving facilities, which would be irrelevant for a proposal which has a development area of 100,831.4m^2 (approx..) but no more than approximately 45 staff.*

In considering an appropriate parking standard for the site, the following is considered relevant:

- Having regard to the nature and scale of the proposal, a majority of the area calculated is purely for storage purposes which does not generate a parking demand.
- The application included a TIS to demonstrate that the proposal will not cause a detrimental impact on traffic and access in and around the site (refer to section 3.4 of this Report and Attachment 8). The TIS indicates that the required number of bays is 60 bays, with 25 proposed.
  However, it should be noted that this TIS has included the future carpark and additional staff numbers which are not currently proposed in this application. The justification behind this is to allow the decision makers to have overarching assessment of the intended proposal, with the future administration building and the carpark being considered as minor development in the scheme of the overall application.
- Noting the above reference to the TIS, the total number of employees for the stage 1 and stage 2 developments will be 45 employees, in lieu of the intended future total of 65 employees. There are approximately 20 administrative staff for the Applicant, which will only move over from the current site when the future administration building is developed.
- Therefore, it is deemed that 25 bays are appropriate based on the calculation that there is 1 person per vehicle. Furthermore, regard should be given to ride sharing, and in addition, there is plenty of vacant area available around the development site for any overflow or additional parking in excess of 25 bays, should the need ever arise.
- The number of car parking bays is therefore deemed acceptable.

Accordingly, it is considered that the proposed development is compliant with the site requirements.

Zone Specific Development Standards

Table 2: Assessment of proposed development under clauses 7.3 and 7.4 of LPS4 – General Provisions.

LPS4: Part 7 General Provisions – Clauses 7.3 & 7.4	
Requirement	**Proposed Development**
7.3.1 Car Parking • Car parking shall be laid out and constructed generally in accordance with the layouts of parking bays and manoeuvring aisles shown in Figure I - Parking Layouts. • Car parking bays shall be capable of use independently of each other.	The proposed carparking is generally designed in accordance with Figure 1 and can be independently used.
7.3.2 Servicing • Clear loading/unloading area. Heavy vehicles to enter the street in forward gear.	Clear loading and unloading areas have been provided. Reference should be made to the Traffic Flow Plan and section 3.5 of this Report.
7.3.3 Landscaping • Landscaping to be designed and planted to enhance the design of the development and to assist with screening (where applicable). • Landscaping plan to be submitted to and approved by the local government. • Landscaping to be maintained in perpetuity.	No additional landscaping is proposed and nor is it considered necessary having regard to the existing vegetation on-site and the rural and largely remote context of the site.
7.3.4 Treatment of Driveways & Parking Areas • All driveways and parking areas designed to the local government's specifications. • All driveways, turning areas and parking areas to be constructed and maintained.	The proposed access road and parking areas will be limestone hardstand which is considered an acceptable design standard given the nature of the development.
7.4.1 • No open storage in front setback area.	No storage is proposed within the front setback area.
7.4.2 • Open storage areas to be screened from nearby roads and public places.	The development itself or any storage will be significantly screened via large setbacks and existing vegetation.

As detailed above, the proposal demonstrates compliance with the applicable development requirements contained in Part 7 of LPS4.

4.2 Shire of Murray Nambeelup – North Dandalup Local Rural Strategy

Currently, the Shire has no adopted Local Planning Strategy. However, a Local Rural Strategy for the Nambeelup and North Dandalup areas (**NNDLRS**) was prepared in March 2012, to which the subject site is applicable to in accordance with Figures 1-4 of the NNDLRS.

Under section 4.5 – Land Capability of the NNDLRS, it states that the subject area of the NNDLRS consists of a range of agricultural, rural, and specialised intensive operations (composting operations). The NNDLRS has acknowledged these uses (including composting) and therefore it is considered that the proposal is compatible with the NNDLRS, and with the relevant management plans in place, the proposal is considered to be consistent with the NNDLRS.

4.3 Planning and Development (Local Planning Schemes) Regulations 2015

In accordance with Schedule 2 (**Deemed Provisions**) of the *Planning and Development (Local Planning Schemes) Regulations 2015* (**LPS Regulations**), the local government is to have due regard to the relevant matters for consideration outlined under Clause 67(2).

The following matters are considered relevant to the proposed development and are addressed in the following table.

Table 3: Assessment of proposed development under Deemed Provisions Clause 67(2).

LPS Regulations Schedule 2: Clause 67(2)	
Requirement	**Proposed Development**
(a) The aims and provisions of this Scheme and any other local planning scheme operating within the Scheme area;	The relevant provisions under the Shire's LPS4 have been addressed under section 4.1 of this Report. The proposed development is for a 'Noxious Industry' land use which is a 'SA' use.
(b) The requirements of orderly and proper planning including any proposed local planning scheme or amendment to this Scheme that has been advertised under the Planning and Development (Local Planning Schemes) Regulations 2015 or any other	This Report has justified the proposal under the relevant provisions of LPS4 and the broader planning framework. We are aware that the Shire is seeking to soon initiate a new draft scheme and

LPS Regulations Schedule 2: Clause 67(2)	
Requirement	**Proposed Development**
proposed planning instrument that the local government is seriously considering adopting or approving;	strategy, but at this stage, neither would be yet matters for due regard. The proposal is therefore considered to be in accordance with the requirements of orderly and proper planning.
(c) any approved State planning policy;	Refer to the relevant assessments of state planning policies between sections 4.5-4.12 of this Report.
(fa) any local planning strategy for this Scheme endorsed by the Commission;	Currently, there is no endorsed Local Planning Strategy for the Shire. A Local Rural Strategy was endorsed by the Commission in 2012 which affects the site. Reference should be made to section 4.2 of this Report for assessment.
(g) any local planning policy for the Scheme area;	Refer to the relevant assessments of local planning policies between sections 4.13-4.15 of this Report.
(m) the compatibility of the development with its setting, including — (i) the compatibility of the development with the desired future character of its setting; and (ii) the relationship of the development to development on adjoining land or on other land in the locality including, but not limited to, the likely effect of the height, bulk, scale, orientation and appearance of the development;	The development is considered compatible with the future character as the site is zoned rural and abuts an industrial area. The proposed development is the perfect mix of a rural and industrial land use and is therefore compatible. Similarly, there is a compatible relationship with the adjoining land due to the development being considered as a mixture of rural and industrial – which compliments the surrounding properties. With regard to the physical nature of the development, the development has provided large setbacks to all site boundaries. Coinciding with the existing vegetation to act as screening, the development will also have minimal

LPS Regulations Schedule 2: Clause 67(2)	
Requirement	**Proposed Development**
	impact via its appearance to the public realm and adjoining land.
(n) the amenity of the locality including the following — (i) environmental impacts of the development; (ii) the character of the locality; (iii) social impacts of the development;	The proposed development has the potential, by the nature of the land use itself, to create significant environmental impacts. Consequently, the attached technical documents have been prepared to ensure that the proposal manages and mitigates all the potential environmental risks. With the proposed design and the management plans in place, the development is considered not to create any adverse environmental impacts and is therefore considered to be acceptable. In terms of the character of the locality and the social impacts, the development is a mixture of rural and industrial. The proposed location of the development is considered to be consistent with the amenity and future amenity of the area. Specifically, impacts such as noise, odour and dust have all be considered and managed through the EAMP. Therefore, it is considered that there are no adverse environmental or social impacts.
(o) the likely effect of the development on the natural environment or water resources and any means that are proposed to protect or to mitigate impacts on the natural environment or the water resource;	Given the nature of the development, the potential impact to water sources is high. The EAMP and the Surface Water and Leachate Management Plan have researched, prepared a design and management system to ensure that there will be no adverse impact to the natural environment or water resources.
(p) whether adequate provision has been made for the landscaping of the land to which the application relates and whether any trees or	No additional landscaping is proposed and nor is it considered necessary having regard to the existing vegetation on-site

LPS Regulations Schedule 2: Clause 67(2)	
Requirement	**Proposed Development**
other vegetation on the land should be preserved;	and the rural and largely remote context of the site. Adequate protection measures have been made to ensure protection of the high valued environmental areas. A majority of the proposed clearing is only for degraded land.
(s) the adequacy of — (i) the proposed means of access to and egress from the site; and (ii) arrangements for the loading, unloading, manoeuvring and parking of vehicles;	The site currently exists with vehicular access and egress to Gull Road via an unsealed access road. No upgrades are considered necessary given the minimal traffic volumes associated with the proposal. Clear loading and unloading areas have been provided. Reference should be made to the Traffic Flow Plan and section 3.5 of this Report. As for staff/visitor parking, a dedicated parking area is proposed around the office and workshop, also allowing for full circulation.
(t) the amount of traffic likely to be generated by the development, particularly in relation to the capacity of the road system in the locality and the probable effect on traffic flow and safety;	The proposed traffic to be generated is considered to be minimal to the existing road network and is therefore considered acceptable. A TIS was prepared and is formed within this application. Reference should be made to section 3.4 of this Report for the assessment against the TIS.
(u) the availability and adequacy for the development of the following — (i) public transport services; (ii) public utility services; (iii) storage, management and collection of waste;	The site is located within a rural area and as such, public transport, walking and cycling are not considered desirable options for travelling to the site. Furthermore, other than staff, visitations to the site are limited to

LPS Regulations Schedule 2: Clause 67(2)	
Requirement	**Proposed Development**
(iv) access for pedestrians and cyclists (including end of trip storage, toilet and shower facilities); (v) access by older people and people with disability;	service/maintenance vehicles and deliveries/pickups. As for waste, all such waste materials are to have been carefully catered for. Reference should be made to the EAMP for the detailed assessment on waste.
(w) the history of the site where the development is to be located;	The site is owned by DevlopmentWA who has leased a section of the property to the Applicant for a period of 50 years.

4.4 Peel Region Scheme – Strategic Minerals and Basic Raw Materials Resource Policy

As identified on the Overall Block Plan contained in Attachment 1, the site is partially located within the Strategic Minerals and Basic Raw Materials Resource Policy Area (**SM&BRMRP**) under the PRS.

Due to the SM&BRMRP area, the proposal is to demonstrate that the development will not prejudice current or future mining of mineral resources, or extraction of basic raw materials (**BRMs**), within the policy area.

The acceptability of any proposed development within or in proximity to the SM&BRMRP area is determined by having regard to buffer areas for a potential extractive industry and the advice sought from the Department of Mineral and Petroleum Resources, now known as the Department of Energy, Mines Industry Regulation and Safety (**DEMIRS**).

The proposal is not considered to be a sensitive land use and therefore any required buffer between the proposal and any future extractive industry would be minimal in nature. Therefore, the proposal, in terms of separation distances needed, is considered not to create any adverse impact with the objectives and requirement of the SM&BRMRP. Reference should be made to the definition of a sensitive land use in accordance with State Planning Policy 2.4 - Planning for Basic Raw Materials (**SPP2.4**), as stated below.

> *Sensitive land uses comprise land uses that are residential or institutional in nature, where people live or regularly spend extended periods of time. These include dwellings, short-stay accommodation, schools, hospitals and childcare centres and generally exclude commercial or industrial premises.*

The proposal is considered to be a land use that won't prejudice the current or future mining of mineral resources or extraction of BRMs as the development can be moved. Due to the nature of the proposal, it is somewhat simpler to move and decommission the site than it would be for other developments (such as residential developments or large complex and technical industrial developments). Due to this ease, it is considered that the proposed land use does not prejudice the future mining of mineral resources or extraction of BRMs within the immediate surrounds.

The proposal adequately ameliorates off site impacts with the relevant management plans. The management plans specifically detail how the management of the site will limit any adverse impacts to the environment, which in essence, limits the potential of land contamination which would then otherwise impact the extraction of minerals and BRMs. With adherence to these management plans, the proposal is considered to not create off site impacts that would impact the security of access to minerals and BRMs.

With relation to the points addressed above, the proposal is considered appropriate in accordance with the objectives and requirements of the SM&BRMRP and warrants approval in this aspect.

4.5 State Planning Policy 2.1 – Peel-Harvey Coastal Plain Catchment

The subject site is located within the Peel-Harvey Coastal Plain Catchment in accordance with Figure 1 of State Planning Policy 2.1 – Peel-Harvey Coastal Plain Catchment (**SPP2.1**). SPP2.1 aims to minimise any potential environmental impacts to the Peel-Harvey Estuarine System through planning control measures. SPP2.1 applies to development located within the designated boundary area as at Figure 1 of SPP2.1.

Table 4: Assessment of proposed development under SPP2.1.

SPP2.1: Peel-Harvey Coastal Plain Catchment - Requirements	
Requirement	**Proposed Development**
5. • Development, including both material changes in land use and the construction of buildings, the policy area should relate to land capability and suitability and specific management practices (such as effluent treatment).	Reference should be made to the attached technical documents that details the specific management practices to ensure the land is capable of development and approval.
5.4 • The retention and rehabilitation of existing remnant vegetation is to be encouraged…	The Applicant is currently in the process of obtaining a clearing permit from DWER. Reference should be made to the areas and percentages below for the proposed clearing. • 1.27ha of Completely Degraded vegetation is to be cleared. This is equivalent to 19.33% of the proposed clearing and holds no environmental value. • 3.65ha of Degraded vegetation is to be cleared. This is equivalent to 55.74% of the proposed clearing and holds minimal to no environmental value. • 0.02ha of Degraded to Good vegetation is to be cleared. This is equivalent to 0.25% of the proposed clearing. Not only is this minimal in area, but also holds little environmental value. • 1.62ha of Good vegetation is to be cleared. This is equivalent to 24.68% of the proposed clearing and holds some environmental value. Due the limited areas and limited quality of the vegetation that is proposed to be cleared; it is considered that rehabilitation is not necessary. This is particularly

SPP2.1: Peel-Harvey Coastal Plain Catchment - Requirements	
Requirement	**Proposed Development**
	evident when the higher value areas are heavily protected with fencing and setbacks. Rehabilitation of the land will only increase the bushfire risk to the site.
5.9 • Approvals will be required from the Water Authority for water supply from bores, wells, rivers in proclaimed water management areas and WAWA drains and for connection of private and local authority drains to WAWA drains.	The Applicant is currently in the process of liaising with DWER for an amendment to the Water Licence to ensure that the existing site (230 Gull Road) and the subject land fall under the one licence. Refer to section 3.7 of this Report.
6.5.1 • Proposals to develop land for industry, where the industrial process would create liquid effluent, must include provision for connection to a reticulated sewerage system.	Reticulated sewer is not provided, nor is it economically feasible to extend any sewer line. Rather, the development proposes a comprehensive Surface Water and Leachate Management System. Reference should be made to the EAMP and Surface Water and Leachate Management Plan.
6.5.2 • Works approvals and licences will be required from the EPA where the proposal has a wastewater discharge or falls within the list of scheduled premises under Part V of the Environmental Protection Act.	C-Wise will seek a Licence from the DWER for the operation of both stages of the Project.

It is considered that the above table demonstrates that the proposal is compliant with the objectives and requirements of SPP2.1.

4.6 State Planning Policy 2.4 – Planning for Basic Raw Materials

As detailed under section 4.4 of this Report, the subject site is partially located with the SM&BRMRP area, and therefore whilst the proposal is not for an extractive industry, SPP2.4 is still applicable.

The proposal is not located within any Significant Geological Supply (**SGS**) area or any known proposed, approved or operating extraction site (**ES**), as determined by GeoVIEW.WA mapping.

As the development is not considered to be a sensitive land use and will create no adverse environmental impacts (as discussed within section 4.4 of this Report), as well as the site not being located within any SGS or ES areas, the proposal is considered acceptable in accordance with SPP2.4.

4.7 State Planning Policy 2.5 – Rural Planning

As the property is zoned 'Rural' under both LPS4 and the PRS, State Planning Policy 2.5 – Rural Planning (**SPP2.5**) is applicable. SPP2.5 is a policy that is more relevant to the creation of strategic frameworks, with the only relevant sections within SPP2.5 being sections 5.12.1 and 6.6, as detailed in the below paragraphs.

Section 5.12.1 of SPP2.5 is looks into minimising potential land use conflict between a development on rural land and surround land uses. SPP2.5 mentions that it is possible to have land uses on rural land that by way of nature is not 100 per cent dedicated as a rural land use. It is considered in this case that a composting facility is a mixture of rural and industrial and therefore there is a potential land use conflict between this development, and it surrounds. This development therefore needs to consider a balance of both SPP2.5, as well as State Planning Policy 4.1 – Industrial Interface (**SPP4.1**).

With regards to the potential conflict of the land use and the surrounding rural land on adjacent properties, it is considered that the development will not create any adverse impacts to these properties due to its large setbacks and highly detailed and technical management plans that have been prepared to minimise any potential on-site and off-site impacts.

Section 6.6 of SPP2.5 is the only dedicated section for development applications, with reference to the provisions Clause 67(2) of the Deemed Provisions. An assessment against the relevant provisions of are contained within section 4.3 of this Report.

4.8 State Planning Policy 2.9 – Water Resources

Due to the nature of the proposal and the site containing wetlands, State Planning Policy 2.9 – Water Resources (**SPP2.9**) is required to be considered, even though SPP2.9 is more appropriate for strategic planning proposals.

SPP2.9 does not contain a set of standard requirements for development applications, rather it has 'generic considerations', whereby SPP2.9 states that the requirements should stem from local planning frameworks (strategies, schemes and policies).

This Report and its technical documents assess in detail the potential impact of the development on the surrounds and the potential impact to the relevant water resources. These assessments are also considered against the relevant criteria found within SPP2.1 (section 4.5 of this Report), Government Sewerage Policy (section 4.12 of this Report), and the Shire's Local Planning Policies, which can be found within sections 4.13-4.15 of this Report.

4.9 Draft State Planning Policy 2.9 – Planning for Water

The WAPC is currently in the process of creating a new state planning policy (**SPP**), Draft State Planning Policy 2.9 – Planning for Water (**Draft SPP2.9**) and Draft State Planning Policy 2.9 – Planning for Water Guidelines (**Draft Water Guidelines**), for water-related policy frameworks. Once gazetted, the Draft SPP2.9 will supersede several SPPs, with particular attention given to SPP2.1, SPP2.9 and the Government Sewerage Policy, which have all been assessed within this Report.

Under Section 5 of the Draft Water Guidelines, the following is mentioned regarding a Water Management Plan (**WMR**).

> *For proposals with minimal water management matters, a separate WMR may not be required, instead the relevant information can be contained as a section of a larger planning report. Where there is no planning report that is accompanying the application, the relevant information may be submitted in an alternative format to the satisfaction of the decision-making authority.*

Furthermore, section 5.5(1)(c) of the Draft Water Guidelines states the following regarding the need for a WMR.

> *Sufficient information has been provided, to the satisfaction of the decision-maker, which demonstrates that the proposal is unlikely to impact upon or be impacted by further water systems or water resource planning.*

Given the complexity and details provide in the EAMP and the Surface Water and Leachate Management Plan (**SWLMP**), the assessment of this Report against the current SPP2.1 and SPP2.9, as well as Draft SPP2.9 yet to be gazetted, it is considered that the need for a dedicated WMR is not required.

4.10 State Planning Policy 3.7 – Planning in Bushfire Prone Areas

As mentioned, the subject land is designated as bushfire prone (refer to **Figure 2** below) and the provisions of State Planning Policy 3.7 – Planning in Bushfire Prone Areas (**SPP3.7**) therefore apply.

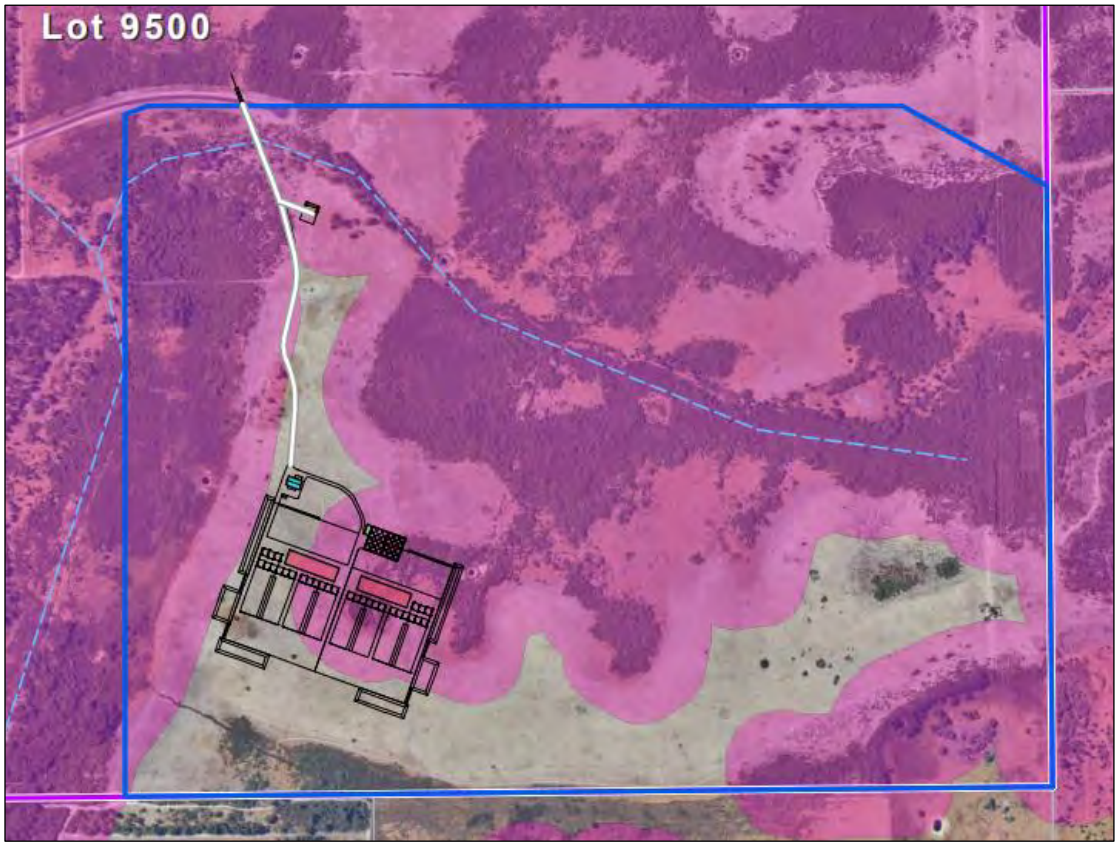

Figure 2: Map of Bushfire Prone Areas (Source: Figure 1.4 of BMP prepared by *Bushfire Prone Planning* dated 25 October 2023)

Accordingly, a Bushfire Management Plan (**BMP**) and a Bushfire Emergency Plan (**BEP**) have been prepared and is detailed below.

The BMP has identified that the vegetation classification for the lease area is predominantly a mixture of forest (Class A), scrub (Class D) and grassland (Class G). In calculating the vegetation classifications and the effective slopes, the BMP has identified the following for the worst-case scenario post development:

(1) The majority of the Site will be have a Bushfire Attack Level (**BAL**) rating of BAL-FZ.

(2) The proposed development is classified as both a high risk and vulnerable land use.

(3) The need for a Bushfire Emergency Plan, to which has been prepared.

(4) The need for a BAL-29 standard Asset Protection Zone (**APZ**).

In addition to the above points, the BMP has conducted an assessment off the bushfire protection criteria contained in Appendix 4 of the Guidelines for Planning in Bushfire Prone Areas (**Bushfire Guidelines**).

Generally, the proposal has achieved compliance with most of the relevant Elements via the required acceptable solutions, with the exception of the below.

- Acceptable Solution 3.2a – Multiple Access Routes was assessed and determined that the proposal does not comply with this acceptable solution. Therefore, an assessment against the relevant Performance Principle of P3i is required to demonstrate that an alternative solution is possible. Reference should be made to Table 5 for the assessment.

- Acceptable Solution 3.3 – Through-Roads was determined to not comply. However, as Acceptable Solution 3.3 is only relevant to strategic planning proposals, structure plans and subdivisions, Acceptable Solution 3.3 is not applicable to this proposal. The only relevancy this Acceptable Solution has is to demonstrate the non-compliance of Acceptable Solution 3.2a (due to no alternative access) as detailed in the BMP.

- Acceptable Solution 5.14 Vehicular Access was assessed as being non-compliant. However, as the Element 5 of the Bushfire Guidelines is only applicable to vulnerable tourism land uses. Therefore, as the proposal is not considered a tourism land use, nor have any tourist component, this non-compliance is not applicable.

Table 5: Assessment of proposed development under Bushfire Guidelines

Guidelines for Planning in Bushfire Prone Areas: Appendix 4 – Bushfire Protection Criteria	
Requirement	**Proposed Development**
Performance Principle P3i: • The design and capacity of vehicular access and egress is to provide for the community to evacuate to a suitable destination before a bushfire arrives at the site, allowing emergency services personnel to attend the site and/or hazard vegetation.	With the proposed alternative solution being the construction of a private onsite shelter building (bushfire bunker or Shelter in Place), it allows the development to have 2 different access ways to suitable locations – one being to Gull Road that leads out from the site and the other being to the dedicated bunker that will be constructed to the required standard. The Shelter in Place will be the Office building at the process plant adjacent to the workshop. Section 5.9.1 of the Bushfire Guidelines requires bunkers to be well placed and designed to the building code. The bunker is located within the lowest BAL rating on site (BAL-12.5) and will be designed and constructed to a BAL-29 standard, in accordance with the recommendations made within the BMP. Furthermore, the shelter in place is sufficiently separated from the proposed workshop. In addition to the above, the BEP has been prepared. This BEP will assist in the safe evacuation of any persons on site to further ensure and demonstrate the proposal meets the intent of Element 3: Vehicular Access.

4.11 State Planning Policy 4.1 – Industrial Interface

As mentioned previously, there is a relationship between SPP4.1 and SPP2.5. Consequently, an assessment against the relevant requirements of SPP4.1 has been provided in the below table.

Table 6: Assessment of proposed development under SPP4.1

SPP4.1: Industrial Interface – Requirements	
Requirement	**Proposed Development**
Section 6.1.6 (a): • Development associated with off-site impacts and/or safety risks is located within the appropriate zone or reserve and there is provision of a compatible land use transition between industry and sensitive zones and reserves.	Excluding the management plans and the designs in place, the land use proposal would create off-site impacts (such as dust, noise, contamination etc.). This proposal is considered to be compatible within this area as the subject lot can be seen as a transition lot between the industrial and rural interfaces. Having a land use such as this proposal, which is considered to be a mixture of an industrial and rural land use, creates the perfect compatibility for this area. Specifically, with the inclusion of the design and the relevant management plans in place.
Section 6.1.6 (b): • Development on land within impact areas is to be consistent with the purpose of providing a compatible land use transition between industries and sensitive land uses, and should not include industrial proposals that would affect the integrity of the interface.	Similarly, the proposal is a mixture of an industrial and rural land use, with the subject site being an area as seen as a transition between the industrial and rural zones. The proposal is therefore deemed acceptable in this aspect.
Section 6.1.6 (c): • Information on the nature and extent of any off-site impacts, which may include technical assessments and reports and/or proposed management plans to support development applications.	All of the relevant plans and technical documents have been attached to this application to assist with the assessment of the proposal.
Section 6.1.6 (d):	All of the relevant approvals required for this application have been noted within this Report and the EAMP. These approvals are not related to the Planning

SPP4.1: Industrial Interface – Requirements	
Requirement	**Proposed Development**
• Identification of any approvals, permits or licences required under other legislation, as they relate to the planning application.	Framework and will therefore be dealt with post determination of the application.
Section 6.3 (a): • Health, amenity and environmental impacts arising from proposals.	All of the potential impacts to health, amenity and the environment have been detailed within this Report and the relevant technical documents. These documents and the Report have determined that there is unlikely to be any adverse impacts resulting from the proposal.
Section 6.3 (b): • Existing and proposed future land uses within the impact area and wider context, particularly the location of sensitive land uses.	To the south, the subject land is zoned 'Industrial' under the Structure Plan as previously stated within this Report. The proposal is deemed to be acceptable in this regard. To the remaining surrounds, the area is zoned Rural and will have rural typed land uses. With reference to the LRS which states that the proposal (composting operations) is seen as a specialized rural land use, the proposal is considered acceptable. There are no sensitive land uses within the general vicinity.
Section 6.3 (c): • Current monitoring and future modelling of any cumulative impacts from other industries in the industrial area including both point source and fugitive emissions.	This requirement is mainly aimed at strategic planning proposals and therefore not applicable.
Section 6.3 (d): • Potential for intensification of industrial land uses in the industrial area that may result in increased cumulative off-site impacts and/or safety risks over time.	Due to the size of the land and the management plans in place, the proposal is considered to have very limited off-site impacts and therefore deemed acceptable.

SPP4.1: Industrial Interface – Requirements	
Requirement	**Proposed Development**
Section 6.3 (e): • Cost and benefit of any associated mitigation and management measures, and whether it is sustainable in perpetuity.	The management measures that will be needed will be solely at the cost of the operator and therefore the risk is minimal as the measures are considered to be relevant and sustainable. If the measures are not in place, the operator will be in breach of their development approval.

As determined within the table above, the proposal is considered to meet the relevant requirements of SPP4.1 and is therefore acceptable.

4.12 Government Sewerage Policy

As the proposed development does not have direct access to reticulated sewerage, the Government Sewerage Policy (**GSP**) applies.

Grey and Black water will be processed via an Aerobic Treatment Unit (**ATU**) and then transferred to the tank farm. Additionally, all sewerage related functions are located greater than 100m from any wetland or water source, therefore complying with the GSP. Further information and assessment is contained within the EAMP.

4.13 Local Planning Policy – Biodiversity Protection

As outlined within the Shire of Murray's Local Biodiversity Strategy, the site contains vegetated Local Natural Area and therefore an assessment against the Shire of Murray's Local Planning Policy – Biodiversity Protection (**Biodiversity Protection LPP**).

Most of the detailed required has been provided within the EAMP and should be referenced as at Attachment 3. In addition to this, an assessment against each of the requirements of the Biodiversity Protection LPP has been provided in the below Table.

Table 7: Assessment of proposed development under Biodiversity Protection LPP

Local Planning Policy : Biodiversity Protection – Requirements	
Requirement	**Proposed Development**
1. A strong presumption against further clearing of natural areas.	Only minimal amounts of clearing are proposed. As identified within the EAMP, most of this clearing is degraded vegetation.
2. Natural areas are identified in the Shire of Murray Local Biodiversity Strategy 2013.	Noted.
3. Proposals are to reflect the objectives and requirements of this policy.	It is considered that this proposal positively reflects the objectives and requirements of the Policy as detailed within this Table, the Report and all of the relevant environmental reports provided as part of this proposal.
4. Proposals to clearly demonstrate how they are to protect and retain natural areas and meet the Specific Biodiversity Feature Targets and Precinct Protection Targets established in the Local Biodiversity Strategy.	As stipulated within the EAMP, most infrastructure will be located at least 100m from the mapped Conservation Category Wetlands (**CCW**)s with the exception of access roads and stormwater and leachate management infrastructure, which will be located at least 50m from wetlands. A fence will be installed at the 50m buffer for all wetlands surrounding the Development Footprint. This buffer is consistent with the Shire's Local Biodiversity Strategy.
5. Site specific information is to be gathered to confirm and assess the ecological values present on site. Detailed ecological site investigations are to be consistent with Environmental Protection Authority Guidance Statements 10, 51 and 56. Ecological assessments are to conform to the requirements as contained in Section 13.1 of the Local Biodiversity Strategy.	The EAMP contains a detailed assessment by a suitably qualified environmental consultant that addresses the ecological values – including an assessment against Threatened Ecological Communities (**TECs**).
6. Where the planning proposal does not involve clearing of natural areas then the need for and extent of information will be	Noted. Only minimal amounts of clearing are proposed. As identified within the

Local Planning Policy : Biodiversity Protection – Requirements	
Requirement	**Proposed Development**
based on individual circumstances having regard for the likely impacts the proposal may have on the natural area.	EAMP, most of this clearing is degraded vegetation.
7. Where a planning proposal relates to land containing a natural area or land within 100 metres of a natural area the following information will be required to be submitted to assess the impact of the proposal on the natural area…	Reference is to be made to the EAMP which has completed all the relevant assessment and provided said detail.
8. Proponents should demonstrate that they meet the Ecological Connectivity criteria.	The EAMP demonstrates this compliance and should be referred to.

4.14 Local Planning Policy – General Development Provisions – Building Setbacks, Car Parking Standards

The Shire's Local Planning Policy – General Development Provisions – Building Setbacks, Car Parking Standards (**General Development LPP**) applies. The General Development LPP is to be read in conjunction with LPS4 and where applicable, the standards of LPS4 are superseded by the requirements of the General Development LPP.

It is noted however the proposal of 'Noxious Industry' is not stipulated within the General Development LPP's Tables 2 or 3, and therefore the General Development LPP is not applicable in this case.

4.15 Local Planning Policy – Water Sensitive Urban Design

As the land is zoned 'Rural', the Shire's Local Planning Policy No. – Water Sensitive Urban Design (**WSUD LPP**) would not normally apply. However, as the land use is a mixture of both industrial and rural land uses, rather than a dedicated rural land use, WSUD LPP is considered to apply.

An assessment of the proposal against the policy statements of WSUD LPP is provided overleaf and demonstrates the proposal's acceptability.

Table 8: Assessment of proposed development under WSUD LPP

WSUD LPP - Requirements	
Requirement	**Proposed Development**
5.1 Proposals shall aim to achieve and maintain the relevant Environmental Quality Criteria as set out in Appendix 1.	The proposal is generally compliant with the specific criteria requirements. The proposal has a number of Environmental Reports attached to this proposal, which should be referred to.
5.2 Stormwater Management Systems should comply with the principles, objectives and guidelines in the Stormwater Management Manual for Western Australia.	A Surface Water and Leachate Management Plan has been prepared by a suitably qualified environmental consult. Reference should be made to this management plan as seen at Attachment 4.
5.3 WSUD outcomes shall be achieved through compliance with the principles addressed in Section 6 of this Policy, preferentially applied using an integrated approach, consistent with the Peel Harvey Coastal Catchment WSUD Technical Guidelines.	Noted. Refer to the below assessment against section 6 of the WSUD LPP.
5.4 Application of this policy shall be practical and appropriate to the level of risk of the proposal.	Noted.
5.5 Planning and development proposals shall implement the WSUD strategies outlined in Section 7 of this policy.	Noted. Refer to the below assessment against section 7 of the WSUD LPP.
5.6 WSUD practices prescribed in strategic planning instruments shall be linked to a planning mechanism that ensures implementation and requires performance monitoring.	Not applicable as the proposal is for a statutory development application only.
5.7 Appropriate investigations shall be performed and documented to support the assessment and approval of development proposals, consistent with the Peel-Harvey Coastal Catchment WSUD Technical Guidelines.	The proposal has a number of Environmental Reports attached to this proposal, which should be referred to. Particular reference should be made to the Environmental Assessment and Management Plan.

WSUD LPP - Requirements	
Requirement	**Proposed Development**
6.1 Provide protection to life and property from flooding that would occur in a 100 year Average Recurrence Interval (**ARI**) flood event.	The subject property is not located with a flood prone area or floodplain development control area.
6.2 Manage rainfall events to minimise runoff as high in the catchment as possible. The one-year-one-hour (1 in1) ARI event should be retained on-site or as close to source as possible. Infiltration should be encouraged in permeable areas through mechanisms such as soakwells, landscaping and flush kerbing. Drainage systems should minimize run off and maximize on-site infiltration where possible.	A Surface Water and Leachate Management Plan has been prepared by a suitably qualified environmental consult. Reference should be made to this management plan as seen at Attachment 4.
6.3 Retain and restore existing elements of the natural drainage system, including waterway, wetland and groundwater features, regimes and processes, and integrate these elements into the urban landscape, possibly through a multiple use corridor. These features should effectively manage mosquito populations and require approval by councils Environmental Health section.	This requirement is generally for strategic proposals and therefore not relevant. Nonetheless, the proposal has provided a number of environmental management plans that address water and flora considerations. Reference should be made to these plans.
6.4 Maximise water use efficiency, reduce potable water demand, and maximise the re-use of water harvested.	The Applicant currently holds a Licence to take Water under Section 5C of the RIWI Act for the existing site. Water Licence allows for the extraction of up to 350,000kL of water each year for the purposes of irrigation, compost production and soil blending. The Applicant is currently liaising with DWER to obtain an amended Licence, which will be dependent on the proposal being approved. This clause will therefore be addressed by the Water Licence by the relevant state department.

WSUD LPP - Requirements	
Requirement	**Proposed Development**
6.5 Minimise pollutant inputs through implementation of appropriate non-structural source controls (such as town planning controls) and structural controls (that manage the quantity and quality of stormwater runoff and prevent or treat stormwater pollution).	Reference should be made to Attachment 3 for the EAMP. The EAMP details the relevant measures to minimise any impacts on physical and liquid waste.
6.6 Drainage sump construction is discouraged and any development adjacent to existing sumps should be encouraged to retrofit the area into a multiple-use site if deemed appropriate by council.	Due to the scale and nature of development, drainage ponds have been developed. Reference to the Surface Water and Leachate Management Plan as at Attachment 4 details the reasoning behind this requirement and why it is acceptable.
7.1 Compliance with environmental quality criteria Proposals shall demonstrate compliance with relevant environmental quality criteria as outlined in Appendix 1.	As previously stated, the proposal is generally compliant with the specific criteria requirements. The proposal has several Environmental Reports attached to this proposal, which should be referred to.
7.2 Compliance with stormwater management policies Stormwater management systems shall comply with the principles, objectives and guidelines in the Stormwater Management Manual for Western Australia, the Murray Drainage and Water management Plan where applicable and be designed in accordance with the Decision Process for Stormwater Management in WA.	A Surface Water and Leachate Management Plan has been prepared by a suitably qualified environmental consult, as stated previously. Reference should be made to this management plan as seen at Attachment 4.
7.3 Application of WSUD treatment trains All plans and proposals incorporate appropriate structural and non-structural practices to improve water management outcomes. Best management practices should be applied using a treatment train approach, consistent with recommendations in the Murray Drainage and Water Management Plan and the Peel-Harvey Coastal Catchment WSUD Technical Guidelines.	Wastewater is treated before its released. Refer to Attachment 4 for the Surface Water and Leachate Management Plan.

WSUD LPP - Requirements	
Requirement	**Proposed Development**
7.4 Preparation of water management strategies The preparation of an Urban Water Management Proposal will be needed for all Development Proposals. The level of detail required in the proposal will be dependent upon the stage of development, site specifics including potential water quality impacts, proximity to water bodies, clearance to groundwater, scale of development and any other site-specific factors.	Noted. The EAMP and Surface Water and Leachate Management Plan has been prepared.
7.5 Soil Amendment Any proposal to develop land on sandy or duplex soils where the annual maximum groundwater level is less than 1.2 metres below natural ground level should incorporate soil amendment to maximise the phosphorus retention capability of the soil.	The proposal seeks to have a minimum separation of 1.5m between the ponds and groundwater, therefore making this requirement redundant.
7.6 Total Phosphorus and Total Nitrogen Import and Export Criteria Any development likely to result in a nutrient input rate above the current average estimated rates are considered environmentally unacceptable and shall be referred to the EPA unless appropriate and acceptable information is provided to demonstrate that the development will achieve the relevant Environmental Quality Objective.	Noted. This requirement has been addressed under section 4.10.4 of the EAMP as at Attachment 3.
7.7 Local Deep Rooted Perennial Vegetation All proposals should aim to retain where possible deep rooted perennial vegetation of local native provenance in areas of public open space. If it is determined that there is insufficient remnant vegetation on site for the development proposed, then re-vegetation work will be required to be undertaken by the landowner.	The site contains a large amount of native vegetation that is not proposed to be impacted in any way. Due to the importance of some of this vegetation, setbacks to these areas have also been provided to ensure there is no adverse impacts.
7.8 Building and Landscaping Guidelines LSPs for new subdivision estates should include Building and Landscaping Guidelines.	Not applicable as the proposal is for a development application only.

WSUD LPP - Requirements	
Requirement	**Proposed Development**
7.9 Construction and Building Site Management Construction and Operational activities on landholdings within the policy area to be consistent with an approved Management Plan. The plan should be submitted and approved prior to the start of site works.	Noted. In accordance with the wording, this can be made as a condition of approval.
8.1 Application Requirements Any application for Council's planning consent shall meet all requirements set out in LPS4 and satisfy the requirements of the Shire of Murray Engineering Standards as well as other relevant policies and guidelines.	The proposal is considered to meet all the relevant requirements as discussed throughout this Report.

5.0 Conclusion

The Applicant is seeking development approval for a carbon recycling facility at the subject land. It is considered that the proposal is classified as 'Noxious Industry' which is a 'SA' use within the 'Rural' zone of LPS4.

For the reasons outlined in this Report, the proposal is suitable for the site and is consistent with both the applicable local and state planning framework, and compatible with the existing rural activities within the locality. The proposal will not have an adverse impact on the character or the amenity of the locality and accordingly, it is submitted that the proposal warrants approval.

We trust that this information is to your satisfaction and welcome the opportunity to review a draft suite of conditions of approval. We otherwise look forward to your prompt and favourable determination.

Altus Planning

WESTERN AUSTRALIA

TITLE NUMBER	
Volume	Folio
2991	**741**

RECORD OF CERTIFICATE OF TITLE

UNDER THE TRANSFER OF LAND ACT 1893

The person described in the first schedule is the registered proprietor of an estate in fee simple in the land described below subject to the reservations, conditions and depth limit contained in the original grant (if a grant issued) and to the limitations, interests, encumbrances and notifications shown in the second schedule.

BGRoberts

REGISTRAR OF TITLES

REGISTRAR OF TITLES WESTERN AUSTRALIA

LAND DESCRIPTION:

LOT 9500 ON DEPOSITED PLAN 414516

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

WESTERN AUSTRALIAN LAND AUTHORITY OF LEVEL 2 40 THE ESPLANADE PERTH WA 6000
(T O756261) REGISTERED 2/6/2021

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. A369846 EASEMENT TO AMPOL EXPLORATION LTD, SHELL DEVELOPMENT (AUSTRALIA) PTY LTD, TEXACO OVERSEAS PETROLEUM CO, CALIFORNIA ASIATIC OIL CO - SEE DEPOSITED PLAN 414516 AND INSTRUMENT A369846 REGISTERED 8/2/1971.
   K395712 NOTIFICATION. THE GRANTEES OF EASEMENT A369846 ARE NOW APT PARMELIA PTY LTD RECORDED 31/10/2007.
2. B516478 EASEMENT TO ALCOA OF AUSTRALIA (W.A.) LTD FOR THE PURPOSE OF LAYING, CONSTRUCTING AND MAINTAINING PIPELINES AND OTHER APPARATUS - SEE DEPOSITED PLAN 414516 INSTRUMENT B516478 REGISTERED 3/5/1978.
3. C624530 EASEMENT TO STATE ENERGY COMMISSION OF WA FOR THE PURPOSE OF CONSTRUCTING, MAINTAINING AND USING ENERGY EQUIPMENT - SEE DEPOSITED PLAN 414516 AND INSTRUMENT C624530 REGISTERED 23/9/1983.
4. F183491 EASEMENT TO STATE ENERGY COMMISSION OF WA FOR THE PURPOSE OF CONSTRUCTING, MAINTAINING AND USING ELECTRICAL TRANSMISSION WORKS - SEE DEPOSITED PLAN 414516 AND INSTRUMENT F183491 REGISTERED 7/5/1993.
5. H864993 EASEMENT TO WATER CORPORATION - SEE DEPOSITED PLAN 414516 REGISTERED 10/9/2001.

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required. Lot as described in the land description may be a lot or location.

----------END OF CERTIFICATE OF TITLE----------

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

END OF PAGE 1 - CONTINUED OVER

REGISTER NUMBER: 9500/DP414516 VOLUME/FOLIO: 2991-741 PAGE 2

SKETCH OF LAND:	DP414516
PREVIOUS TITLE:	1915-979
PROPERTY STREET ADDRESS:	320 GULL RD, KERALUP.
LOCAL GOVERNMENT AUTHORITY:	SHIRE OF MURRAY
RESPONSIBLE AGENCY:	WESTERN AUSTRALIAN LAND AUTHORITY

Carbon Recycling Facility

Environmental Assessment and Management Plan

Prepared for C-Wise

9 November 2023

Project Number: TW21124

DOCUMENT CONTROL					
Version	**Description**	**Date**	**Author**	**Reviewer**	**Approver**
0.5	Draft released for Client Comment	20/10/2023	TH/MH/EP	RC	
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2.0	Updated Release	9/11/2023	MH/TH	RC	RC

Approval for Release

Name	**Position**	**File Reference**
Ronan Cullen	Director & National Waste Lead	TW21124_C-Wise_EAMP_2.0
Signature		

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1 Introduction

C-Wise Holdings Pty Ltd (C-Wise) is currently seeking approval to develop a new Carbon Recycling Facility (the Facility) for the acceptance and processing of a range of solid and liquid organic wastes to produce compost and similar products (the Project). The Project will be located at 320 Gull Road, Keralup, a portion of Lot 9500 on Deposited Plan 414516 (the Site). The Site is situated approximately 11 kilometres (km) northeast of the Mandurah town centre (Figure 1). The total area of the Site is approximately 269.4 hectares (ha) of which the Development Footprint occupies approximately 17.12ha. The Site boundary and Development Footprint are shown Figure 2.

Operation of the Facility will support the diversion of organic waste from landfill, including the implementation of Food Organics and Garden Organics (FOGO) kerbside collections in the Perth and Peel regions, as outlined in the Waste Avoidance and Resource Recovery Strategy 2030 (Waste Authority, 2020) (Waste Strategy 2030). Recognising the importance of the Facility, C-Wise was successful in obtaining $5.6 million in funding from both the State and Federal governments through the Food Waste for Healthy Soils Fund (Section 2.2).

Due to the activities of the Project, it will be classified as a Prescribed Premises under Part V of the *Environmental Protection Act 1986* (EP Act) and therefore requires approval from the Department of Water and Environmental Regulation (DWER) prior to construction and operation. This Environmental Assessment and Management Plan (EAMP) has been developed to support a Works Approval application to the DWER and the Development Approval from the Shire of Murray.

1.1 Objectives

The objectives of EAMP are to provide the following details in relation to the Project:

- Describe the environmental and social values on and surrounding the Site;
- Describe in detail the Project, including design and operation;
- Identify any potential impacts to environmental aspects associated with the Project;
- Summarise the community consultation undertaken and key findings;
- Outline environmental engineering and management measures to ensure that all potential impacts are managed to appropriate standards; and
- Assess the residual risks following the proposed management measures.

2 Background

C-Wise has been operating its existing composting facility in Nambeelup for 25 years and has been proactive in continually enhancing its composting technique and environmental management measures to achieve the best possible environmental and social outcomes. This includes the development of a technology that incorporates their own mobile air floor (MAF) system in combination with other known and proven techniques to produce compost. C-Wise has become a leader in the development of carbon-based soil amendments, providing smart natural solutions to farms, communities and industry. This has been recognised on multiple occasions with the following awards:

- Telstra's WA winner of the 2024 Best of Business Award for promoting sustainability;
- Andy Gulliver (Founding Director) wins AORA Legend Award in 2016 for his contribution to the composting industry;
- Organic Consumer Choice Awards 2014, Best Organic Input Supplier;
- Resource and Waste Management Awards 2012, for the New Perth Bunbury Highway Soil Manufacturer for Landscaping and Construction; and
- The Western Australian Environment Awards 2005, Overall Winner and Small Business Leading by Example.

Recognising that the remaining lifetime of the existing composting facility is limited, C-Wise has been actively seeking an alternative long-term location to establish a modern, better practice facility for over a decade. The Site was determined to be a suitable location for a new facility due to its proximity to C-Wise's existing operations and the large extent of historically cleared land, which provides an opportunity to significantly expand C-Wise's current production capacity.

Through development of the Project, C-Wise is seeking to progressively move all operations to the Facility and eventually cease operation of the existing Nambeelup composting facility. Due to the extensive engineering and operational management measures that have been incorporated into the design of the Project, the risk of significant environmental impacts is considered to be low and particularly in comparison to C-Wise's existing operations.

Moving C-Wise's operations to the new, modern and better practice Facility presents an opportunity for C-Wise to continue to expand while also affording the surrounding environment greater protection from potential impacts. C-Wise is proposing to implement a wide range of better-practice infrastructure and operational measures, including clean floor policies in FOGO receival areas, fully enclosed composting cocoons, and significant roofing to eliminate leachate generation.

2.1 Department of Housing Residential Development Plan

The Department of Housing purchased a 4,000ha parcel of land, which included the Site and much of the surrounding area, through public tender in 1992. The Department of Housing intended to clear this land and develop it into a residential area that could house up to 90,000 people. However, this plan was discontinued in 2014 and the focus turned to alternative uses. The State Government subsequently undertook a Registration of Interest (ROI) in 2018 and 2019 to identify future land use options for the area. C-Wise submitted a response to this ROI outlining its intention to construct and operate the Facility at the Site. C-Wise was successful in the ROI process which culminated with a lease agreement being executed between C-Wise and DevelopmentWA (the land owner) in August 2021 to allow for the establishment of the Facility. Under the agreement, C-Wise have lease rights at the Site for up to 50 years.

2.2 Grant Funding

In May 2023, the State and Federal governments awarded $11.25M in funding for three new organic recycling infrastructure projects through the Food Waste for Healthy Soils Fund. C-Wise received approval for $5.75M in funding for the establishment of the Facility at the Site, which was the most funding received out of the three grant recipients. This indicates the State and Federal governments support and recognition of the need for and importance of the Facility.

In addition, C-Wise also received $100,000 in funding from the State government in October 2023 through the WasteSorted Grants for the introduction of specialist equipment to its existing Nambeelup Composting Facility. This equipment will reduce the amount of physical contamination in C-Wise's compost product and minimise the risk of litter entering soils and waterways. This demonstrates C-Wise's ongoing commitment to minimising the potential for environmental harm as a result of its operations, as well as the State government's ongoing support for C-Wise's operations.

2.3 Project Benefits

There are significant benefits from establishing the Facility, including:

- Alignment with the Waste Strategy 2030;
- Resource recovery;
- Reducing environmental impacts; and
- Job opportunities.

2.3.1 Alignment with the Waste Strategy 2030

The Waste Authority released the Waste Strategy 2030 in February 2019. The Waste Strategy 2030 sets the overarching objectives of 'avoid', 'recover' and 'protect'. The Project will support the Waste Strategy 2030's 'avoid', 'recover' and 'protect' objectives through the processing of organic materials such as solid and liquid wastes into usable compost products. This in turn diverts these organic materials from landfill, delivering upon the circular economy ethos of the State Waste Strategy.

The Waste Strategy 2030 provides new targets for the recovery of waste, outlined in Table 2-1.

Table 2-1: Waste Strategy 2030 Targets

Objectives	Community	Government	Industry
Avoid	• 2025 – Reduction in MSW generation per capita by 5%; and • 2030 – Reduction in MSW generation per capita by 10%.	• Reduction in C&D waste generation per capita by 15% by 2025, 30% by 2030; and • Reduction in C&I waste generation per capita by 5% by 2025, 10% by 2030.	• 2030 – All waste is managed and/or disposed using better practice approaches.
Recover	• 2020 – Increase MSW material recovery to 65% in the Perth and	• C&I sector – Increase material recovery to 70% by 2020, 75% by	• 2030 – All waste facilities adopt resource recovery better practice.

Objectives	Community	Government	Industry
	Peel regions, 50% in major regional centres; • 2025 – Increase MSW recovery to 67% in the Perth and Peel regions, 55% in major regional centres; and • 2030 – Increase MSW material recovery to 70% in the Perth and Peel regions, 60% in major regional centres.	2025, 80% by 2030; and • C&D sector – Increase material recovery to 75% by 2020, 77% by 2025, 80% by 2030.	
Protect	• 2030 – Move towards zero illegal dumping; and • 2030 – Move towards zero littering.	• 2030 – Move towards zero illegal dumping.	• 2030 – No more than 15% of Perth and Peel regions' residual waste is disposed to landfill; and • 2030 – All waste facilities adopt environmental protection better practice.

Recognising these targets, there is a collective and positive national shift towards diverting more materials from landfill and aligning waste management practices with the waste hierarchy. The recovery of organic materials through the operation of the Facility will support the achievement of the Waste Strategy 2030 targets.

The Project also supports the Waste Strategy 2030's headline strategy for "*a consistent three bin kerbside collection system, which includes separation of food organics and garden organics from other waste categories, to be provided by all local governments in the Perth and Peel region by 2025 and supported by State Government through the application of financial mechanisms*." The Project will increase the available capacity for processing organic waste which will be vital to ensuring this strategy can be achieved.

The Project supports the idea of a circular economy through the recovery of materials by implementing waste management options high up in the waste hierarchy. By using organic waste materials to generate compost and similar products, the Project directly contributes to a circular economy as the compost can be used to regenerate the environment.

The Project also supports a key principle within the State Waste Strategy; 'Better practice'. Better practice is defined in the Waste Strategy 2030 as "*practices and approaches that are considered by the Waste Authority to be outcomes-focussed, effective and high performing, which have been identified based on evidence and benchmarking against comparable jurisdictions*." This is further emphasised with the industry targets including:

- 2030 Avoid Industry Target: All waste is managed and/or disposed using better practice approaches;
- 2030 Recover Industry Target: All waste facilities adopt resource recovery better practice; and

- 2030 Protect Industry Target: All waste facilities adopt environmental protection better practice.

The Projects delivered upon all these three industry targets. Of particularly relevant to planning and environmental approvals and this EAMP, is the protect target and C-Wise commitment to deliver a modern, better practice facility (as will be outlined within this document).

2.3.2 Resource Recovery

The Project will help facilitate the recovery of valuable resources, thereby increasing recycling rates and the diversion of 'waste' from landfill. When fully operational, the Facility will have the capacity to process 200,000 tonnes of solid organic materials and 60,000 tonnes of liquid wastes for recycling. The organic material to be accepted will be processed into compost which will be supplied to a variety of markets including agricultural, horticultural and landscaping to improve soil quality and nutrient retention. They key benefits of this are the diversion of waste from landfill, protection of ecosystems by reducing the requirement to extract virgin resources and using fewer chemical fertilisers, as well as lower carbon emissions.

2.3.3 Reducing Environmental Impacts

Landfilling waste can result in environmental impacts through the clearing of vegetation, generation of leachate and landfill gas, attraction of vermin and feral animals, as well as amenity issues including dust, odours and visual impacts. In particular, landfilling organic waste results in higher volumes of carbon emissions compared to recovering as compost. Diverting organic materials away from landfill for processing at the Facility will help to reduce these impacts.

2.3.4 Employment

Jobs will be created both directly and indirectly through the construction and operation of the Facility. Skills and services required will include:

- Civil contracting;
- Material handling;
- Administration;
- Accounting;
- Equipment and Earthworks suppliers; and
- Operators.

It is estimated that the Project will support 24 temporary construction jobs and create 36 ongoing positions.

3 Approval Pathway

C-Wise will require a variety of environmental and planning approvals before construction and operation of the Project can commence. Talis Consultants Pty. Ltd. (Talis) was engaged by C-Wise to assist with seeking the relevant approvals for the Project, which include:

- DWER:
  - Works Approval;
  - Licence; and
  - Area Clearing Permit.
- Shire of Murray approvals:
  - Planning approval.

While the Project will be delivered in two stages, C-Wise is seeking approval for both stages of the Project within each application. Stage 1 of the Project will involve the processing of primarily FOGO materials, whereas Stage 2 represents the complete shift from C-Wise's operations at its existing Nambeelup composting facility to the Carbon Recycling Facility.

3.1 Works Approval

Certain industrial premises with the potential to cause emissions and discharges to air, land or water are classified as 'Prescribed Premises' and trigger regulations and associated approvals under Part V of the EP Act. DWER is responsible for the regulation of Prescribed Premises under Part V of the EP Act, approval under which is granted in the form of Works Approvals for construction and Licences for operation.

The Prescribed Premises categories relevant to the Project are outlined in Table 3-1.

Table 3-1: Summary of Prescribed Premises Categories

Category No.	Name	Description	Production or Design Capacity
61	Liquid waste facility	Premises on which liquid waste produced on other premises (other than sewerage waste) is stored, reprocessed, treated or irrigated.	100 tonnes or more per year
67A	Compost manufacturing and soil blending	Premises on which organic material (excluding silage) or waste is stored pending processing, mixing, drying or composting to produce commercial quantities of compost or blended soils.	1,000 tonnes or more per year

As part of this application, C-Wise is requesting to undertake time-limited operations for a period of 180 days. C-Wise wishes to commence the operational period for the Project as soon as practicable to support the diversion of organic materials from landfill.

3.2 Licence

A Licence is required to operate Prescribed Premises under Part V of the EP Act. Licences stipulate a range of conditions for each Prescribed Premises category relating to a range of activities,

infrastructure, management measures, monitoring and reporting requirements. A Licence provides strict conditions to minimise or mitigate environmental impacts from any discharges and emissions.

Following completion of construction and during the time limited operations, C-Wise will seek a Licence from the DWER for the operation of both stages of the Project.

3.3 Clearing Permit

While the Facility will be primarily located in a historically cleared part of the Site and has been sited and designed to avoid unnecessary clearing, some clearing of native vegetation will be required for its establishment. Approximately 45.51ha of vegetation clearing will be required for the Project, including for required asset protection zones and earthworks necessary to achieve groundwater separations across the Facility. It is noted that the condition of this vegetation ranges from Completely Degraded to Degraded to Good as summarised in Table 3-2.

Table 3-2: Summary of Vegetation Condition

Vegetation Condition	Proportion of Site		Proportion of Clearing Area	
	ha	%	ha	%
Completely Degraded	123.14	45.71	39.28	86.31
Completely Degraded to Degraded	17.85	6.62	-	-
Degraded	35.95	13.34	4.23	9.30
Degraded to Good	27.31	10.14	2.00	4.39
Good	51.89	19.26	-	-
Good to Very Good	7.74	2.87	-	-
Very Good to Excellent	5.56	2.06	-	-

Through careful consideration for the siting and design of the Facility:

- 86.31% of the vegetation within the Clearing Area is classified as Completely Degraded due to historic clearing;
- No clearing of Completely Degraded to Degraded vegetation will occur;
- 9.30% of the vegetation within the Clearing Area is classified as Degraded;
- 4.39% of the vegetation within the Clearing Area is classified as Degraded to Good; and
- No clearing of vegetation in a Good or better condition will occur.

An application for an Area Clearing Permit for the necessary clearing was submitted to the DWER in October 2023. While the Project will be delivered in two stages, C-Wise is seeking approval to clear the maximum extent of clearing required for the Project within the Area Clearing Permit application.

3.4 Planning Approval

Planning approval is required under the *Planning and Development Act 2005* (PD Act) and are regulated by the Western Australian Planning Commission (WAPC). Approval is given by the relevant local government when a development in the City of Perth has a value of less than $20 million or has a value of less than $10 million and is elsewhere in the state. Developments that exceed this threshold are instead required to be determination to the Development Assessment Panel (DAP). As the

estimated cost of the Project is over $10 million, it will be determined by the Metro Outer Joint Development Assessment Panel (JDAP).

Development Approval applications to be determined by JDAPs are first lodged with the relevant local government, which in this instance is the Shire of Murray, and will be forwarded to the JDAP by the local government for final determination. The JDAP is typically a five-person panel consisting of three independent experts and two local government council representatives who will determine the outcome of the application.

C-Wise is proposing to submit the application for planning approval in November 2023 and therefore run the environmental and planning approval processes concurrently.

4 Environmental and Social Attributes

The following sections outline the key environmental attributes on, and surrounding, the Site.

4.1 Site Location and Ownership

The Project will be located on 270ha of land at 320 Gull Road, Keralup, within a portion of Lot 9500 on Deposited Plan 414516 in Certificate of Title Volume 2991 Folio 741, of which the Development Footprint encompasses approximately 20.5ha (Figure 2).

A lease agreement was executed between C-Wise and DevelopmentWA, the current landowner, in August 2021.

4.2 Surrounding Land Use and Zoning

The Site is zoned 'Rural' under the Peel Region Scheme (PRS) and the Shire of Murray's Local Planning Scheme No. 4 (LPS), as shown in Figure 3.

Most of the land immediately surrounding the Site has been historically cleared and is used for grazing purposes, which is also zoned as 'Rural' under both the Peel Region Scheme and Shire of Murray Local Planning Scheme (No. 4). C-Wise's existing Nambeelup composting facility is directly south of the Site, zoned as 'Rural' under the Shire of Murray Local Planning Scheme (No. 4) and 'Industrial' under the Peel Region Scheme.

4.3 Sensitive Receptors

The Environmental Protection Authority's (EPA's) Guidance Statement No. 3 - Separation Distances between Industrial and Sensitive Land Uses (EPA, 2005) outlines the recommended separation distances between industrial activities and sensitive land uses. Sensitive land uses are defined within Guidance Statement No. 3 as those that are potentially sensitive to emissions from industry and other infrastructure, and include residential developments, schools, shopping centres and some public buildings.

The recommended separation distances for the relevant Prescribed Premises categories for the Project are outlined in Table 4-1.

Table 4-1: Recommended Separation Distance

Category No.	Name	Impacts				Recommended Separation Distance (m)
		Gaseous	Noise	Dust	Odour	
61	Liquid waste facility		✓		✓	Case by case
67A	Compost manufacturing and soil blending		✓	✓	✓	500 for manures, mixed food/putrescible & vegetative food waste; 250 for biosolids & 150 for green waste

In addition to the above, the DWER's Guideline: Better Practice Organics Recycling (Organics Recycling Guideline) indicates that a separation distance of 1km should be considered for receiving high-risk feedstocks.

As illustrated in Figure 4, the nearest sensitive receptor to the Site is approximately 2.56km to the southeast, significantly higher than any set separations distances referenced in the aforementioned guidelines.

Receptors to the south of the Site have the following classification in the Shire of Murray's *Local Planning Scheme No. 4 (June 2023)*:

- K – Special Use: Kennels;
- V – Special Use: Various;
- N – Nambeelup Industrial Development;
- HB – Special Use: Home Business;
- A – Special Use: Abattoir; and
- Rural.

Though some of these receptors contain homes associated with businesses, they are located on rural, isolated blocks and these are generally industrial, agricultural and special use zonings. A separation distance of 2.56km is therefore expected to be sufficient to mitigate potential impacts.

4.4 Climate

The average and 90th percentile rainfall data was sourced from SILO, a database of Australian climate data from 1889 to the present day that is hosted by the Queensland Department of Environment and Science. It provides daily meteorological datasets for a range of climate variables in ready-to-use formats suitable for biophysical modelling, research, and climate applications. The datasets are constructed from observational data obtained from BOM, using mathematical interpolation techniques to infill gaps in time series and construct spatial grids. The spatial grid selected (Latitude: -32.50, Longitude: 115.85) is for Keralup, WA and encompasses the majority of the Site.

Table 4-2: Average Rainfall in Millimetres (1971-2022)

Rainfall	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average (mm)	14.4	14.2	18.6	41.9	111	145	154	121	83.9	43.3	29.2	10.8	788
90th Percentile	0.2	2.7	22.4	43.5	245	222	65.1	127	115	78.6	20.4	13.4	955

The Site experiences a subtropical climate with distinctly dry summers and mild, wet winters. Rainfall in the area mainly occurs during the winter months of May to September. The driest months are December to March.

4.5 Topography

The topography at the Site ranges from 10m Australian Height Datum (AHD) to the northeast to 18mAHD to the southeast. The topography within the Development Footprint currently ranges from 14mAHD to 20mAHD, with a steep drop to 12mAHD on the western side. This Development Footprint has been selected to maximise the separation distance to groundwater. The current topography is shown in Figure 5.

It is noted that following construction, the topography in the Development Footprint will be altered. The base of the Development Footprint, following earthworks, will sit at approximately 17.5mAHD.

4.6 Geology and Soils

The Department of Primary Industries and Regional Development (DPIRD) maintain a soil landscape mapping database that incorporates surveys at various scales between 1:20,000 and 1:3,000,000. Soil mapping of the Site indicates that it consists of four soil landscape units (Figure 5):

- Bassendean B1 Phase – extremely low to very low relief dunes, undulating sandplain and discrete sand rises with deep bleached grey sands sometimes with a pale yellow B horizon or a weak iron-organic hardpan at depths generally greater than 2m; banksia dominant;
- Bassendean B2 Phase – flat to very gently undulating sandplain with well to moderately well drained deep bleached grey sands with a pale yellow B horizon or a weak iron-organic hardpan at 1-2m;
- Bassendean B3 Phase – closed depressions and poorly defined stream channels with moderately, poorly to very poorly drained bleached sands with an iron-organic pan, or clay subsoil. Surfaces are dark grey sand or sandy loam; and
- Bassendean B4 Phase – broad poorly drained sandplain with deep grey siliceous sands or bleached sands, underlain at depths generally greater than 1.5m by clay or less frequently a strong iron-organic hardpan.

The Development Envelope occurs primarily over Bassendean B1 and B2 Phase soils, with a portion of the Stage 2 development occurring over B4 Phase soils. The Conservation Category Wetlands present on the western and southern sides of the Site (Section 4.9) are mapped as occurring primarily over Bassendean B3 Phase soils, over which minimal activities will occur, limited to the establishment of a fence to form a wetland protection buffer. Most of the Resource Enhancement Wetlands within the Site and near the Development Footprint occur over Bassendean B4 Phase soils.

The majority of construction and operational activities will occur over Bassendean B1 and B2 Phase soils, which have minimal overlap with the mapped wetlands at the Site. The similarities between the soil and wetland mapping at the Site suggests that the soils and wetlands at the Site are closely associated with one another. Given that there will be minimal disturbance to Bassendean B3 Phase soils, the corresponding Conservation Wetlands are not expected to be impacted by the Project.

Surface geology at the Site and over the Development Footprint is classified as predominantly Qag – Alluvial sand and clay with shallow marine and estuarine lenses and local basal conglomerate (Figure 6).

4.6.1 Contaminated Sites

The DWER Contaminated Sites Database was reviewed to identify any sites classified under the *Contaminated Sites Act 2003* within or adjacent to the Site. The Site itself is not currently classified as a contaminated site.

Due to the historical use of the site as a piggery, C-Wise's existing facility at 139 Nambeelup Road, directly south of the Site, is classified as a contaminated site (Figure 7).

4.6.2 Acid Sulfate Soils

Acid Sulfate Soils (ASS) are naturally occurring soils that contain iron sulphide (iron pyrite) minerals that, if disturbed by soil excavation, dewatering or drainage, can then oxidise resulting in the release of contaminants and potentially cause environmental impacts.

A review of the Perth Groundwater Map (PGM) indicates that the entire Site is located in an area with a moderate to low risk of ASS and a small portion in the southeast corner of the Site has a high to moderate risk as shown in Figure 6.

During the intrusive investigation undertaken by Western Environmental in February 2021, groundwater samples were taken from existing groundwater monitoring bores, of which two are located within the Site (B07 and B09). The results from these wells showed exceedances in ASS parameters which is consistent with the surrounding areas which were previously investigated in 2008 (Western Environmental, 2021).

Proposed measures to manage risks associated with ASS are discussed in Section 7.11.

4.7 Groundwater

Regional groundwater flows in a westerly direction towards the Serpentine River (Coterra Environment, 2021). Two bores (B07 and B08) are located within the Site boundary. Groundwater data gathered from these bores indicates the depth the groundwater in the vicinity is 2.8 metres below ground level (mbgl) at B07 and 1.9mbgl at B08. The bore locations and inferred groundwater depths based on this data are shown in Figure 8. The DWER Water Information Reporting (WIR) tool indicates that there are multiple groundwater wells to the west and downgradient of the Site. One DWER monitoring site is located within the north-western portion of the Site (Figure 8).

Groundwater flow between adjoining aquifers is limited by a partial aquitard, layer of low permeability underlying a significant portion of the Site, resulting in extended periods of waterlogging during the winter months (Coterra Environment, 2021).

According to Perth Groundwater Map, the salinity of groundwater at the Site ranges from 250 to 500 mg/L indicating that it is fresh. Groundwater parameters such as pH and electrical conductivity (EC) were recorded during the intrusive investigations undertaken by Western Environmental which indicated that the groundwater is acidic (B07 – pH 4.5 and B09 – pH 3.73). EC ranged from 185.3µs/cm at B07 and 149.2µs/cm at B09, confirming that the groundwater is fresh. The EC results exceed the Freshwater Guidelines for slightly to moderately disturbed systems (Western Environmental, 2021).

4.7.1 Groundwater Studies

A detailed Keralup District Water Management Strategy (KDWMS) was prepared by Emerson Stewart in 2008-2009, which assessed the groundwater levels at the Site and determined that a coffee rock

layer was present across the Site, resulting in the presence of a perched aquifer. The DWER provided comments on the KDWMS and disagreed with this conclusion.

WSP Australia Pty Ltd (WSP) was subsequently engaged by C-Wise to assess the groundwater levels and behaviours at the Site and determine whether the perched aquifer was beneath the Site and Development Footprint (WSP, 2023).

Continuing from this work, FSG-Geotechnical was engaged to provide advice on the final design of the Facility in relation to the proposed Controlled Groundwater levels and sub-soil drainage system. This is discussed further in Section 5.5, and the Groundwater Control Level Study undertaken by FSG-Geotechnical is provided in Appendix B..

4.7.1.1 *Perched Aquifer*

WSP notes that "*a perched water table or aquifer is an aquifer that occurs above the regional water table or aquifer. The perched aquifer forms when there is an impermeable layer (aquitard) above the regional aquifer but below the land surface, which makes water perch on top of this layer. Typically for perched water there would be an unsaturated zone between the perched aquifer and the regional aquifer.*" To determine whether a perched aquifer was present at the Site, WSP reviewed the borelogs for three boreholes drilled within the Site. The relevant geology and well construction details are outlined in Table 4-3.

Table 4-3: Geology and Well Construction Details

Well ID	Ground Elevation (mAHD)	Bore Hole Depth (m)	Screened Interval (mbgl)	Screened Geology	Coffee Rock (mbgl) [mAHD]	Screen in Relation to Coffee Rock	Groundwater Level Range (mbgl) [mAHD]
EB07	16.59	8.9	5.9 to 8.9	Geology only described to 5m	3.8 [12.8)	Below	2.4 to 3.5 [13.0 to 13.9]
EB08	19.00	5.4	2.4 to 5.4	White medium sand (Bassendean Sand)	4.8 [14.2]	Across	2.3 to 2.9 [16.1 to 16.7]
EB09	21.91	6.1	2.7 to 5.7	White medium sand (Bassendean Sand)	Possibly at 6.1 [15.8]	Above	3.3 to 4.0 [18.0 to 18.7]

The borelogs indicate that EB07 is screened below the coffee rock layer, however the recorded groundwater levels are above the coffee rock. A hand auger borehole was drilled next to EB07 in November 2022, during which groundwater was encountered at the same depth as measures in EB07. As a result, WSP concludes that "*perched groundwater is not present above the coffee rock at EB07*."

WSP also reviewed the recorded groundwater levels from two DWER monitoring wells approximately 2km south of the Site, Well 61410678 and Well 61410677. Well 61410678 is installed to a depth of 3.5mbgl and screened above the coffee rock layer, whereas Well 61410677 is installed to a depth of 8.3mbgl and screened below the coffee rock. It was found that the groundwater levels in each well was above the coffee rock layer, indicating that there is no unsaturated zone below the coffee rock and that perched groundwater is not present above the coffee rock at these wells.

Based on the results of the investigation, WSP agrees with the DWER and considers that "*the observed groundwater levels form part of the regional Superficial Aquifer*" rather than a large-scale perched aquifer, as suggested in the KDWMS.

4.7.1.2 *Groundwater Level*

As part of the Groundwater Level Study, WSP was tasked with determining the Design Groundwater Levels to support the design of the Project and set the levels. The DGWL was estimated using historic groundwater levels, hydrogeological features and key parameters such as climate, surface water, drains, groundwater abstraction and land use. WSP developed two sets of DGWL contours:

- Average Annual Maximum Groundwater Level (AAMGL), 50% Annual Exceedance Probability (AEP):
  - The AAMGL ranges from reduced level (RL) 9mAHD at the northwestern Site boundary to RL 19mAHD at the eastern boundary;
  - The AAMGL within the Stage 1 Development Footprint ranges from RL 13mAHD RL 14.5mAHD; and
  - The AAMGL within the Stage 2 Development Footprint ranges from RL 14.5mAHD RL 16mAHD.
- 50 Year DGWL, 2% AEP:
  - The 50 Year DGWL ranges from RL 9.5mAHD at the northwestern boundary Site to RL 19.5mAHD at the eastern boundary;
  - The 50 Year DGWL within the Stage 1 Development Footprint ranges from RL 13.9mAHD RL 15.2mAHD; and
  - The 50 Year DGWL within the Stage 2 Development Footprint ranges from RL 15.1mAHD RL 16.5mAHD.

Based on these works, WSP prepared a Controlled Groundwater Level study to determine the engineering measures required to maintain a suitable separation distance to groundwater beneath the Development Footprint (Section 5.5).

4.8 Surface Water

To protect water sources, surface water proclaimed areas have been allocated under the *Rights in Water and Irrigation Act 1914* (RIWI Act). Surface water areas are proclaimed for the purpose of controlling the taking of water from watercourses and wetlands in order to systematically management their use. The Site is located in a Surface Water Proclaimed Area; the Serpentine River System (Figure 9).

4.8.1 Watercourses

The nearest major watercourse to the Site is the Serpentine River, located approximately 3km to the west (Figure 9). A minor watercourse connecting to the Serpentine River is located approximately 0.75km northwest from the Site and a second minor watercourse connected to Black Lake is located approximately 1.25km to the east.

The Gull Road Drain is located along the southern boundary of the Site, approximately 125m south of the Development Footprint. It enters the Lower Serpentine River approximately 3.1km west of the Development Footprint.

4.8.1.1 *Floodplain Mapping*

Floodplain mapping data indicates that the Site is not located in a floodplain area (Figure 10). The nearest floodplain is located 1.25km east of the Site around the minor watercourse connected to Black Lake. The area surrounding the Serpentine River, 3km west of the Site, is also mapped as a floodplain.

4.8.2 Water Resources

The nearest public drinking water source area to the Site is the North Dandalup Dam Catchment Area, located approximately 15km upgradient of the Site to the east and in a separate catchment area. No public drinking water sources are located at or surrounding the Site.

4.9 Wetlands

Most of the mapped wetlands surrounding the Site are classified as Multiple Use Wetlands. There are small portions of Multiple Use Wetlands within the northwest and southeast corners of the Site. A portion of two unnamed palusplain Conservation Category Wetlands are located on the western and southern boundaries of the Site, as shown in Figure 10. An unnamed sumpland wetland is located in the southeast corner and excluding the small sections of Multiple Use Wetlands and cleared pasture areas where most infrastructure is to be located, the remainder of the Site is categorised as Resource Enhancement Wetlands.

A review of the mapped wetlands within and surrounding the Site was completed by the Department of Biodiversity, Conservation and Attractions (DBCA) in 2021 to ensure that the wetland evaluation accurately reflects the mapped extent of the wetlands. As a result of the review, manual changes have been applied to the dataset internally, however these changes have not yet been applied to the publicly available data. The extent of the Conservation Category Wetlands within and surrounding the Site was altered following the DBCA's review. Both the original and updated wetland mapping has been considered during the development of the Project.

The Facility has been sited and designed to ensure a minimum 50m separation distance between infrastructure and the mapped Conservation Category Wetlands, as well as to minimise impacts to nearby Resource Enhancement and Multiple Use Wetlands as far as practicable. Most infrastructure will be located at least 100m from the mapped Conservation Category Wetlands with the exception of access roads and stormwater and leachate management infrastructure, which will be located at least 50m from wetlands. There will be a fence installed at the 50m buffer for all wetlands surrounding the Development Footprint. This buffer is consistent with the Shire's Local Biodiversity Strategy (Shire of Murray, 2013), which outlines minimum separation distances from wetlands and states that "*the Shire will not accept buffers to wetlands of less than 50m for Conservation Category Wetlands*."

Due to the presence of Conservation Category Wetlands within the Site, the Project may be classified as a high risk development under the Shire's Local Planning Policy: Water Sensitive Urban Design (LPP:WSUD) (Shire of Murray, 2018). The Project has therefore been developed in accordance with the principles and strategies outlined within the LPP:WSUD to ensure that the associated risks are managed appropriately. This includes consideration of the Stormwater Management Manual for Western Australia (DWER, 2022) during the development of a Surface Water and Leachate Management Plan for the Site (Section 7.1).

4.10 Flora and Vegetation

Approximately half of the vegetation within the Site has been historically cleared, with infrastructure to be constructed primarily within the cleared areas. Focused Vision Consulting (FVC) undertook a vegetation review and field assessment of the Site in November 2017 and September 2019 to outline the vegetation units, classify the condition of vegetation and identify the presence of any conservation significant species (Coterra Environment, 2021). The vegetation units within the Site are listed within Table 4-4 and shown in Figure 11.

Table 4-4: Vegetation Units

Code	Description	Area (ha)	% of Site
AsKgTS	*Astartea scoparia* and *Kunzea glabrescens* Closed Tall Scrub to 3m over *Juncus pallidus* Very Open Sedgeland to 1.4m over **Lotus subbiflorus* Very Open Herbland to 0.15m.	33.38	12.55
AsTSJpOS	*Astartea scoparia* Tall Shrubland to 2.1m over *Juncus pallidus* Open Sedgeland to 2m over **Hypochaeris glabra*, **Ornithopus pinnatus* and **Lotus subbiflorus* Open Herbland to 0.4m over **Anthoxanthum odoratum* Very Open Grassland to 0.35m.	0.2	0.07
cOF(D)	*Corymbia calophylla* Open Forest to 12m over *Melaleuca preissiana* Low Woodland to 7m over *Regelia ciliata* Closed Tall Scrub to 3.5m over *Xanthorrhoea preissii*, *Hypocalymma angustifolium* and *Acacia pulchella* Open Shrubland to 1.2m over *Dasypogon bromeliifolius* Very Open Herbland to 0.4m.	1.88	0.71
EmLOF	*Eucalyptus marginata* subsp. Marginata (with *Hardenbergia comptoniana*) and *Xylomelum occidentale* Low Open Forest to 8m over *Xanthorrhoea preissii* Open Shrubland to 1m over *Hibbertia hypericoides* Low Open Shrubland to 0.8m over**Briza maxima* and **Vulpia myuros* Open Grassland to 0.3m.	2.59	0.97
ErMpLCF	*Eucalyptus rudis* and *Melaleuca preissiana* Low Closed Forest to 8m over *Astartea scoparia* Tall Open Shrubland to 2.5m over *Juncus pallidus* and *Lepidosperma longitudinale* Sedgeland to 1.2m over **Lotus subbiflorus* and **Hypochaeris glabra* Very Open Herbland to 0.3m over **Vulpia* sp. and **Bromus diandrus* Very Open Grassland to 0.3m.	5.35	2.01
ErMpW	*Eucalyptus rudis* and *Melaleuca preissiana* Woodland to 13m over *Melaleuca rhaphiophylla* Low Open Woodland to 6m over *Kunzea glabrescens* and *Astartea scoparia* Tall Shrubland to 5m over *Juncus*	4.05	1.52

Code	Description	Area (ha)	% of Site
	pallidus Sedgeland to 1m over **Isolepis prolifera* and *Azolla* sp. Herbland to 0.4m.		
JpSAs	*Juncus pallidus* Sedgeland to 1. 8m over **Lotus subbiflorus* and **Moraea flaccida* Open Herbland to 0.5m over **Cynodon dactylon* and **Cenchrus clandestinus* Open Grassland to 0.15m with occasional *Astartea scoparia* to 1.5m.	19.6	7.37
JpSAsMp	Juncus pallidus Sedgeland to 1.8 m over *Lotus subbiflorus and *Moraea flaccida Open Herbland to 0.5 m over *Cynodon dactylon and *Cenchrus clandestinus Open Grassland to 0.15 m with occasional Astartea scoparia to 2.2 m and scattered Melaleuca preissiana to 10 m.	6.13	2.3
KgTOS	*Kunzea glabrescens* Tall Open Shrubland to 2.6m over *Astartea scoparia* Open Heath to 2m over *Juncus pallidus* Open Sedgeland to 2m over **Ornithopus pinnatus* and **Hypochaeris glabra* Very Open Herbland to 0.35m and scattered *Melaleuca preissiana* to 10m.	51.64	19.41
MpLOF/MpLOF(D)	*Melaleuca preissiana* Low Open Forest to 6m over *Astartea scoparia* tall Open Scrub to 2.8m over *Juncus pallidus* Very Open Sedgeland to 2m over **Ornithopus pinnatus* and **Hypochaeris glabra* Herbland to 0.5m.	5.22	1.96
MpWAsS	*Melaleuca preissiana* Woodland to 10m over *Astartea scoparia* Shrubland to 2m over *Juncus pallidus* Open Sedgeland to 1.8m over **Vulpia* sp. Open Grassland to 0.15m over **Lotus subbiflorus* and **Romulea rosea* Open Herbland to 0.2m.	5.22	1.96
Cleared pasture		130.76	49.14

Source: Information sourced from Coterra Environment (2021) – originally sourced from Focused Vision Consulting (2020). Vegetation Review – Keralup. Report prepared for Coterra Environment on behalf of the Department of Communities, Perth, Western Australia

The majority of the Development Footprint is located in the cleared pasture area, however some clearing of the AsKgTS (13.52%), cOF(D) (0.63%) and MpLOF(D) (0.18%) vegetation types will be required for the Facility, including within the bushfire Asset Protection Zone (APZ).

4.10.1 Vegetation Condition

The condition of vegetation across the Site ranges from Completely Degraded to Excellent (Figure 12) and is summarised in Table 4-5.

Table 4-5: Summary of Vegetation Condition

Vegetation Condition	Proportion of Site		Proportion of Development Footprint	
	ha	%	ha	%
Completely Degraded	123.14	45.71	39.28	86.31
Completely Degraded to Degraded	17.85	6.62	-	-
Degraded	35.95	13.34	4.23	9.30
Degraded to Good	27.31	10.14	2.00	4.39
Good	51.89	19.26	-	-
Good to Very Good	7.74	2.87	-	-
Very Good to Excellent	5.56	2.06	-	-

Through careful consideration for the siting and design of the Facility:

- 86.31% of the vegetation within the Clearing Area is classified as Completely Degraded due to historic clearing;
- No clearing of Completely Degraded to Degraded vegetation will occur;
- 9.30% of the vegetation within the Clearing Area is classified as Degraded;
- 4.39% of the vegetation within the Clearing Area is classified as Degraded to Good; and
- No clearing of vegetation in a Good or better condition will occur.

The proposed clearing aligns with the Shire's Local Biodiversity Strategy, which outlines a target to protect all estuarine wetlands with vegetation in Good or better condition.

FVC assessed the extent of native vegetation and regrowth at the Site during the vegetation review and field assessment. Approximately 5% of the vegetation on the Site is comprised of native vegetation, primarily on the eastern side of the Site. Native regrowth (48%) and cleared pasture (47%) make up the remainder of the Site however FVC noted that the native regrowth does not represent endemic species and instead represents novel assemblages typically dominated by one or two species, particularly *Kunzea glabrescens* or *Astartea scoparia* (Coterra Environment, 2021).

As outlined in Section 3.3, C-Wise submitted an Area Clearing Permit for the Project to the DWER's Native Vegetation branch on 19 October.

4.10.2 Conservation Significant Flora

According to the DBCA online individual records of Priority Flora, there are no Threatened or Priority Flora located within the Site. Similarly, FVC did not record any Threatened or Priority Flora species at the Site during the vegetation review and field assessment. The nearest recorded Priority Flora to the Site is a Priority 4 species, located approximately 300m to the west (Figure 14).

Given that no Threatened or Priority flora have been recorded within the Site, the Project is not anticipated conservation significant flora.

4.10.3 Threatened Ecological Communities

One Threatened Ecological Community (TEC) is mapped over the Site, Banksia Woodlands of the Swan Coastal Plain/Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region (Coterra

Environment, 2021). As of September 2016, this TEC is listed as Endangered under the *Environmental Protection and Biodiversity Conservation Act 1999*.

As no Banksia species have been identified within the Site (Coterra Environment, 2021), this TEC is not expected to be impacted by the Project.

4.10.4 Conservation Reserves

The Conservation Category Wetlands located on the western and the southern sides of the Site are classified as Environmentally Sensitive Areas as discussed further in Section 4.9.

The Site is located within the Environmental Protection (Peel Inlet – Harvey Estuary) Policy 1992 area (Figure 15), which sets out environmental quality objectives for the Harvey Estuary and outlines the means by which these objectives are to be achieved and maintained. It was introduced to address the nutrient enrichment of the Harvey Estuary caused by the clearing of native vegetation and by land uses that result in nutrients leaching into waterways. The Shire's LPP:WSUD also states that a proposal where phosphorous input is likely to exceed 15kg per hectare per annum or nitrogen input is likely to exceed 150kg per hectare per annum may be considered a high risk development.

As the Site is located at least 0.75km from the nearest watercourse, the clearing of vegetation for the Facility is not expected to result in impacts relating to the nutrient enrichment of the Harvey Estuary. The proposed management measures (Section 7) for the Project are expected to be sufficient to ensure that phosphorus and nitrogen inputs are minimal and below the thresholds outlined within the LPP:WSUD. Additionally, the design of the Facility has looked to eliminate the generation of leachate and ensure that all discharges are from the stormwater system (Section 7.1).

4.10.5 Dieback

The Project Dieback and Southcoast Natural Resources Management – Dieback Public Map provides information on the extent of *Phytophthora cinnamomi* dieback as of June 30, 2008. Dieback at the Site has not been mapped, however a portion of land directly to the northeast of the Site is mapped as having a moderate confidence of being infested (Figure 13).

Dieback is not known to occur at the Site, therefore the Site is not expected to result in significant environmental impacts relating to dieback.

4.11 Fauna

A fauna assessment of the Site was undertaken in 2009 by Coffey Environments and led to the identification of two fauna habitats (Coterra Environment, 2021):

- Open paddock with Juncus pallidus (*Juncus pallidus* in paddock with occasional *Astartea scoparia*, often on the edge of wetland area); and
- Melaleuca remnant woodland with wetland understorey (woodland dominated by Melaleuca and Flooded Gums, with moist, dense understorey).

The results of the fauna assessment indicated that the fauna assemblages at the Site were typical of fauna species that occur on the Swan Coastal Plain.

4.11.1 Conservation Significant Fauna

According to the DBCA online individual records of Priority Fauna, there are no records of Threatened or Priority Fauna being located within the Site. The nearest recorded Priority Fauna to the Site is a Priority 4 species, located approximately 2km to the south-southwest (Figure 14).

During the fauna assessment, 134 fauna species were observed at the Site, six of which were conservation significant species. Coffey Environments undertook a search of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters Search Tool and determined the likelihood of some significant species occurring at the Site (Table 4-6).

Table 4-6: Significant Fauna Species Recorded at the Site (Coffey Environments, 2009)

Species	EPBC Act Conservation Status	Biodiversity Conservation Act Status	Type of Presence	Potential to be found in Project Area
Birds				
Actitus hypoleucos (Common Sandpiper)	Migratory		Species or species habitat likely to occur within area	
Apus pacificus (Fork-tailed Swift)	Migratory	Migratory	Species or species habitat likely to occur within area	
Ardea alba (Great Egret)	Migratory		Breeding known to occur within area	Recorded on site
Botaurus poiciloptilus (Australian Bittern)	Endangered		Species or species habitat likely to occur within area	
Calidris acuminata (Sharp tailed Sandpiper	Migratory	Migratory	Species or species habitat known to occur within area	Possible
Calidris canutus (Red Knot, Knot)	Endangered	Endangered	Species or species habitat known to occur within area	
Calidris ferruginea (Curlew Sandpiper)	Critically Endangered		Species or species habitat may occur on site	Possible
Calidris melanotus (Pectoral Sandpiper)	Migratory		Species or species habitat known to occur within area	
Calidris ruficollis (Red-necked Stint)	Migratory	Migratory		Possible
Calyptorhynchus banksii naso (Forest Red-tailed Black Cockatoo)	Vulnerable	Vulnerable	Species or species habitat likely to occur within area	Recorded on site – feeding
Calyptorhynchus baudinii (Baudin's Black Cockatoo)	Endangered		Species or species habitat likely to occur within area	Unlikely

Species	EPBC Act Conservation Status	Biodiversity Conservation Act Status	Type of Presence	Potential to be found in Project Area
Calyptorhynchus latirostris (Carnaby's Black Cockatoo)	Endangered	Endangered	Breeding likely to occur within area	Likely (foraging)
Motacilla cinerea (Grey Wagtail)	Migratory	Migratory	Species or species habitat may occur on site	
Merops ornatus (Rainbow Bee-eater)	Migratory			Recorded on site
Numenius madagascariensis (Eastern Curlew)	Critically Endangered	Critically Endangered	Species or species habitat may occur within area	Possible
Pandion haliaetus (Osprey)	Migratory	Migratory	Species or species habitat likely to occur within area	
Phaps elegans (Brush Bronzewing)		Priority 4		Recorded on site
Pluvialis squatarola (Grey Plover)	Migratory	Migratory		Possible
Rostratula australis (Australian Painted Stripe)	Endangered		Species or species habitat likely to occur within area	
Sternula nereis nereis (Australian Fairy Tern)	Vulnerable		Species or species habitat may occur within area	
Thinornis rubricollis (Hooded Plover)	Priority 4			Possible
Tringa nebularia (Common Greenshank)	Migratory	Migratory	Species or species habitat likely to occur within area	Recorded on site
Tringa stagnatilis (Marsh Sandpiper)	Migratory	Migratory		Possible
Mammals				
Dasyurus geoffroi (Chuditch,Western Quoll)	Vulnerable	Priority 4	Species or species habitat likely occur within area	Unlikely
Falsistrellus mackenziei (Western False Pipistrelle)		Priority 4		Possible
Hydromys chrysogaster (Water –rat, Rakali)		Priority 4		Possible
Isoodon fusciventer (Southwestern Brown Bandicoot)		Priority 4		Recorded on site
Notamacropus irma (Western Brush Wallaby)		Priority 4		Unlikely

Species	EPBC Act Conservation Status	Biodiversity Conservation Act Status	Type of Presence	Potential to be found in Project Area
Phascogale tapatafa wambenger (Brush-tailed Phascogale		Conservation Dependent		Possible
Pseudocheirus occidentalis (Western Ringtail Possum)	Critically Endangered		Species or species habitat likely occur within area	Unlikely
Reptiles				
Lerista lineata (Lined Skink)		Priority 3		Possible
Neelaps calonotus (Black striped Snake)		Priority 3		Possible

Coffey Environments suggested that, due to the results of previous fauna studies, the degraded nature of potential habitat and a review of conservation significant species that may occur at the Site, the Site provides limited fauna value (Coffey Environments, 2009). Habitat for Black Cockatoos at the Site was also noted to be minimal as it is generally limited to Eucalypt woodland areas which occur further to the west along the Serpentine River.

As the results of the fauna assessment suggest that fauna assemblages at the Site are typical of the area and the Site was determined to provide limited fauna value. Therefore, the Project is not anticipated to result in significant impacts to fauna.

4.12 Aboriginal Heritage Sites

A search for relevant Aboriginal Heritage was conducted using the Department of Aboriginal Affairs (DAA) online Aboriginal Cultural Heritage Inquiry System (ACHIS), which incorporates both the Heritage Site Register and the Heritage Survey Database, which lists the following sites:

- Registered Aboriginal Sites;
- Other Heritage Places; and
- Heritage Survey Areas.

The Site has been previously subject to an ethnographic and archaeological survey (27409) that covered approximately 4,000 ha of the Keralup area. No registered sites were identified within the Site boundary. The nearest registered site (3582) is located approximately 2.3km west of the Site and a smaller artefacts/scatter registered site (4110) is located approximately 2.1km to the south-southeast. A number of other sites that have been lodged or are classified as ‘stored data/not a site’ are located in the region (Figure 16).

As there are no known or registered sites within the Site, the Project is not expected to impact Aboriginal cultural heritage.

4.13 Summary of Environmental and Social Attributes

A summary of the environmental attributes of the Site is provided in Table 4-7.

Table 4-7: Summary of Environmental and Social Attributes

Aspect	Summary
Site Location and Ownership	The Project will be located on 269.4ha of land at 320 Gull Road, Keralup, of which the Development Footprint encompasses approximately 17.12ha. A lease agreement was executed between C-Wise and DevelopmentWA, the current landowner, in August 2021.
Surrounding Land Use and Zoning	The Site is zoned 'Rural' under the PRS and the Shire's LPS, as is most of the land surrounding the Site. C-Wise's existing Nambeelup composting facility is directly south of the Site and is zoned as 'Rural' under the Shire's LPS and 'Industrial' under the PRS.
Sensitive Receptors	The edge of the facility is located approximately 2.56km to the nearest sensitive receptor, a residential property to the southeast. Other properties include a boarding kennel approximately 2.56km southwest, and a residential community approximately 3.2km west.
Climate	Dry summers and mild, wet winters with most rainfall occurring between June and August. The average annual rainfall is 788mm.
Topography	The topography at the Site ranges from 10mAHD to the northeast to 18mAHD to the southeast, and from 14mAHD to 20mAHD within the Development Footprint. The base of the Development Footprint, following earthworks, will sit at 17.5mAHD.
Geology and Soils	The Site consists of four soil landscape units (Bassendean B1 to B4 Phases) and surface geology is classified as predominantly Qag - Alluvial sand and clay with shallow marine and estuarine lenses and local basal conglomerate. The Development Footprint lies primarily over Bassendean B1 and B2 Phase soils, as well as a small portion of B4 Phase soil. Apart from a small part of the proposed boundary fence, no infrastructure will be located within B3 Phase soils.
Contaminated Sites	The Site is not classified as a contaminated site. The nearest contaminated site is C-Wise's existing Nambeelup facility, located directly south of the Site.
Acid Sulfate Soils	The Development Footprint and the majority of the Site is located in an area with a moderate to low risk of ASS and groundwater samples taken from wells at the Site in 2021 indicated exceedances in ASS parameters.
Groundwater	Groundwater at the Site flows in a westerly direction towards the Serpentine River and is limited by a partial aquitard, resulting in extended periods of waterlogging during the winter months. The recorded depth to groundwater ranges from 1.9mbgl to 2.8mbgl and groundwater at the Site is noted to be fresh and acidic, with a pH ranging from 3.73 to 4.5. The AAMGL ranges from RL 9mAHD at the northwestern Site boundary to RL 19mAHD at the eastern boundary and the 50 Year DGWL ranges from RL 9.5mAHD to RL 19.5mAHD. An investigation undertaken by WSP determined that a large-scale perched aquifer is not present at the Site.
Watercourses	The Serpentine River is located approximately 3km west of the Site and two minor watercourses are located 0.75km to the northwest and 1.25km to the east, respectively. The Gull Road Drain is located along the southern boundary of the Site, approximately 125m south of the Development Footprint, and enters the Lower Serpentine River 3.1km to the west.

Aspect	Summary
	The nearest floodplain is located around the minor watercourse 0.75km east of the Site.
Water Resources	The nearest public drinking water source to the Site is the North Dandalup Dam Catchment Area, located approximately 15km to the east and in a separate catchment area.
Wetlands	Two Conservation Category Wetlands are located on the western and southern boundaries of the Site. Small sections of Multiple Use Wetlands are located within the northwestern and southeastern corners of the Site. Excluding the cleared pasture areas, the remainder of the Site is classified as Resource Enhancement Wetlands. Most infrastructure will be located at least 100m from Conservation Category Wetlands with the exception of access roads and stormwater and leachate management infrastructure, which will be located at least 50m from these wetlands. Part of the Development Footprint is located within Resource Enhancement wetlands, and a small portion of the access to the Site will be through a Multiple Use Wetland.
Vegetation Condition	While the vegetation condition at the Site ranges from Completely Degraded to Excellent, the vegetation within the Development Footprint is classified as Completely Degraded to Degraded to Good: • 86.31% is classified as Completely Degraded; • 9.3% is classified as Degraded; and • 4.39% is classified as Degraded to Good.
Dieback	Dieback is not known to occur at the Site, however a portion of land directly to the northeast is mapped as having a moderate confidence of being infested.
Conservation Significant Flora	There are no Threatened or Priority Flora species within the Site, with the nearest recorded species located 300m to the west.
Threatened Ecological Communities	Banksia Woodlands of the Swan Coastal Plain/Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region are mapped as occurring at the Site, however no Banksia trees are present at the Site.
Conservation Reserves	The Conservation Category Wetlands located to the west and south of the Site are classified as Environmentally Sensitive Areas and the Site is located within the Environmental Protection (Peel Inlet – Harvey Estuary) Policy 1992 area. The Conservation Category Wetlands are not within the Development Footprint.
Fauna	No Threatened or Priority fauna species have been recorded within the Site. The nearest record of a Threatened or Priority fauna species is 2km to the south-southwest of the Site.
Aboriginal Cultural Heritage	There are no known or registered sites within the Site, with the nearest registered site (3582) located approximately 2.3km to the west.

5 Project Design and Operations

The Project will be a modern, better practice facility that recycle organic waste, including FOGO collections, into composter and similar products. A description of the Project design and function is provided in the following sections.

5.1 Waste Sources, Streams and Volumes

C-Wise is proposing to initially accept approximately 100,000 tonnes per annum of solid organic materials for processing, increasing to a total of 200,000 tonnes per annum as the Stage 2 development is delivered. In addition to this, 30,000 tonnes per annum of liquid wastes will be accepted initially, increasing to 60,000 tonnes per annum once the Stage 2 development has been completed. This represents the generation of approximately 70,000 tonnes per annum of composted products in the initial stage, and 140,000 tonnes once the Stage 2 development is complete.

The various waste types to be accepted by C-Wise is provided in Table 5-1.

Table 5-1: Waste Acceptance Volumes

Prescribed Premises Category	Waste Type	Annual Quantity Limit
Solid Wastes		
67A – Soil blending and compost manufacturing	Greenwaste (shredded trees or plants)	200,000 tonnes
	Untreated timber (sawdust and various other wood fractions)	
	Natural fibrous organics (straw, grain husks and other crop waste)	
	Mushroom compost	
	Off-spec dairy products and food wastes	
	Animal mortalities	
	Piggery bedding	
	Animal manures	
	Dewatered screenings from CM Farms wastewater treatment plant	
	Domestic and commercial food organics and garden organics (FOGO)	
Liquid Wastes		
61 – Liquid waste Facility	Piggery wastewater and sludge (animal effluent and residues)	60,000 tonnes
	Fertiliser wash waters	
	Glycols	
	Grease trap wastes	
	Ammonia nitrate	

5.2 Design Status

The Project is currently in the conceptual design stage with these drawings utilised to support the various approval applications. As part of the conceptual design works, specific focus was given to the environmental engineering and operational management controls for the Facility, which are outlined within this document.

C-Wise is proposing to deliver the project through a Design and Construct style Contract. Therefore, the Detailed Design will be delivered by the C-Wise selected construction contractor. Based on the current project timelines, the selection of the Design and Construct contractors is scheduled to occur in late 2023/early 2024. Therefore, the Detailed Design works for the Stage 1 development are not scheduled to be completed until mid-2024. All detailed design will be approved by C-Wise and its Project Consultancy Team prior to the commencement of construction works.

Based on experience with the delivery of similar projects, it is anticipated that there may be some changes to the design of the Facility arising from the detailed design phase. However, C-Wise can confirm that there will be no significant alterations to the design intent or performance standards of the environmental engineering controls included within the conceptual designs and as outlined within this document.

5.2.1 Conceptual Drawings

A range of conceptual drawings have been developed for the Project. These are outlined in Table 5-2 and are provided in Appendix A.

Table 5-2: List of Drawings

Drawing Name	Drawing Description
C-100	General Arrangement
C-101	Site Plan Layout
C-102	Site Plan Layout Isopachyte
C-104	Earth Work Plan Layout
C-105	Staged Layout
C-106	Surface Water and Leachate Management Layout – Stage 1
C-107	Surface Water and Leachate Management Layout – Stage 2
C-108	Proposed Prescribed Premises Boundary Layout
C-110	Environmental Monitoring Point Layout
C-201, C-202, C-203, C-204	Long Sections 1-4
C-300	Ponds and Containment Infrastructure
C-301	Channels and Conveyance Infrastructure
C-302	Groundwater Control Infrastructure

5.3 Staging of Development

The Project will be delivered across two stages to provide C-Wise with an opportunity to progressively relocate all existing operations to the new Facility. The Project will be delivered in two stages, with the Stage 1 development being used to process primarily FOGO materials. The Stage 2 development represents the shift from C-Wise's operations at its existing Nambeelup composting facility to the Carbon Recycling Facility. Following completion of the Stage 2 development and the complete move of operations to the Carbon Recycling Facility, the Nambeelup composting facility will be decommissioned.

The key composting infrastructure included in the Stage 2 development is the same as the Stage 1 development. Most of the ancillary Site infrastructure will be constructed during the Stage 1 development with the exception of one additional surface water pond and two additional leachate management ponds.

The key infrastructure to be constructed for each stage includes:

Stage 1:

- Access Road;
- Weighbridge;
- Administration Office;
- Composting Infrastructure:
  - Carbon storage area;
  - Liquid waste receival area and tanks;
  - Receival building;
  - Process Area, comprising:
    - Cocoons (fully enclosed);
    - MAF area (under cover); and
    - Final maturation area (under cover).
  - Screening and dispatch area;
- Two leachate ponds;
- Stormwater pond;
- Wetland fencing and firebreaks;
- Fuel store and service areas; and
- Workshop, crib room and office.

Stage 2:

- Composting Infrastructure:
  - Carbon storage area;
  - Liquid waste tanks;
  - Receival building;
  - Process Area, comprising:
    - Cocoons (fully enclosed);
    - MAF area (under cover); and

        - Final maturation area (under cover).
    - Screening and dispatch area;
- Two leachate ponds; and
- Stormwater pond.

5.4 Site Access

Access to the Site will be from the northwestern boundary, directly on to Gull Road. The Shire of Murray recently completed the extension works to Gull Road, extending just east of C-Wise's boundary to support the Project's development.

As further development occurs in the area, it is anticipated that Gull Road will continue to extend eastward and eventually connect to with Yangedi Road, providing access from the east and west to the Site, though these plans are not yet finalised.

5.5 Controlled Groundwater Level

FSG Geotechnics was engaged by C-Wise to undertake the design of a controlled groundwater level drainage system across the Facility to ensure a minimum separation distance of 1.5m is maintained between the base of each pond and the estimated 50 Year Design Groundwater Level at the Site. The groundwater drainage system modelled by FSG Geotechnics will be staged with the development of the Facility. Stage 1 will initially comprise an open swale along its eastern and southern site edges, which will control groundwater levels beneath the three ponds to no higher than 14mAHD. At the development of Stage 2, the eastern swale between Stage 1 and Stage 2 will be converted into a sub-soil drain pipe, and Stage 2 will have its own swale installed along the Stage 2 eastern and southern boundaries to control the groundwater level beneath the Stage 2 ponds to no more than 15mAHD.

The investigation found that the groundwater designs for the Facility are able to control groundwater to the required depth underneath all leachate and surface water ponds. The controls within Stage 1 are designed to only remove the seasonal peak groundwater level, with any flows and associated discharge only likely to occur during the wet winter months. The final design of the Stage 2 groundwater control will be refined prior to construction, once additional groundwater data has been gathered across the Site as part of the operation of Stage 1 of the Facility.

5.6 Composting Infrastructure

The proposed layout of the Facility is shown in Drawing C-101. The following section outlines the infrastructure from acceptance through to dispatch. The Facility design has been developed in general accordance with the Organics Recycling Guideline, which provide environmental performance objectives and benchmark controls for the planning, design and operations of organics recycling facilities regulated under Part V of the *Environmental Protection Act 1986* (EP Act).

The composting process will be completed in several stages, each of which will be fully enclosed to minimise potential odour emissions and to assist in the management of leachate. These stages include:

- Receival;
- Stage 1 – Cocoon system (10-14 days);
- Stages 2-4/5 – Pasteurisation (10-14 days each);

- Stage 5/6 – Settling (2-4 days); and
- Screening and Dispatch.

Composting will be completed in general accordance with the Organics Recycling Guideline to ensure that the finished product will satisfy various market requirements.

5.6.1 Carbon Storage Area

Low risk feedstocks such as greenwaste, forestry residues and natural fibrous organics (such as cereal waste) will be stored in the carbon storage area. The carbon storage area is located on the northern side of the composting infrastructure, near the access road, to minimise the distance that waste delivery vehicles need to travel and limit the potential for vehicle interactions with Site personnel. It will consist of a compacted limestone hardstand that is graded to the north to direct all leachate towards the nearby leachate management pond, rather than the surrounding environment. The limestone material will be applied in a minimum 300mm thick layer, which has been shown to achieve an effective permeability of $2.8x10^{-8}$m/s. Any leachate generated at the carbon storage area will free flow across the surface of the hardstand, which will be maintained to ensure ponding of leachate on the surface does not occur. Bunding will be installed at the edge of the hardstand to assist in directing leachate toward the pond.

A second carbon storage area will be constructed as part of the Stage 2 development, also consisting of a compacted limestone hardstand, graded to the associated leachate ponds. It is anticipated that the Stage 2 carbon storage area will be slightly smaller than the Stage 1 carbon storage area due to the space required for the liquid waste receival area and tanks (Section 5.6.1).

It is important to note that in accordance with Table 4 of the Organics Recycling Guideline, leachate generated in this area is defined as low-risk, as it is generated from low-risk feedstocks.

Low risk feedstocks will be received directly on the hardstand and will be transported to the Receival Building prior to being blended into the pre-treated compost mix. Occasional wetting of materials using stormwater or groundwater will occur on this hardstand to minimise wind-driven dispersion of finer materials, and to pre-wet materials prior to inclusion in the composting process.

5.6.2 Receival Building

High risk feedstocks such as FOGO will be delivered by waste vehicles to the receival building and pre-sorted to remove contamination prior to composting. The receival building will be enclosed and roofed to eliminate the risk of clean stormwater coming into contact with waste materials and generating high-risk leachate. Doors will be installed and kept closed when waste materials are not being delivered to minimise the uncontrolled release of odours from the building. A mechanical ventilation system will be installed in the receival building to meet the minimum required four air changes per hour.

The receival building will include a FOGO receival area for vehicles to place waste materials and internal processing equipment for pre-sorting and the removal of contamination. There will also be processing plant to ensure all materials are a consistent or suitable size before progressing into the composting process. Mixers will combine the FOGO stream with materials from the carbon storage area, where appropriate, producing a blend suitable for inclusion in the composting process.

A second receival building will be constructed as part of the Stage 2 development and is expected to contain similar infrastructure, equipment and operations.

Organic materials will be delivered directly to the receival hall for pre-treatment. An initial inspection will be undertaken for all waste loads entering the Site to ensure that the material will be suitable for composting and does not contain unreasonable levels of contamination. Once they have been deposited in the receival building, organic materials will be fed via a hopper into a further sorting process to remove contamination. The material will then be passed through a size-separation process before being stored in a FOGO bunker within the hall. Materials from the carbon storage area will also be brought into the receival building for storage in the material bunkers prior to inclusion in the process, when required.

The organic materials will then be transferred from the bunkers to the mixers where they will be moistened and blended with the desired volume of various feedstocks. Once this process is complete, the blended feedstocks will be transferred to the cocoons to commence the composting process. The receival building will be run with a 'clean floor' policy, with all materials processed and removed from the receival building by the end of each working day.

5.6.3 Liquid Waste Receival Area and Tanks

Liquid wastes will be accepted at the liquid waste receival area for blending into compost products. The liquid waste receival area will and bunded, which minimises the risk of liquid wastes entering the environment in the event of a spill or leak.

The Stage 1 development will include twelve storage tanks, with each tank having a storage capacity of 340,000L. The tanks within the farm for each stage will be arranged in banks of three, with the tank farm bunded to a capacity of 110% that of the volume of a single bank within the bund, in accordance with AS1940. The tanks will also be equipped with monitoring equipment (e.g. high-level alarms) to ensure that they do not overfill. Three of the storage tanks located in this area will be reserved for the temporary storage of high-risk leachate generated from the receival building, cocoon area and process area.

An additional 12 storage tanks will be installed directly to the east of the existing tanks as part of the Stage 2 development, with three reserved for management of high-risk leachate generated in Stage 2. No additional liquid waste receival area will be constructed as part of the Stage 2 development and the existing liquid waste receival area from the Stage 1 development will be used to service all liquid waste tanks.

Vehicles delivering liquid wastes to the Facility will do so in the liquid waste receival area. Liquid wastes will be released into an in-ground pit that contains a pump and filter to separate any solids. The liquid waste will be stored in the adjacent liquid waste storage tanks to minimise potential odour emissions. Liquid waste accepted at the Site, and leachate stored within the tank farm, will be used in the compost manufacturing process.

5.6.4 Cocoons

As part of the C-Wise Smart Composting project, a proprietary composting system using custom-built composting cocoons has been developed for the initial stage of composting for the Project. Both Stage 1 and Stage 2 developments will feature 12 composting cocoons located between the receival building and MAF area within the process area, with an additional three cocoons for surge capacity located adjacent to the receival building.

The cocoons will be fully enclosed and can be managed and operated individually. They will include a tension fabric roof with a structural insulated panel system to protect the piles from contact with stormwater and to minimise leachate generation. The cocoon system is suspended underneath each tension fabric roof and will be lowered over the piles of organic material in the initial stages of the

process. Each cocoon will have a capacity of 500m^3 and be constructed over an effectively impermeable bunded concrete hardstand to minimise the risk of leachate entering soils. The concrete floor of each cocoon will be graded towards a collection pit to allow the extraction of high-risk leachate for storage in the tank farms and will not allow any high-risk leachate to escape.

The initial composting process will take place in the cocoons, which are fully enclosed to minimise odour emissions and the risk of leachate being released into the environment. Air exchanges will occur throughout the process to maintain aerobic conditions and minimise odour generation, with air removed from the process being pumped through the initial MAF compost stack to act as a biofilter and further mitigate odour generation.

This initial composting and pasteurisation stage is expected to take between 10-14 days to complete, during which the piles will be subject to temperatures in excess of 55°C to ensure pasteurisation. This is similar to how enclosed tunnel composting systems work, wherein the initial stage is used for pasteurisation. Following this stage, the partially processed compost will be transferred to the MAF area for additional processing and maturation.

5.6.5 Process Area

Two processing sheds for each stage will be constructed to host the composting process after the material has gone through the initial processing within the cocoon system. Each processing shed will feature a roof, located approximately 6m above the ground level. This roof is a critical and key environmental control at the Site, effectively eliminating rainfall-driven generation of high-risk leachate from the composting process. To allow for operational flexibility, each shed will not have permanent sidewalls, however a series of precast retaining bunkers walls will be used for each stage of the composting process to contain the stockpiles and minimise any rainfall-drive leachate generation.

The floor within each processing shed will be made of an effectively impermeable concrete hardstand and will feature bunds and slopes to contain any leachate generated within and drain it towards leachate collection pits. The concrete floor shall be designed so that the fall ensures no leachate will escape the processing shed. Leachate will then be pumped from the collection pits for storage in the tank farm or for reuse in the composting process.

Each process shed will host five additional stages of the composting process, using a combination of MAF and passive composting maturation to deliver a final compost material to the screening and dispatch area. The following subsections discuss the infrastructure and operational aspects of the two composting processes which occur within the processing sheds.

5.6.5.1 *MAF Area*

Following the initial process within the cocoons, the maturation phase of the composting process will take place in the MAF area, directly south of the cocoons. Though the number of MAF stages will vary depending on operational requirements, it is anticipated that a minimum of three MAF stages will occur as part of the regular composting process. Each stage is anticipated to take between 10-14 days to complete.

The MAF system comprises a perforated pipe which is laid on top of the hardstand processing shed floor prior to the placement of organic material. This will force air through the pile and achieve aeration without the need for turning. At the end of each stage the compost material is inspected and moisture levels are assessed. Master Units (MU) and Sub Units (SU) are disconnected, with any damage or faults are addressed before being placed into position for the next stage of the composting

process. Air Supply (AS) Pipes are extracted from underneath current pile and moved into position with MAF MU and SU units at the next stage. Once connected and tested for correct operation, the compost stockpile is moved from previous MAF stage to this next stage. The front-end loader movement of the compost pile involves additional mechanical breakdown and mixing of the material when transferring to the subsequent MAF stage. This mixing also facilitates additional pasteurisation to that achieved in the cocoon composting stage and further maturation of the compost.

The piles will be monitored to ensure that appropriate temperature and moisture levels are maintained to ensure pasteurisation and achieve further maturation. The MAF stages following the cocoon phase of the composting, allow C-Wise to control the maturity of the compost to be meet its intended market. High maturity composts will require longer maturation times and therefore additional composting stages. Lower maturity composts will have lower timeframe demands.

Any leachate generated during this phase of the composting process will drain across the concrete floor of the processing shed to a collection pit for collection prior to temporary storage in the tank farm.

The pasteurisation process is used to kill plant and animal pathogens, parasites and weeds/seeds within the compost. This stage of the process will occur in the MAF area. Pasteurisation via the MAF system will be completed across a minimum of three stages, between which the piles will be manually turned to ensure that the outer layers of compost reach pasteurisation temperatures. Each stage is anticipated to take between 7-10 days to complete. Once pasteurisation is complete, the pasteurised compost will be transferred to the final maturation area for settling.

The same MAF system and process will be utilised in all process areas across Stage 1 and 2.

5.6.5.2 *Final Maturation Area*

The final stages of the composting process before screening and dispatch will see the final maturation of the compost product in the southmost stages of the processing shed. The product will come from the MAF Area and be formed into stockpiles underneath the processing shed roof, where it will be left to passively sit and settle on the concrete hardstand. As in all areas of the processing shed, any leachates generated from this process will drain to the collection pits for pumping to the tank farm.

It is anticipated that each stage of this process will occur for a minimum 2-4 days, after which the product will be moved to the screening and dispatch area before ultimately being removed from Site.

The maturation area process and infrastructure will be the same in both the Stage 1 and Stage 2 developments.

5.6.6 Screening and Dispatch Area

The screening and dispatch area is where the finished compost product will be stored prior to removal from Site. It is located south of the MAF and final maturation areas, towards the back of the Facility. As this area will only be used for the storage of the finished compost product, it will not be roofed. It will consist of an effectively impermeable bunded asphalt hardstand in accordance with the Organics Recycling Guideline. Any leachate generated in this area will be classified as low-risk in accordance with the Organics Recycling Guideline and will be directed towards the adjacent leachate management pond within each stage.

Once the composting process has been completed, the compost product will be screened to grade the product according to size, as well as allow for the removal of any remaining physical contaminants.

The final product will be tested and classified in accordance with the Organics Recycling Guideline to ensure that it is fit-for-purpose and of a sufficient quality. At this stage, it is unknown if the outputs from the Facility will be classified as either Category A or Category B products, as this is dependent on the feedstocks used to create the products, as outlined in the Organics Recycling Guideline. The quality and type of feedstocks used to create compost at the Facility will be confirmed during operations through appropriate and regular testing. It is noted that C-Wise has a proven history of sourcing appropriate feedstocks for market requirements at its existing Nambeelup composting facility and therefore it is anticipated that both Category A and Category B products may be generated at the Facility.

The final product will be stored in the screening and dispatch area prior to being loaded into vehicles for transport to appropriate markets.

5.6.7 Markets

C-Wise currently produces a range of recycled organic products at its existing Nambeelup composting facility, including compost, soil improvers and mulch. These are supplied to several key markets, including:

- Agriculture:
  - Cropping and pasture;
  - Vegetable production;
  - Fruit and orchards;
  - Viticulture; and
  - Turf production.
- Urban Amenity:
  - Parks and garden management;
  - Landscaping; and
  - Home gardeners.
- Environmental Remediation:
  - Bioremediation;
  - Roadside rehabilitation; and
  - Mining rehabilitation.

It is anticipated that the products generated at the Facility will be supplied to similar markets.

5.7 Ancillary Site Infrastructure

The proposed layout of the Facility is shown in Drawing C-101. The Project will include the following ancillary infrastructure:

- Wetland fencing and firebreaks;
- Fuel store and service areas;
- Administration building;
- Workshop and office;
- Gatehouse and weighbridge;

- Security infrastructure;
- Traffic management;
- Surface water and leachate management ponds; and
- Water supply.

Apart from an additional surface water pond and two leachate management ponds, the ancillary Site infrastructure will all be constructed during Stage 1 of the Project.

5.7.1 Wetland Fencing and Firebreaks

The Facility has been sited and designed to minimise potential impacts to the wetlands and other environmental values within and surrounding the Site. As discussed in Section 4.9, there are several mapped Conservation Category, Resource Enhancement and Multiple Use wetlands within the Site. Wetland buffers have been developed with due consideration given to the Draft Guideline for the Determination of Wetland Buffer Requirements (DWER, 2005) (the Wetland Buffer Guidelines).

For the Conservation Category and Resource Enhancement wetlands, a 50m wetland protection buffer has been allowed for natural revegetation, which will be fenced to prevent access Site operations. For the Resource Enhancement wetlands at the Site, a 50m wetland protection buffer has been implemented and will also be fenced to minimise the impacts of the development on the wetlands. Where the 50m asset protection buffer from the facility has been required, the location of the fence has been relocated, however a minimum 50m distance exists between the edge of the facility to the resource enhancement wetlands. An additional 50m managed asset protection buffer has been included between operational areas of the Site and the edge of the wetland protection buffer for Conservation Category wetlands. This effectively creates a 100m buffer from Site operations to minimise the impacts of the operation on the conservation category wetlands. A firebreak will be developed along the fence within 50m asset protection buffer, and grasses within the asset protection buffer will be managed to minimise the fire risk to the facility. Surface water and leachate ponds will be partially located within the 50m asset protection buffer, however these are not expected to cause significant environmental impacts due to the extensive engineering controls that have been incorporated into the design (Section 5.7.7).

The proposed wetland buffer, fencing and firebreak areas are shown in Drawing C-108.

5.7.2 Fuel Store and Service Areas

Trucks and other vehicles will be stored in the fuel store and service area when not in use.

The fuel store and service area is located near the workshop and office and away from daily operational activities to minimise potential safety risks, such as vehicle collisions and the spread of fires. In the event that equipment is damaged and can be moved, it will be serviced in this area to reduce risks to personnel safety.

5.7.3 Workshop and Office

The workshop and office will be located north of and separated from the key composting infrastructure to minimise potential safety risks to staff from vehicle movements. This area will contain operational controls for the plant and an office area inclusive of a staff kitchen and toilets.

5.7.4 Gatehouse and Weighbridge

On arrival at the Site, all vehicles must enter via the weighbridge. All vehicles will be weighed on entry to and exit from the Site. A computerised weighing system will record the weight of vehicles on entry and exit of the Site. Upon a waste load being accepted, incoming vehicles will be directed to the appropriate section of the Facility.

This area will also contain the staff office and parking bays.

5.7.5 Security

As discussed in Section 5.7.1, a fence will be installed between key Facility infrastructure and the nearby Conservation Category and Resource Enhancement wetlands to provide additional protection. The fence will also reduce the risk of unauthorised personnel accessing the Facility, particularly from the western and southern sides of the Site where the majority of fencing will be installed. A front gate will be installed at the entrance to the Site will be locked outside of operational hours.

Access to the Site and key infrastructure will be available only through the Site entrance near the gatehouse and weighbridge.

5.7.6 Traffic

A Traffic Impacts Statement (TIS) for the Site was prepared by Talis to outline the transport aspects of the proposed development, focusing on traffic operations, loading vehicle operations, access and car parking. The TIS was prepared in accordance with the WAPC Transport Impact Assessment Guidelines: Volume 4 – Individual Developments (WAPC, 2016).

Overall, the TIS made the following conclusions in relation to the development:

- There are no current public transport upgrade plans to provide access within walking distance to the site, however there are plans to provide good active transport accessibility to the Site access, with wide pedestrian footpaths and good shared paths within the surrounding area;
- The Site will generate approximately 78 vehicles during the peak AM and PM periods; and
- There will be 68 parking bays provided for staff and visitors, meeting the required minimum parking requirements.

5.7.7 Surface Water and Leachate Management System

The design of the Facility has been developed with consideration of the Organics Recycling Guideline and an aim to minimise the volume of leachate generated and subsequently maximise the capture of any stormwater or leachate generated at the Site. A comprehensive Surface Water and Leachate Management System (SWLMS) has been developed for the Site to manage surface water and leachate generated across various operational areas.

As part of the SWLMS, one surface water pond and two leachate management ponds will be constructed to support each stage of the Project. Clean surface water will be directed away from The Processing Shed, Cocoon and Receival Hall roofs and into the surface water ponds to eliminate the rainfall-driven generation of high-risk leachate within these areas. The surface water ponds will consist of:

- A 300mm compacted subgrade layer using onsite soil material; and
- A 2mm High Density Polyethylene (HDPE) Geomembrane.

Each surface water pond has been sized to a 1-in-20-year, 24-hour storm event in accordance with the Organics Recycling Guidelines and will include a passive spillway that allows for a controlled release of stormwater offsite.

The leachate management ponds will be used to capture any low-risk leachate generated from the carbon storage area and the product screening and dispatch area. Any high-risk leachate generated at the Site will be collected in a series of collection pits under the roofed area and then pumped to the liquid waste tanks for storage prior to reuse in the composting process.

To prevent low-risk leachate stored in the ponds from percolating into the groundwater system, the ponds will be lined in general accordance with the Composting Guidelines:

- A 300mm Compacted Subgrade Layer;
- A 2mm High Density Polyethylene (HDPE) Geomembrane; and
- Geosynthetic Clay Liner (GCL).

This minimises the risk of leachate leaching from the ponds into soils and groundwater. A minimum separation distance of 1.5m from the base of the ponds to groundwater will also be maintained. A water balance assessment was undertaken on the ponds, which shows that they can safely operate without overtopping in five, consecutive 90th percentile rainfall years. The leachate ponds have also been designed to have an operational capacity to cater for a 1-in-100-year, 24-hour storm event and in the event of a more significant storm event, will safely overtop into the Facility's stormwater drainage system to be further diluted prior to being released into the environment.

The layout for the SWLMS in Stage 1 is shown in Drawing C-106, while Drawing C-107 shows the layout of the SWLMS for Stage 2, available in Appendix A. A Surface Water and Leachate Management Plan was also prepared for the Facility and is presented in Appendix E. A Technical Specification and Construction Quality Assurance (CQA) Plan for the ponds and swales has been developed, and this is available in Appendix F.

5.7.8 Water Supply

C-Wise currently holds a Licence to take Water under Section 5C of the RIWI Act for the existing Nambeelup composting facility (Instrument No. GWL166732(2). The Licence to take Water (Water Licence) allows for the extraction of up to 350,000kL of water each year for the purposes of irrigation and compost production and soil blending.

C-Wise is seeking an amendment to the Water Licence so that it applies to both the existing Nambeelup composting facility and the Site. DWER have previously advised that an amended Water Licence can be issued once a signed lease agreement for the Site can be provided. The lease agreement is expected to be signed once the necessary environmental and planning approvals have been obtained for the Project and will be provided to the DWER once available.

5.8 Project Timeline

The current estimated Project Timeline for the delivery of the Stage 1 Facility is shown in Table 5-3. These timeframes may vary due to approval assessment periods and contractor timetables.

Construction of the Project will be undertaken in two stages and commissioned as each area is completed.

It is anticipated that construction of the Stage 2 development will commence approximately 24 months after operations of the Stage 1 development begin. A more accurate timeframe for the delivery of the Stage 2 development will be confirmed following completion of the Stage 1 construction works.

Table 5-3: Estimated Project Timeline

Stage	Duration	Start	End
DWER Assessment of Application	3 months	27/10/23	31/01/24
Stage 1 Construction	12 months	1/02/24	1/02/25
Critical Containment Report Preparation and Assessment	1 month	1/02/25	1/03/25
Stage 1 Operations under Time Limited Operations Period	180 days	1/03/25	28/08/25
Stage 2 Construction (Proposed)	12 months	1/03/27	1/03/28
Stage 2 Operations under TLO (Proposed)	180 days	1/03/28	28/08/28

5.9 Time Limited Operations

The Guideline: Industry Regulation Guide to Licencing (DWER, 2019) states that time limited operations (TLO) may be authorised under a Works Approval, the maximum period for which is 180 days. Once the DWER is satisfied the Project has been constructed in accordance with the Works Approval conditions and approved designs, C-Wise wishes to operate the Facility under TLO for the maximum allowable period of 180 days.

The proposed volume of waste to be accepted during the TLO period is outlined in Table 5-4.

Table 5-4: Waste Acceptance during Time Limited Operations Period

Category No.	Name	TLO Waste Acceptance	Normal Operations Waste Acceptance
61	Liquid waste facility	15,000 tonnes during TLO	30,000 tonnes per annual period
67A	Compost manufacturing and soil blending	50,000 tonnes during TLO	100,000 tonnes per annual period

6 Stakeholder Consultation

C-Wise recognises the importance of undertaking stakeholder consultation for the Project due to its significance in relation to the Waste Strategy targets and to provide stakeholders the opportunity to provide early input. In relation to the engagement, C-Wise and its Project Consultancy Team has engaged with both government bodies (including approval authorities) and the community. These actions are discussed in the following sections.

6.1 Government Bodies

Recognising the importance of early stakeholder input, C-Wise has undertaken extensive regulatory authority engagement for the Project since it was first proposed to the Department of Communities in 2019.

6.1.1 Department of Communities & Development WA

The Project was first submitted to the Department of Communities as a Registration of Interest (ROI) for the East Keralup – Southern Portion Development Opportunities in 2019 and C-Wise subsequently entered into an option to lease agreement with Development WA for the Site. At this stage, an Intent to Lease Agreement has been executed between C-Wise and Development WA. As per this agreement, Development WA will be provided with a copy of the Development Approval and supporting documentation for approval prior to submission to the Shire of Murray. As per standard practice, the final lease will take effect following receipt of the required approvals.

6.1.2 Department of Water and Environmental Regulation

C-Wise engaged with DWER on 13 June 2022 and held a scoping meeting to introduce the Project. DWER was represented by Hayden Nebel, Tracey Hassel, and Jarrod Abrahams. The potential environmental aspects were discussed in this meeting and it was suggested by DWER that the Department of Biodiversity, Conservation and Attractions (DBCA) should be engaged with due to the Site's proximity to wetlands and potential vegetation clearing requirements. DWER's information and specialist study requirements were also discussed in this meeting and it was determined that an Odour Impact Assessment would be required and that C-Wise should consider cumulative odour impacts of the transitional period between using its existing facility at Nambeelup and the proposed Carbon Recycling Facility. This meeting provided some early guidance that helped shape the siting and design of the Facility.

A second meeting was held with the DWER and DBCA on 26 April 2023, attended by Jarrod Abrahams and Hayden Nebel from the DWER. This meeting focused on the wetlands surrounding the Site and included discussions around wetland protection buffers, bushfire clearing, waste acceptance, leachate and stormwater management as well as groundwater protection and monitoring. This meeting helped shape the detailed design of the key environmental controls for the Facility.

C-Wise took the DWER's feedback onboard and held a final pre-submission meeting on 12 October 2023 with both the DWER and DBCA to present the updates to the Site designs. This meeting covered the increased wetland buffers, controlled groundwater level, and controls for the leachate and surface water ponds. The Community Engagement Strategy was also discussed and is outlined further in Section 6.2. Discussions were also focused on the tight project timelines including the approvals processing timeframe. Following this meeting, C-Wise progressed with finalising the Area Clearing Permit and Works Approval applications for submission.

6.1.3 Department of Biodiversity, Conservation and Attractions

As per the advice of DWER, C-Wise engaged with the DBCA regarding the Project and its proximity to wetlands on 26 April 2023. At the meeting with the DWER and DBCA, the DBCA were represented by Lyndon Mutter, Fiona Felton, and Kathy Bates. At this meeting, clearing and wetland protection buffers were discussed, particularly around the overlap between asset fire protection buffers and wetland protection buffers.

C-Wise implemented feedback from the DBCA, including a minimised clearing area, increased wetland protection buffers, and implementation of a wetland buffer fence. These updates were presented to the DBCA on 12 October 12 2023 at a meeting attended by Lyndon Mutter.

6.2 Community Engagement

C-Wise recognises the importance of engagement with the surrounding community for this Project. C-Wise has discussed the various community engagement processes to devise the final engagement strategy and activities. These activities are scheduled to occur in the coming weeks to ensure the local community has the ability to obtain information on the Project and provide feedback. The proposed community engagement process is summarised as follows:

1. Materials will be prepared to inform the community, and will be made available via an online website;
2. An online questionnaire will also be provided online to gather feedback from the community and provide a method for asking queries and providing feedback;
3. An open day will be held to allow the community and key stakeholders such as the DWER to attend and engage with C-Wise and Talis staff in person; and
4. A letter drop will occur to surrounding premises to inform them of the informative documentation, online feedback form and community open day.

A standalone community engagement report has been prepared to outline the community engagement works undertaken, summarise the feedback obtained received from both the online survey and during the open day, as well as C-Wise and its Project Consultancy team's response. The community engagement report also includes copies of all relevant information supplied and obtained during the community engagement process.

The community engagement report is presented in Appendix D.

7 Environmental Aspects and Management

There are a variety of environmental aspects that have been considered during the development of the Project. They key risks associated with the Project relate to clearing of vegetation, odour, leachate generation and surface and groundwater contamination. However, there are a variety of other environmental factors that warrant careful consideration to ensure that all potential impacts are controlled to appropriate standards.

The Organics Recycling Guideline has been considered during the development of the Project. Table 7-1 provides as summary of how the project complies with the Organics Recycling Guideline Better Practice Benchmarks.

Table 7-1: Organics Recycling Guideline Better Practice Benchmarks

Better Practice Benchmark	Environmental Performance Objective	Relevant Section(s)
Feedstocks	Undertake organics recycling using feedstocks that have a beneficial outcome for product quality.	Section 5.1
Emissions to Land and Water	Protect the environment by preventing and, where that is not possible, minimising emissions to land and water that may cause pollution or environmental harm.	Sections 7.1, 7.2, 7.7, and 7.11
Odour	Protect the environment by preventing and, where that is not possible, minimising odour emissions that may cause pollution or environmental harm.	Section 7.3
Point Source Emissions to Air	Protect the environment by preventing and, where that is not possible, minimising point source emissions to air that may cause pollution or environmental harm.	Section 7.3
Dust	Protect the environment by preventing and, where that is not possible, minimising dust emissions that may cause pollution or environmental harm.	Section 7.9
Noise	Protect the environment by preventing emissions of unreasonable noise and maintaining compliance with the assigned levels in the Environmental Protection (Noise) Regulations 1997 to prevent pollution and environmental harm.	Section 7.8
Emissions of Litter and Debris	Protect the environment by preventing, and where that is not possible, minimising emissions of litter and debris that may cause pollution or environmental harm.	Section 7.12
Fire Prevention and Management	Protect the environment by minimising the risk of fires occurring and be sufficiently prepared in the event of a fire to prevent and, where that is not possible, minimise pollution and environmental harm.	Section 7.6
Vectors	Protect the environment by minimising the risk of attraction, refuge, growth and spread of vermin and pests to prevent pollution and environmental harm.	Sections 7.5 and 7.9
Product Quality	Contaminants in feedstocks are treated effectively and recycled organic products are fit-for-purpose.	Section 5.6.7

7.1 Leachate

Leachate may be generated from the decomposition of the organic materials accepted at the Facility or by stormwater coming into contact with waste. If not adequately managed, leachate may contaminate soils, groundwater or surface water sources at or surrounding the Site. Leachate may also be generated via fire wash waters, which are discussed further in Section 7.7.

A Surface Water and Leachate Management Plan (SWLMP) has been developed for the Site, which outlines the approach to eliminating and reducing the generation of high-risk leachate, and the management and control of low-risk leachate. Where possible, surface water will be diverted from areas with the potential to generate leachate. Each stage will feature roofed processing areas to eliminate rainfall-driven generation of high-risk leachate, and hardstands and collection pits for the collection of high-risk leachates prior to transport to the tank farm for each stage.

Low-risk leachate is the main leachate generated at the Site, and this is collected via a number of HDPE-lined swales and directed to a low-risk leachate pond, lined with both HDPE and a GCL. These ponds have been sized to a 1-in-100-year, 24-hour rainfall event, and are designed to safely overtop via HDPE-lined swales into a surface water pond for further dilution prior to discharge to the environment in extreme rainfall events.

The proposed measures to minimise leachate generation and the potential for impacts to the environment include:

- A fully enclosed building is proposed for the receival building, with an internal concrete floor sloped to a leachate collection pit;
- The composting process areas are all roofed or fully enclosed within cocoons, with sidewalls to minimise rainfall intrusion and concrete hardstands falling toward leachate collection pits;
- All leachate collection pits are pumped out to a tank farm, with tanks arranged in banks of three and bunded to a capacity of 110% that of the volume of a single bank within the bund, in accordance with AS1940;
- Roofed areas will drain to a HDPE-lined surface water pond, sized for a 1-in-20-year, 24-hour storm event in accordance with the Organics Recycling Guideline;
- The external perimeter of all buildings and roof areas will slope away from any doors to prevent stormwater ingress;
- Low-risk leachate generated on hardstands will drain via HDPE-lined channels to leachate ponds;
- Low-risk leachate ponds are sized for a 1-in-100-year rainfall event, higher than the benchmark control within the Organics Recycling Guideline;
- Low-risk leachate ponds will be lined with HDPE and a GCL to minimise the likelihood of leaks;
- A controlled groundwater level has been developed for the Site to minimise the impact of fluctuating groundwater on the pond lining system, and to maintain a minimum groundwater separation;
- Regular inspections and a groundwater monitoring regime will be undertaken to identify any damage to the leachate management system;
- A SWLMP has been prepared for the Site and will be implemented during construction and operation; and
- During extreme rainfall events, the leachate ponds are designed to safely overtop into the surface water pond for further dilution prior to controlled release into the environment.

It is anticipated that these management measures will enable C-Wise to appropriately manage any leachate generated at the Site.

7.2 Surface Water

Precipitation on the Site will result in the generation of stormwater, which may lead to the formation of leachate if it comes into contact with waste materials. Excess surface water at the Site may result in flooding or overflow of contaminated surface water into the surrounding environment.

Surface water will be collected from the roofs of the Facility and other asphalted areas on which processing, and storage of compost or feedstocks does not occur. Surface water will drain from these areas to a HDPE-lined surface water pond.

The proposed measures for the management of surface water and the potential for impacts to the environment include:

- Roofed and asphalted areas graded away from leachate-generating areas to minimise leachate generation;
- A surface water pond lined with HDPE, sized for a 1-in-20-year, 24-hour storm event;
- An overflow channel to allow the safe overtopping of surface water during events larger than a 1-in-20-year, 24-hour storm event; and
- A SWLMP has been prepared for the Site and will be implemented during construction and operation.

It is anticipated that these management measures will enable C-Wise to appropriately manage any surface water generated at the Site.

7.3 Odour

Due to the acceptance and processing of organic waste material types at the Facility, odours will be generated. The generation of odours has the potential to reduce amenity, impacting personnel at the Site and potentially external sensitive receptors if odours are released to the environment.

It is recognised that any odours associated with the Facility are a key concern for DWER and surrounding residents. C-Wise therefore engaged Environmental and Air Quality Consulting (EAQ) to undertake an Odour Impact Assessment (OIA) to understand the potential odour impacts from the Project. EAQ also provided input into the design of the Project and organic process with an aim to eliminate and mitigate odour emissions as far as practicable. The OIA was completed in accordance with the Guideline: Odour Emissions (DWER, 2019) (Odour Guideline) and compared the predicted odour footprint of the Facility to the odour footprint from C-Wise's existing Nambeelup composting facility. The OIA considered both Stage 1 and Stage 2 developments, as well as the progressive closing of the existing Nambeelup composting facility.

To mitigate risks associated with odour, the Project will capture and either re-use or treat the primary odour emissions from the composting activities. The re-use will involve the odours being extracted from the covered composting cocoons and the airstream recirculated back into the MAF system to be used as aeration. The aeration of the odours will be treated within the composting piles. Importantly, the nearest sensitive receptor (rural residence) is approximately 2.57km southeast of the Development Footprint. According to the Odour Guideline, the recommended screening distances for a Category 61 Prescribed Premises is 1,000m and is on a case-by-case basis for a >50,000 tonne per annum (tpa) Category 67A Prescribed Premises with outdoor covered windrows and continuous

aeration. As a result of the separation distance from the Site to the nearest sensitive receptor, the risk of impacts from odours generated at the Site is considered to be low.

Despite this significant separation distance, C-Wise has also designed a process where odour is controlled and minimised to further limit potential risks to amenity. FOGO materials accepting and pre-treatment occurs indoors in the enclosed receival building, which will include a mechanical ventilation system to meet a minimum four air changes per hour to mitigate odour concentrations. The initial stage of the composing process will occur under a cocoon system, which will contain odours during the most volatile stage of the process. Air will be removed from the cocoons and be pumped through compost in subsequent stages of the process, minimising odours generated by a 'biofilter' effect.

The OIA found that, as a result of these controls and the re-use or treatment of the primary odour emissions, the odour footprint from the Project will not be of the same magnitude as the existing C-Wise activities to the south of the Site. Therefore, the cumulative odour footprint arising from the Stage 1 development is unlikely to increase the odour risk profile from existing and proposed C-Wise composting activities. It was concluded in the OIA that the Project, once finalised, will reduce the total odour footprint of C-Wise's operation.

C-Wise will implement the following management measures to ensure that odour emissions are minimised as far as practicable:

- Highly putrescible organic materials such as FOGO, which will generate the most odour emissions, will be processed in an enclosed composting system;
    - Less putrescible organic materials that produce fewer odour emissions, such as greenwaste, will be stored in the carbon storage area.
- Organic materials will be delivered to the receival building for initial inspection, which is enclosed and roofed to minimise potential odour releases;
    - The receival building will include doors that will be kept closed at all times when waste is not being delivered.
    - The receival building will also operate with a 'clean floor' policy, with all received wastes removed by the end of each working day.
- The initial composting stage will occur in the cocoons, which will be fully enclosed. Odorous air will be extracted from the cocoon process and used in the MAF processing area which will provide a biofilter effect;
- The use of the MAF system during the pasteurisation phase will reduce odour emissions through the continuous operation of windrows;
- The MAF and final maturation areas will be roofed to provide optimal processing conditions to mitigate the potential for odour emissions arising from poor maturation;
- Liquid waste accepted at the Site will be stored in enclosed tanks, which will minimise potential odour emissions;
- Vehicles transporting waste materials to the Site and compost products away from the Site will be required to be covered at all times; and
- A complaints register will be maintained and, in the event that a complaint is received, C-Wise will investigate the source and implement appropriate management controls.

7.4 Vegetation

As discussed in Section 4.10, much of the Site has been historically cleared for agricultural uses and the remaining vegetation is in relatively poor condition. The Facility has been sited and designed to minimise the extent of clearing required, as well as prioritise the protection of vegetation in Good or better condition. Approximately 45.51ha of vegetation is required to be cleared for the Project, which includes:

- 39.28ha of Degraded to Completely Degraded vegetation, 31.90% of this vegetation condition type within the Site;
- 4.23ha of Degraded vegetation, 11.77% of this vegetation condition type within the Site; and
- 2.00ha of Degraded to Good vegetation, 7.31% of this vegetation condition type within the Site.

Importantly, no vegetation in Good or better condition will be cleared to establish the Facility or any ancillary infrastructure.

C-Wise recently submitted an application for an Area Clearing Permit for the Facility to DWER under Section 51E of the EP Act, which included the maximum extent of clearing required to establish both Stage 1 and Stage 2 developments.

C-Wise will aim to minimise impacts from clearing through the application of the following management methods:

- Prior to disturbance activities, the clearing and disturbance area will be demarcated. The clearance and disturbance area will be defined using high visibility tape and or spray paint where suitable to ensure operators undertake activities within the clearing boundary;
- Avoid, minimise and reduce the impact of clearing as far as practicable;
- Clearing to be undertaken in a progressive manner to allow fauna to move into adjacent native vegetation ahead of clearing; and
- Undertake measures to minimise the spread of any introduced species within the Site.

7.5 Weeds

The activities of the Project, as well as vehicle movements to and from the Facility, have the potential to result in the spread of weeds, particularly during construction when a higher volume of vehicle movements will occur. There is a potential for weeds to be spread to the wetlands present within and surrounding the Facility if not appropriately managed.

C-Wise has an existing Weed Management Procedure (WMP) for the Nambeelup composting facility, which has been effectively used to manage weeds at that Facility. C-Wise intends to apply the management measures outlined in the WMP to the Facility. A variety of environmental management measures to manage, mitigate and control the potential impacts of weeds at the Facility will be implemented; including the following:

- The main operational areas of the Facility will consist of hardstands or roads, limiting the ability for weeds to grow and spread;
- Vehicles will be required to adhere to existing roads and tracks to minimise the risk of encountering weed seeds or spreading weeds offsite;

- A fence and firebreak between the Development Footprint and surrounding wetlands will be established and maintained, providing physical barriers and significant distance between the Facility and surrounding environment, limiting the potential for weeds to be spread from the Site;
- Regular monitoring for the presence of weeds at the Facility and its surrounds during both construction and operation;
- Where practicable, contractors entering the Site will be required to hold appropriate hygiene certificates relating to weed management;
- Staff inductions will include weed hygiene training and education on environmental impacts relating to the introduction or spread of weeds; and
- Spot sprays will be applied to weeds as required.

It is anticipated that these management measures will enable C-Wise to appropriately manage potential weed impacts relating to the Project. C-Wise will update the existing WMP to include the Facility which will be reviewed periodically to ensure its appropriateness.

7.6 Fire

Fires may occur at the Facility during the composting process, if not managed appropriately. or through faulty equipment, machinery, or arson. In addition, the Site in located within a bushfire prone area and is at risk of being impacted by bushfires originating offsite. Fire may cause damage to infrastructure and pose a threat to staff. Bushfire Prone Planning (BPP) was engaged to prepare a suite of documents to address bushfire risks and emergency procedures. These include:

- Bushfire Management Plan (BMP);
- Bushfire Emergency Plan (BEP); and
- Bushfire Risk Management Plan (BMRP).

These documents are currently being prepared and will be provided to Shire of Murray and the Department of Fire and Emergency Services (DFES) as part of the planning approval for the Project.

Though the specific fire-fighting measures for the Site will be addressed as part of the planning approval for the project, buildings at the Site will comply with the relevant guidelines and codes for fire management at industrial waste-management facilities. Therefore, the management measures to mitigate the risk of fires will include:

- Smoke detectors will be installed in buildings in accordance with relevant standards;
- Fire extinguishers will be located in appropriate locations around the Facility;
- Fire hose reels will be located at all buildings and accessible at all times;
- All prevention/mitigation equipment will be kept in good working order, clearly signed and tested in accordance with the manufacturer's specifications;
- Staff will be adequately inducted and trained to respond to fire and smoke; and
- A Site emergency response procedure and evacuation procedure will be developed.

The proposed controls are anticipated to be sufficient to effectively manage any risks relating to fires at the Facility.

7.7 Fire Wash Water

In the unlikely event that a fire occurs at the Facility, fire wash waters used by firefighting agencies can cause environmental harm, and the management of these waters should be considered. The following management measures have been considered for addressing the management of fire wash waters:

- Concrete, asphalt and crushed limestone hardstands have been implemented in all processing areas at the Facility to minimise any fire wash waters from entering the soils at the Site;
- Hardstands and processing areas feature minimum 1:100 falls towards leachate collection pits and leachate ponds around the Facility for low-risk leachate areas and 1:80 falls for high-risk leachate areas, which will capture any runoff generated by fire wash waters;
- Drains at the Site are connected to appropriate drainage infrastructure, such as leachate pond or surface water pond, minimising the likelihood of fire wash waters entering the environment without detention; and
- The highest risk area for fires, the receival building wherein FOGO will be initially received, is fully enclosed to further mitigate the risk of any fire wash waters contaminating other areas of the Facility.

It is anticipated that these measures will appropriately enable C-Wise to manage the risk associated with fire wash water generation at the Facility.

7.8 Noise

Noise emissions generated from the Project may reduce amenity or impact personnel operating the Facility. Emissions will predominantly be generated from the construction of the Facility the movement of vehicles during construction and operations and the processing of materials.

The Facility is approximately 2.56km from the nearest sensitive receptor, which is greater than the minimum recommended separation distance for the Facility (Table 4-1). Given this, sensitive receptors near the Site are not expected to be impacted by noise generated at the Site. To further minimise the risk of noise impacts, the following management measures will be implemented:

- The key operational areas where composting will take place are roofed, which will minimise potential for noise impacts to nearby receptors;
- All C-Wise-operated trucks and mobile equipment to be fitted with broadband noise reversing alarms to minimise the impact from vehicle reversing alarms;
- Speed limit controls will be adopted across the Site which will be signposted at appropriate locations including the entrance;
- Noise-generating activities outside enclosed areas will be periodic and generally limited to daylight hours, including movement of material around the Facility by front-end loader, traffic movement in and out of the Facility, and screening of product in the screening and dispatch area;
- All equipment and plant will be maintained in good working condition;
- Staff and visitors will be provided with appropriate PPE, as required, to mitigate any noise impacts associated with construction and operation; and
- Operation of the Project will comply with the assigned levels within the *Environmental Protection (Noise) Regulations 1997* (Noise Regulations).

As a result of these management measures, it is anticipated that the risks associated with noise emissions can be adequately managed and ensure compliance with the Noise Regulations.

7.9 Dust

There is the potential for dust generation during the construction and operational stages of the Project. The potential impacts from exposure to the dust that is generated during construction activities includes reduced visual amenity, eye and respiratory irritation and impacts to nearby vegetation. Reduced visual amenity from dust can lead to safety risks or cause general nuisance to personnel, visitors and surrounding land users. Inhalation of dust may result in respiratory impacts such as couching and eye and lung irritation. Dust emissions may result in impacts to nearby vegetation through dust settlement on plants, impacting their ability to photosynthesise.

A number of operational management measures to mitigate the potential for dust generation and potential impacts are proposed. These controls will include:

- All waste and final product loads will be covered during transport to and from the Site;
- Mobile water carts will be used as required during construction and operation to suppress potential dust emissions;
- Hardstand or sealed roads throughout the Site, which will significantly reduce dust generation;
- Speed limit controls will be adopted across the Site, which will be signposted at appropriate locations including the entrance;
- Operators and visitors will use appropriate PPE as required to manage potential impacts from dust emissions; and
- A complaints register will be maintained to record and respond to any complaints regarding dust generated at the Site.

It is anticipated that these management measures will enable C-Wise to appropriately manage potential impacts relating to dust.

7.10 Vermin and Feral Animals

Vermin such as rats, mice, birds and insects may be attracted to waste management facilities, particularly those that handle putrescible waste. If uncontrolled, vermin and feral animals can present a health risk and be a nuisance to staff and surrounding land users.

The management measures proposed to mitigate the potential for impacts relating to feral animals and vermin include:

- All waste and final product loads will be covered during transport to and from the Site, reducing the potential for organic materials to be scattered across the Site which may attract vermin and feral animals;
- The receival building will operate with a clean floor policy, with all waste materials removed by the end of each day;
- Receival, treatment and initial processing of putrescible FOGO waste to occurring indoors, in undercover or sealed areas;
- Regular washdown of the compost processing areas to reduce unintended build-up of organic wastes;

- A fence between the Development Footprint and surrounding wetlands will be established and maintained, limiting the potential for large vermin and feral animals to enter the Site;
- Any suspect and/or known shelters or breeding grounds for vermin will be managed appropriately; and
- In the event that a population of vermin or feral animals becomes problematic, C-Wise will engage a qualified pest control contractor to implement appropriate management measures.

It is anticipated that these management measures will enable C-Wise to appropriately manage potential impacts relating to feral animals and vermin.

7.11 Acid Sulfate Soils

Acid Sulfate Soils (ASS) are naturally occurring soils that contain iron sulphide (iron pyrite) minerals that, if disturbed by soil excavation, dewatering or drainage, can then oxidise resulting in the release of contaminants and potentially cause environmental impacts.

A review of the PGM indicates that the entire Site is located in an area with a moderate to low risk of ASS and a small portion in the southeast corner of the Site has a high to moderate risk. The development of the Facility has been located as far from mapped Acid Sulfate Soils as possible as a primary control, and earthworks below the permanent low water table have been eliminated where possible.

In the event that ASS are encountered during construction, appropriate management measures will be undertaken in accordance with the DWER's guideline Treatment and Management of Soil and Water in Acid Sulfate Soil Landscapes (DWER, 2015) (ASS Guideline).

7.12 Litter

Litter may be generated if feedstocks are contaminated or as a result of waste acceptance and handling, particularly during windy conditions. As well as reducing visual amenity and causing health problems to wildlife, litter can attract vermin to the Site, which may affect surrounding land uses if these vermin to migrate offsite.

To ensure that the generation of litter is minimised and appropriately managed at the Site, the following management measures will be implemented:

- Waste materials will be received in the receival building, which is enclosed and roofed, minimising the risk of litter being blown across the Site;
- Waste loads will be inspected in the receival building to ensure that there is minimal to no contamination present;
- Regular washdown of operational areas to reduce unintended build-up of litter;
- A fence between the Development Footprint and surrounding wetlands will be established and maintained, limiting the potential for litter to escape from the Site into the wetlands; and
- Any litter generated around and immediately outside the Site will be collected on a regular basis.

These management measures are expected to enable C-Wise to appropriately manage any litter generated at the Site.

7.13 Security

A breach of security of the Site may result in injury to trespassers should interaction with plant and equipment occur. The management measures proposed to minimise security risks include:

- Appropriate warning signs and gates will be installed at the Site entrance;
- A front gate will be installed at the Site entrance and will be locked outside of operational hours;
- All buildings will be locked outside operating hours; and
- All access gates will be locked securely outside of main operational hours.

It is anticipated that these management measures will enable C-Wise to appropriately manage potential security risks.

8 Residual Risk Assessment

The objective of the Residual Risk Assessment is to ensure the potential environmental and social risks associated with the proposed activities are understood and managed appropriately to ensure that there is no unacceptable residual risk. The risk assessment was undertaken in accordance with the Guideline: Risk Assessments (DWER, 2017).

8.1 Sources of Hazards

For the purpose of this assessment, a source is defined as a primary risk with the potential to cause significant contamination or harm to the environment. With regards to the environment and public health, sources and the potential hazards which may arise from the Project have been identified and outlined in Table 8-1.

Table 8-1: List of Potential Hazards

Source	Description of Hazards
Leachate	Leachate may be generated as a result of the decomposition of organic waste at the Site or if clean stormwater comes into contact with waste materials or areas where waste has been held.
Stormwater	Excessive stormwater that is not properly managed can lead to flooding onsite. Stormwater that comes into contact with waste or an area that holds waste is classified as leachate.
Odour	Odours generated from the processing of organic waste can cause impacts to amenity on and off site.
Vegetation	Clearing of vegetation may result in impacts to fauna and the surrounding environment.
Weeds	Weeds have the potential to migrate from the Facility and impact surrounding flora.
Fire	Organic materials undergoing the composting process may ignite, or fires may be caused by faulty equipment, mobile machinery or arson.
Fire Wash Water	Chemicals used in firefighting can cause harm if released into the environment during fire-fighting operations.
Noise	Noise emissions can reduce amenity onsite and for nearby sensitive receptors.
Dust	Dust generated during construction works and operational activities can result in reduced visual amenity, cause respiratory issues or other dust impacts.
Vermin and Feral Animals	Food waste can attract vermin and feral animals which may cause nuisance and present health risks.
Acid Sulfate Soils	Disturbance of ASS may result in release of heavy metals or other contaminants to the environment.
Litter	Windblown litter can cause impact to visual amenity, cause impact to wildlife and attract vermin to the Site.

Source	Description of Hazards
Security	Unauthorised personnel may enter the Site resulting in security risks to infrastructure, equipment and staff.

8.2 Pathways for Hazards

For the purpose of this assessment, a pathway for a hazard is defined as the route by which potential emission, contamination or harm can migrate. The key migration pathways generally include the following:

- Air, through which lightweight materials, such as dust, litter, odour emissions can travel;
- Surface, along which the sources of contamination or harm can travel or be present at (e.g. surface water runoff, litter, persons walking or working over the surface); and
- Sub-surface, whereby the underlying soils, bedrock, aquifers, and infrastructure permit stormwater or leachate migration towards the groundwater.

For the purpose of this assessment, a receptor is defined as the location where the impact of the emissions, contamination or harm is registered/received. The possible receptors of the contamination or harm caused by the identified hazards are summarised in Table 8-2.

Table 8-2: Receptors

Receptor	Description of the Receptor
Site Users	• Persons authorised to access the Site, including: o Delivery and collection personnel; o Operational staff; o Contractors carrying out maintenance or monitoring; and o Visitors.
Infrastructure and Plant	• Buildings and plants onsite; and • Surrounding infrastructure.
Surrounding Land Users	• People who work or live beyond the boundary of the Site.
Surface Water	• Surface water bodies surrounding the Site such as wetlands and dams.
Groundwater	• Shallow groundwater that exists beneath the Site.
Soils	• Soils within and surrounding the Site.
Flora	• Flora on and surrounding the Site.
Fauna	• Fauna residing within, or adjacent to the Site.

8.3 Risk Rating Matrix

To assess the various risks, the potential hazards identified in Table 8-1 were classified according to the Guideline: Risk Assessments (DWER, 2017), as shown in Table 8-3.

Table 8-3: Risk Rating Matrix

		Consequence				
		Slight	Minor	Moderate	Major	Severe
Probability	Almost Certain	Moderate	High	High	Extreme	Extreme
	Likely	Moderate	Moderate	High	High	Extreme
	Possible	Low	Moderate	Moderate	High	Extreme
	Unlikely	Low	Moderate	Moderate	Moderate	High
	Rare	Low	Low	Moderate	Moderate	High

8.4 Risk Profile

Risk management measures refers to the key management strategies as outlined within Section 7 that will be implemented to ensure that all hazards, and potential risks identified, are controlled to an appropriate level, and that strategies are in place to react to any potential incidents or accidents. In all cases these risk management measures decrease the probability and/or consequence of identified hazards and therefore lower the risk rating. The current risk rating and revised probability and consequence for each identified hazard following the implementation of management measures for the Project are shown in Table 8-4.

Through the adoption of the management measures are outlined with this EAMP, all potential risks can be managed to risk ratings of moderate and low. All recycling and waste infrastructure have inherent risk associated with their design and operation. In addition, surrounding land use is a key factor in determining the risk profile of operations, and the distance to receptors. This is widely recognised and is why these facilities are regulated pursuant to Part V of the EP Act.

The siting and design of the Facility means that many key risks associated with operations are considered as low in relation to potential impacts on surrounding receptors, even without the comprehensive suite of better-practice controls that C-Wise propose to implement.

Where a moderate residual risk remains, such as for the management of leachate, fire, fire wash water and weeds, a comprehensive suite of environmental management measures have been implemented, which often exceed the requirements of the Organics Recycling Guideline. The likelihood of the risk occurring is significantly reduced by implementing these measures, however the residual risk remains at moderate more associated with the consequence of these risks occurring as opposed to the likelihood.

Table 8-4: Residual Risk Assessment

Source	Receptor	Pathway	Risk	Probability	Consequence	Risk Rating	Management Measures	Revised Probability	Revised Consequence	Revised Risk Rating
Leachate	Groundwater and Soils	Sub-surface	Leachate can ingress into the groundwater if not appropriately captured	Likely	Major	High	• A fully enclosed building is proposed for the receival building, with an internal concrete floor sloped to a leachate collection pit; • The composting process areas are all roofed or fully enclosed within cocoons, with sidewalls to minimise rainfall intrusion and concrete hardstands falling toward leachate collection pits; • All leachate collection pits are pumped out to a tank farm, with tanks arranged in banks of three and bunded to a capacity of 110% that of the volume of a single bank within the bund, in accordance with AS1940; • Roofed areas will drain to a HDPE-lined surface water pond, sized for a 1-in-20-year, 24-hour storm event in accordance with the Organics Recycling Guideline; • The external perimeter of all buildings and roof areas will slope away from any doors to prevent stormwater ingress; • Low-risk leachate generated on hardstands will drain via HDPE-lined channels to leachate ponds; • Low-risk leachate ponds are sized for a 1-in-100-year rainfall event, higher than the benchmark control within the Organics Recycling Guideline; • Low-risk leachate ponds will be lined with HDPE and GCL to minimise the likelihood of leaks; • A controlled groundwater level has been developed for the Site to minimise the impact of fluctuating groundwater on the pond lining system, and to maintain a minimum groundwater separation; • Regular inspections and a groundwater monitoring regime will be undertaken to identify any damage to the leachate management system; • A SWLMP has been prepared for the Site and will be implemented during construction and operation; and • During extreme rainfall events, the leachate ponds are designed to safely overtop into the surface water pond for further dilution prior to controlled release into the environment.	Rare	Major	Moderate
	Surface Water and Flora	Surface	Leachate can flow overland toward adjacent wetlands if not appropriately managed.							
Surface Water	Site Infrastructure	Surface	Surface water that is not properly managed can lead to flooding onsite resulting in damage to infrastructure.	Unlikely	Major	Moderate	• Roofed and asphalted areas graded away from leachate-generating areas to minimise leachate generation; • A surface water pond lined with HDPE, sized for a 1-in-20-year, 24-hour storm event; • An overflow channel to allow the safe overtopping of surface water during events larger than a 1-in-20-year, 24-hour storm event; and • A SWLMP has been prepared for the Site, and will be implemented during construction and operation.	Rare	Minor	Low

Source	Receptor	Pathway	Risk	Probability	Consequence	Risk Rating	Management Measures	Revised Probability	Revised Consequence	Revised Risk Rating
Odour	Site Users and Surrounding Land Users	Air	Waste streams that are accepted onsite can produce strong odours and impact amenity. Leachate generation can result in unpleasant odours.	Possible	Moderate	Moderate	• Highly putrescible organic materials such as FOGO, which will generate the most odour emissions, will be processed in an enclosed composting system; o Less putrescible organic materials that produce fewer odour emissions, such as greenwaste, will be stored in the carbon storage area. • Organic materials will be delivered to the receival building for initial inspection, which is enclosed and roofed to minimise potential odour releases; o The receival building will include doors that will be kept closed at all times when waste is not being delivered. o The receival building will also operate with a 'clean floor' policy, with all received wastes removed by the end of each working day. • The initial composting stage will occur in the cocoons, which will be fully enclosed. Odorous air will be extracted from the cocoon process and used in the MAF processing area which will provide a biofilter effect; • The use of the MAF system during the pasteurisation phase will reduce odour emissions through the continuous operation of windrows; • The MAF and final maturation areas will be roofed to provide optimal processing conditions to mitigate the potential for odour emissions arising from poor maturation; • Liquid waste accepted at the Site will be stored in enclosed tanks, which will minimise potential odour emissions; • Vehicles transporting waste materials to the Site and compost products away from the Site will be required to be covered at all times; and • A complaints register will be maintained and in the event that a complaint is received, C-Wise will investigate the source and implement appropriate management controls.	Unlikely	Slight	Low
Vegetation	Onsite Flora	Surface	Clearing of vegetation will impact onsite flora in clearing areas.	Almost Certain	Moderate	High	• Prior to disturbance activities, the clearing and disturbance area will be demarcated. The clearance and disturbance area will be defined using high visibility tape and or spray paint where suitable to ensure operators undertake activities within the clearing boundary; • Avoid, minimise and reduce the impact of clearing as far as practicable; • Clearing to be undertaken in a progressive manner to allow fauna to move into adjacent native vegetation ahead of clearing; and • Undertake measures to minimise the spread of any introduced species within the Site. •	Almost Certain	Unlikely	Low
Weeds	Onsite and Offsite Flora	Surface & Air	Weeds and weed seeds distributed by air can cause harm to surrounding environments,	Likely	Moderate	High	• The main operational areas of the Facility will consist of hardstands or roads, limiting the ability for weeds to grow and spread; • Vehicles will be required to adhere to existing roads and tracks to minimise the risk of encountering weed seeds or spreading weeds offsite;	Unlikely	Minor	Moderate

Source	Receptor	Pathway	Risk	Probability	Consequence	Risk Rating	Management Measures	Revised Probability	Revised Consequence	Revised Risk Rating
			including onsite and offsite wetlands.				• A fence and firebreak between the Development Footprint and surrounding wetlands will be established and maintained, providing physical barriers and significant distance between the Facility and surrounding environment, limiting the potential for weeds to be spread from the Site; • Regular monitoring for the presence of weeds at the Facility and its surrounds during both construction and operation; • Where practicable, contractors entering the Site will be required to hold appropriate hygiene certificates relating to weed management; • Staff inductions will include weed hygiene training and education on environmental impacts relating to the introduction or spread of weeds; and • Spot sprays will be applied to weeds as required.			
Fire	Site Users and Site Infrastructure	Surface	Risk of fires onsite from faulty equipment or waste creating risk to personnel and infrastructure.	Possible	Severe	Extreme	• Smoke detectors will be installed in buildings in accordance with relevant standards; • Fire extinguishers will be located in appropriate locations around the Facility; • Fire hose reels will be located at all buildings and accessible at all times; • All prevention/mitigation equipment will be kept in good working order, clearly signed and tested in accordance with the manufacturer's specifications; • Staff will be adequately inducted and trained to respond to fire and smoke; and • A Site emergency response procedure and evacuation procedure will be developed.	Rare	Major	Moderate
Fire Wash Water	Groundwater and Soils	Sub-surface	Fire wash waters can ingress into the groundwater if not appropriately captured	Likely	Major	High	• Concrete, asphalt and crushed limestone hardstands have been implemented in all processing areas at the Facility to minimise any fire wash waters from entering the soils at the Site; • Hardstands and processing areas feature minimum 1:100 falls towards leachate collection pits and leachate ponds around the Facility for low-risk leachate areas and 1:80 falls for high-risk leachate areas, which will capture any runoff generated by fire wash waters; • Drains at the Site are connected to appropriate drainage infrastructure, such as the leachate pond or surface water pond, minimising the likelihood of fire wash waters entering the environment without detention; and • The highest risk area for fires, the receival building wherein FOGO will be initially received, is fully enclosed to further mitigate the risk of any fire wash waters contaminating other areas of the Facility.	Rare	Major	Moderate
	Surface water and Flora	Surface	Fire wash waters can flow overland toward adjacent wetlands if not appropriately managed.							
Noise	Site Users and Surrounding Land Users	Air	Noise impacts form activities onsite can impact Site users and nearby receptors.	Possible	Minor	Moderate	• The key operational areas where composting will take place are roofed, which will minimise potential for noise impacts to nearby receptors; • All C-Wise operated trucks and mobile equipment to be fitted with broadband noise reversing alarms to minimise the impact from vehicle reversing alarms;	Unlikely	Slight	Low

Source	Receptor	Pathway	Risk	Probability	Consequence	Risk Rating	Management Measures	Revised Probability	Revised Consequence	Revised Risk Rating
							• Speed limit controls will be adopted across the Site which will be signposted at appropriate locations including the entrance; • Noise-generating activities outside enclosed areas will be periodic and generally limited to daylight hours, including movement of material around the Facility by front-end loader, traffic movement in and out of the Facility, and screening of product in the Screening and Dispatch area; • All equipment and plant will be maintained in good working condition; • Staff and visitors will be provided with appropriate PPE, as required, to mitigate any noise impacts associated with construction and operation; and • Operation of the Project will comply with the assigned levels within the Noise Regulations.			
Dust	Site Users	Air	Visibility may be impaired and inhalation of dust may occur during construction activities.	Likely	Slight	Moderate	• All waste and final product loads will be covered during transport to and from the Site; • Mobile water carts will be used as required during construction and operation to suppress potential dust emissions; • Hardstand or sealed roads throughout the Site, which will significantly reduce dust generation; • Speed limit controls will be adopted across the Site, which will be signposted at appropriate locations including the entrance; • Operators and visitors will use appropriate PPE as required to manage potential impacts from dust emissions; and • A complaints register will be maintained to record and respond to any complaints regarding dust generated at the Site.	Unlikely	Slight	Low
Vermin and Feral Animals	Site Users	Surface	Organic waste can attract vermin, presenting health risks, reduced amenity and annoyance.	Likely	Minor	Moderate	• All waste and final product loads will be covered during transport to and from the Site, reducing the potential for organic materials to be scattered across the Site which may attract vermin and feral animals; • The receival building will operate with a clean floor policy, with all waste materials removed by the end of each day; • Receival, treatment and initial processing of putrescible FOGO waste to occurring indoors, in undercover or sealed areas; • Regular washdown of the compost processing areas to reduce unintended build-up of organic wastes; • A fence between the Development Footprint and surrounding wetlands will be established and maintained, limiting the potential for large vermin and feral animals to enter the Site; • Any suspect and/or known shelters or breeding grounds for vermin will be managed appropriately; and • In the event that a population of vermin or feral animals becomes problematic, C-Wise will engage a qualified pest control contractor to implement appropriate management measures.	Unlikely	Slight	Low

Source	Receptor	Pathway	Risk	Probability	Consequence	Risk Rating	Management Measures	Revised Probability	Revised Consequence	Revised Risk Rating
Acid Sulfate Soils	Soils and Groundwater	Surface	Disturbance of ASS may result in release of heavy metals or other contaminants to the environment.	Unlikely	Major	Moderate	• In the event that ASS are encountered during construction, appropriate management measures will be undertaken in accordance with the DWER's ASS Guideline.	Unlikely	Slight	Low
Litter	Fauna & Site Users	Surface & Air	Windblown litter can cause visual amenity issues, and cause harm to fauna.	Likely	Slight	Moderate	• Waste materials will be received in the receival building, which is enclosed and roofed, minimising the risk of litter being blown across the Site; • Waste loads will be inspected in the receival building to ensure that there is minimal to no contamination present; • Regular washdown of operational areas to reduce unintended build-up of litter; • A fence between the Development Footprint and surrounding wetlands will be established and maintained, limiting the potential for litter to escape from the Site into the wetlands; and • Any litter generated around and immediately outside the Site will be collected on a regular basis.	Unlikely	Slight	Low
Security	Site Users and Site Infrastructure	Surface	Unauthorised personnel may enter the Site resulting in security risks to facilities, equipment and staff.	Possible	Moderate	Moderate	• Appropriate warning signs and gates will be installed at the Site entrance; • A front gate will be installed at the Site entrance and will be locked outside of operational hours; • All buildings will be locked outside operating hours; and • All access gates will be locked securely outside of main operational hours.	Unlikely	Minor	Low

9 Conclusion

C-Wise is seeking approval to construct a new Carbon Recycling Facility to compost a range of organic materials into a high-quality compost product. The Project has attracted significant government investment and will support a circular economy and the implementation of a FOGO collection service in Perth and Peel, as outlined within the Waste Strategy 2030.

The key potential environmental aspects and risks associated with the construction and operation of the Facility include:

- Leachate;
- Surface Water;
- Odour;
- Vegetation;
- Weeds;
- Fire;
- Fire Wash Water;
- Noise;
- Dust;
- Vermin and Feral Animals;
- Acid Sulfate Soils;
- Litter; and
- Security.

The current conceptual design of the Facility and operational management measures have been developed to ensure that these risks and potential impacts are managed appropriately. The overall risk of these potential impacts, once the proposed management measures are implemented, is low or moderate. The environmental management controls within this document will be further refined when detailed designs are prepared by a contractor engaged by C-Wise through a Design and Construct contract.

Several benefits are associated with the Project, including alignment with the Waste Strategy 2030 and increasing resource recovery. The Project will support the headline strategy for local governments in the Perth and Peel regions to provide a consistent three bin kerbside collection system through additional FOGO processing capacity, which will also assist in reducing environmental impacts cause by landfilling as materials are diverted. The Carbon Recycling Facility will also provide employment opportunities during construction and operation.

Based on the infrastructure and operational measures outlined within this EAMP, Talis and C-Wise believe that the construction and operation of the Project can be achieved in a manner that ensures that any potential impacts can be managed to appropriate standards.

10 References

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Figure 11: Vegetation Units

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Figure 15: Threatened Ecological Communities and Conservation Reserves

Figure 16: Aboriginal Cultural Heritage

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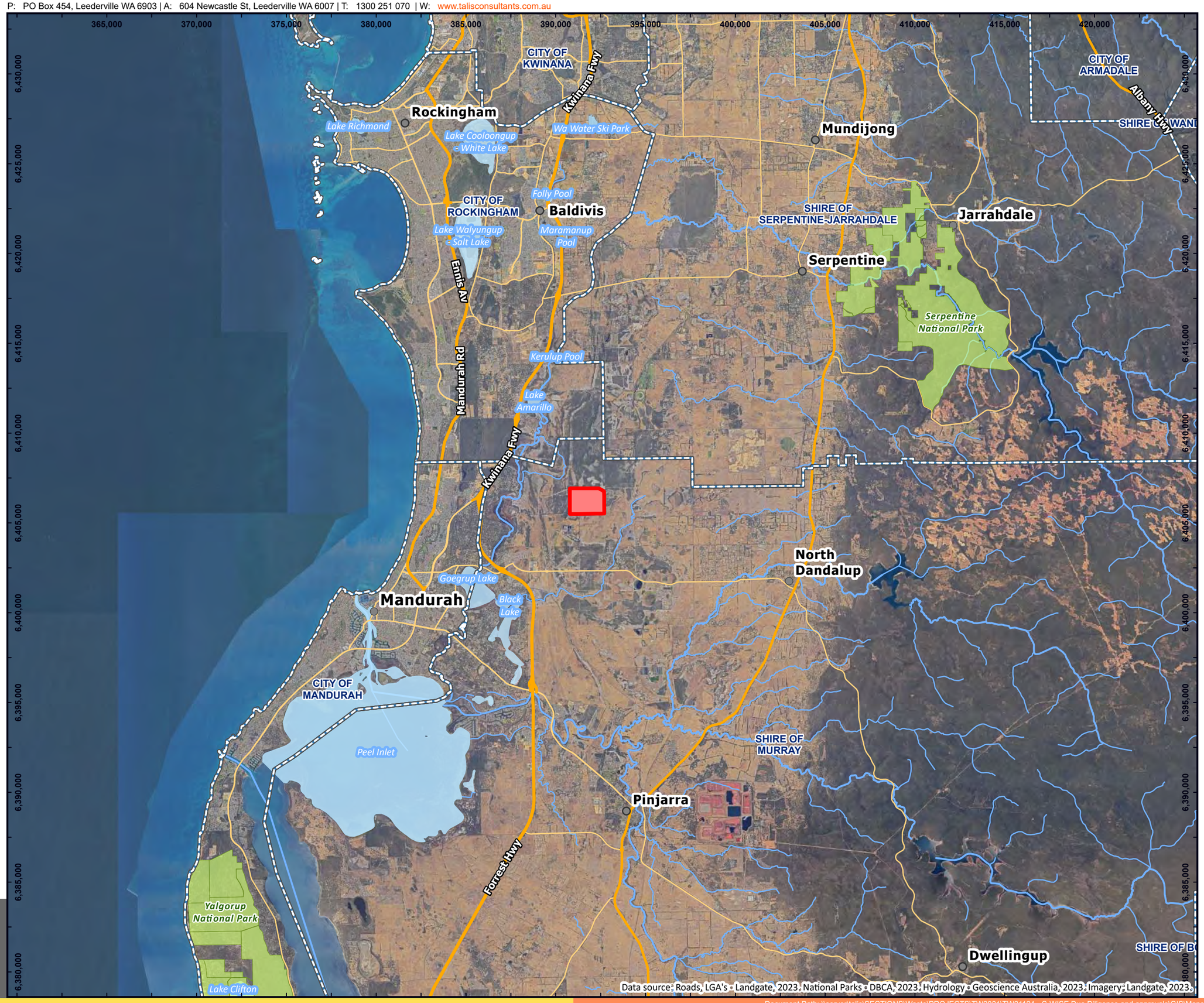


LEGEND

- Site Boundary
- Local Government Area
- National Park

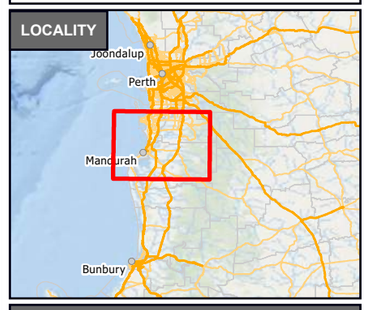
Hydrography

- Lakes
- Major Watercourse
- Minor Watercourse

Western Australian Roads

- Freeway / Highway
- Main Road

LOCALITY



0 50 100 150 200 250 km

LOCALITY

Environmental Assessment and Management Plan

C-Wise
320 Gull Road
Keralup WA 6182

N 0 2 4 6 8 Km

Coordinate System: GDA2020 MGA Zone 50
Scale @ A3: 1:200,000

Prepared:	E Jackson	Date:	11/10/2023
Reviewed:	T Hunter	Revision:	A
Project:	TW21124		

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Figure 01

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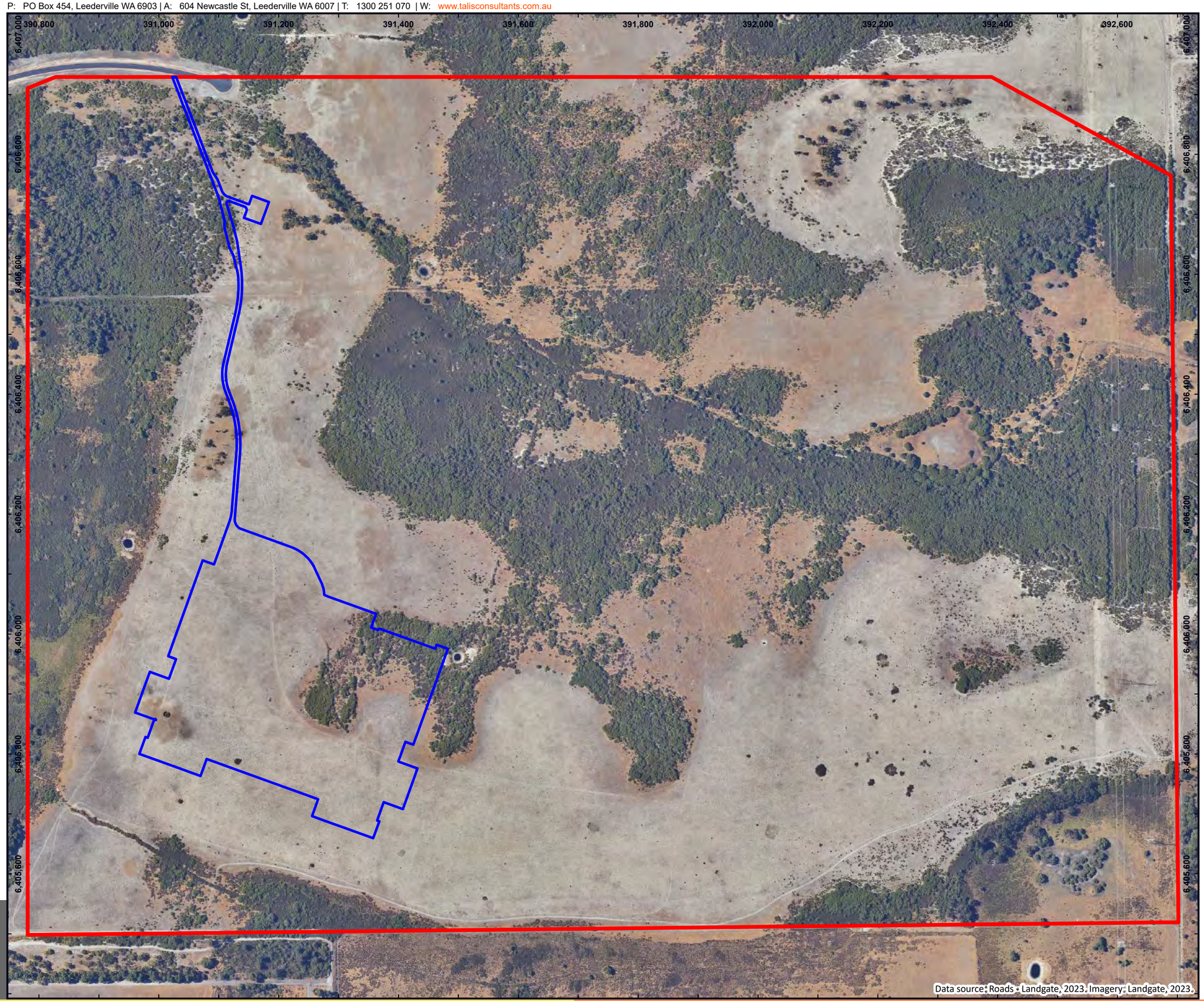
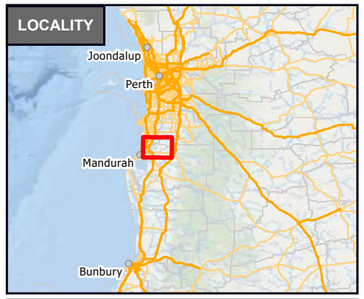


LEGEND

- Site Boundary
- Development Envelope

LOCALITY



0 50 100 150 200 250 km

PROPOSED LOCATION

Environmental Assessment and Management Plan

C-Wise
320 Gull Road
Keralup WA 6182

N

0 50 100 150 200 250 m

Coordinate System: GDA2020 MGA Zone 50
Scale @ A3: 1:6,000

Prepared: E Jackson	Date: 11/10/2023
Reviewed: T Hunter	Revision: A
Project: TW21124	

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Figure 02

Data source: Roads - Landgate, 2023. Imagery: Landgate, 2023.

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389,000 390,000 391,000 392,000 393,000 394,000

6,408,000 6,407,000 6,406,000 6,405,000 6,404,000

LEGEND

- Site Boundary
- Development Envelope

Local Planning Scheme

- Conservation
- Nambeelup industrial development
- Rural
- Special use

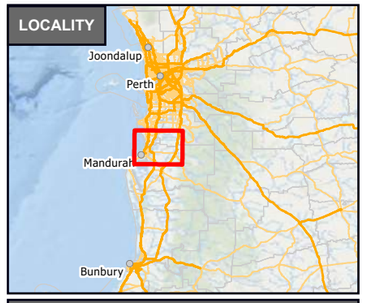
Peel Region Planning Scheme

- Industrial
- Rural

Western Australian Roads

- Minor Road
- Other

LOCALITY



0 50 100 150 200 250 km

ZONING

Environmental Assessment and Management Plan

C-Wise
320 Gull Road
Keralup WA 6182

N

0 200 400 600 800 m

Coordinate System: GDA2020 MGA Zone 50
Scale @ A3: 1:20,000

Prepared:	E Jackson	Date:	12/10/2023
Reviewed:	T Hunter	Revision:	A
Project:	TW21124		

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Figure 03

Data source: Roads - Landgate, 2023. Local and Regional Planning Schemes - DPLH, 2023. Imagery: Landgate, 2023.

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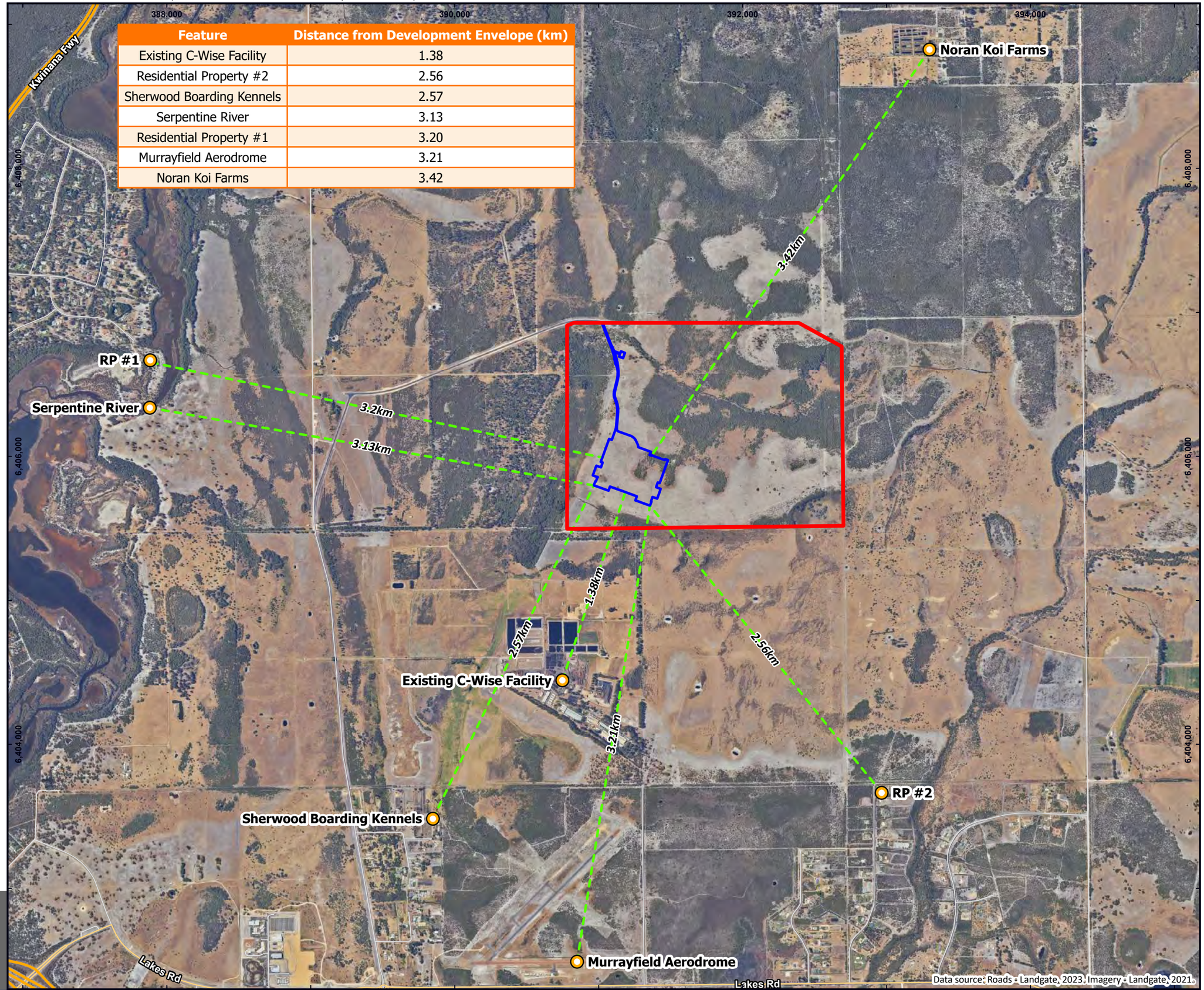
Feature	Distance from Development Envelope (km)
Existing C-Wise Facility	1.38
Residential Property #2	2.56
Sherwood Boarding Kennels	2.57
Serpentine River	3.13
Residential Property #1	3.20
Murrayfield Aerodrome	3.21
Noran Koi Farms	3.42



LEGEND

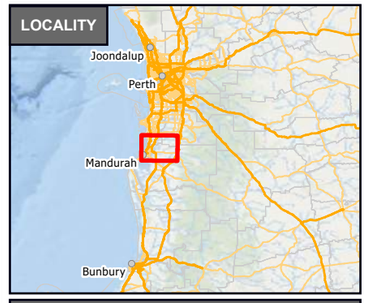
- Site Boundary
- Development Envelope

Sensitive Receptors

- Sensitive Receptors
- Separation Distance

Western Australian Roads

- Freeway / Highway
- Main Road
- Minor Road



SENSITIVE RECEPTORS

Environmental Assessment and Management Plan

C-Wise
320 Gull Road
Keralup WA 6182

N
0 200 400 600 800 1,000 m

Coordinate System: GDA2020, Datum: GDA2020
Scale @ A3: 1:25,000

Prepared:	E Jackson	Date:	12/10/2023
Reviewed:	T Hunter	Revision:	A
Project:	TW21124		

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Figure 04

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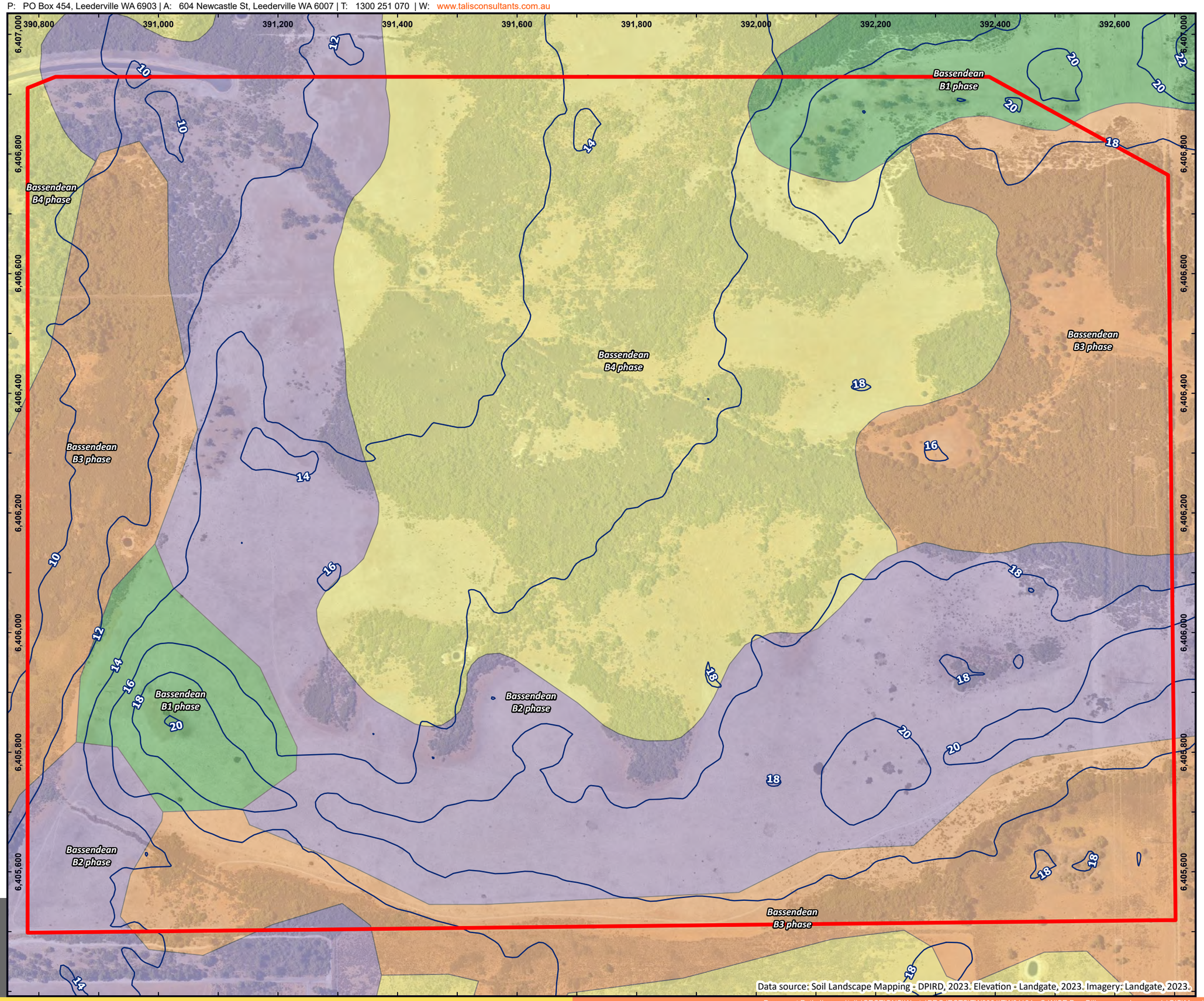


LEGEND

- Site Boundary
- Elevation (m AHD)

Soil Landscape Mapping

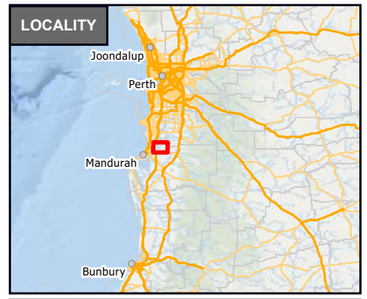
Bassendean B1 phase: Extremely low to very low relief dunes, undulating sandplain and discrete sand rises with deep bleached grey sands sometimes with a pale yellow B horizon or a weak iron-organic hardpan at depths generally greater than 2 m; banksia dominant

Bassendean B2 phase: Flat to very gently undulating sandplain with well to moderately well drained deep bleached grey sands with a pale yellow B horizon or a weak iron-organic hardpan 1-2 m

Bassendean B3 phase: Closed depressions and poorly defined stream channels with moderately deep, poorly to very poorly drained bleached sands with an iron-organic pan, or clay subsoil. Surfaces are dark grey sand or sandy loam

Bassendean B4 phase: Broad poorly drained sandplain with deep grey siliceous sands or bleached sands, underlain at depths generally greater than 1.5 m by clay or less frequently a strong iron-organic hardpan

LOCALITY



0 50 100 150 200 250 km

TOPOLOGY & SOIL LANDSCAPE MAPPING

Environmental Assessment and Management Plan

C-Wise
320 Gull Road
Keralup WA 6182

N 0 50 100 150 200 250 m

Coordinate System: GDA2020 MGA Zone 50
Scale @ A3: 1:6,000

Prepared:	E Jackson	Date:	12/10/2023
Reviewed:	T Hunter	Revision:	A
Project:	TW21124		

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Figure 05

Data source: Soil Landscape Mapping - DPIRD, 2023. Elevation - Landgate, 2023. Imagery: Landgate, 2023.

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390,000
392,000
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6,408,000
6,406,000
6,404,000
Qt
Qdcb
Qt
Qt

Data source: Acid Sulphate Soils, DWER, 2023. Surface Geology - Geoscience Australia, 2023. Imagery: Landgate, 2023.

LEGEND

Site Boundary

Acid Sulfate Soil Risk Map

1 - High to Moderate Risk

2 – Moderate to Low Risk

Surface Geology (GA)

Qdcb: Basal conglomerate overlain by dune quartz sand with heavy mineral concentrations

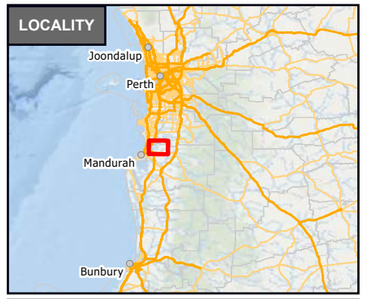
Qt: Lake and swamp deposits; mud, silt, evaporites, limestone; minor sand, peat

Western Australian Roads

Minor Road

Other

LOCALITY



0 50 100 150 200 250 km

SURFACE GEOLOGY & ACID SULPHATE SOILS

Environmental Assessment and Management Plan

C-Wise
320 Gull Road
Keralup WA 6182

N
0 200 400 600 800 m

Coordinate System: GDA2020 MGA Zone 50
Scale @ A3: 1:20,000

Prepared:	E Jackson	Date:	12/10/2023
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Project:	TW21124		

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Figure 06

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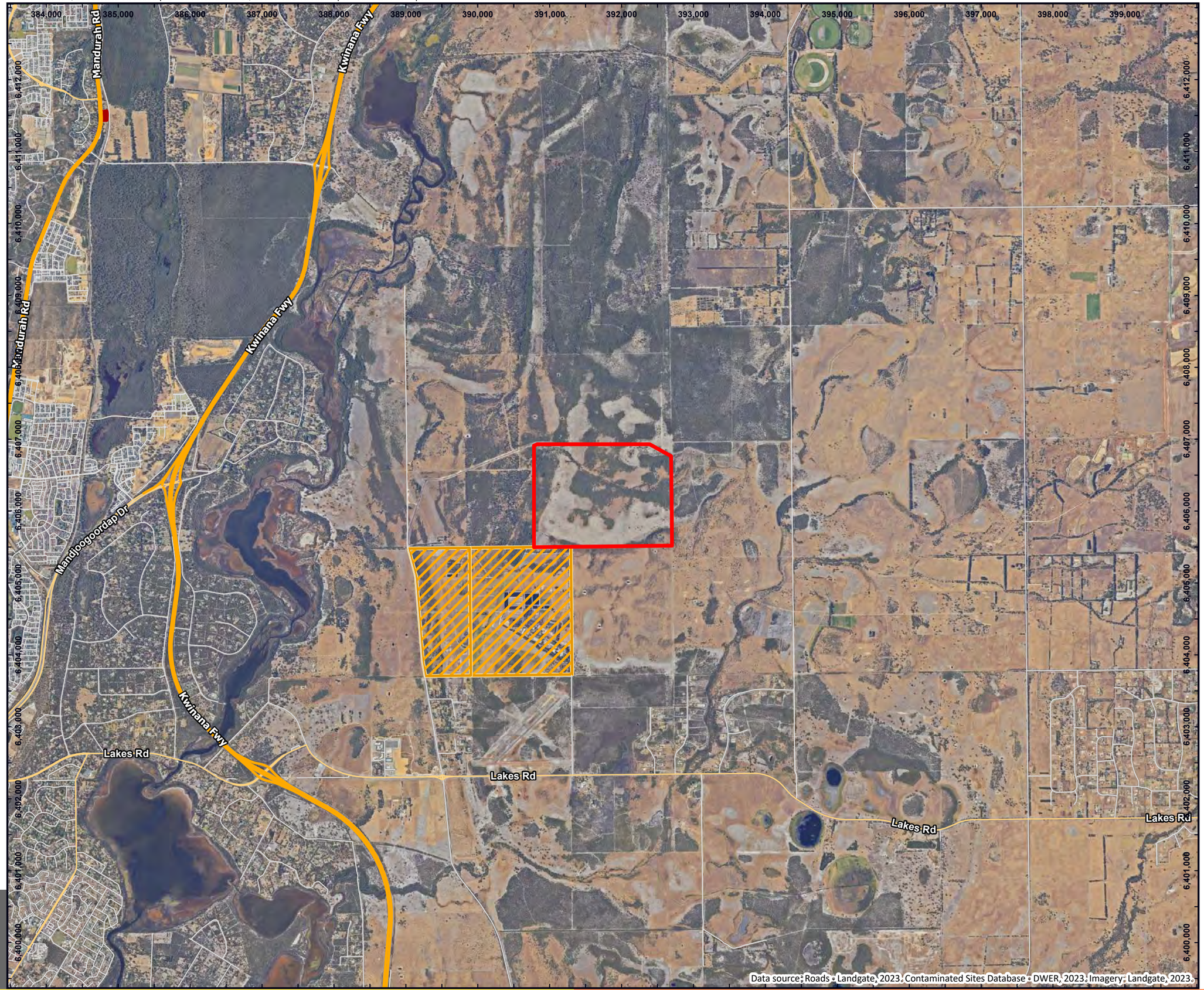


LEGEND

- Site Boundary

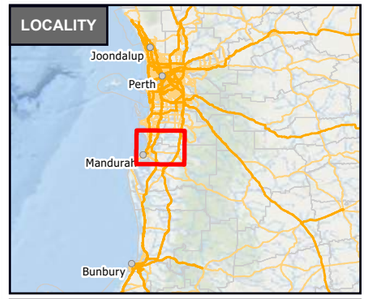
Contaminated Sites Database

- Contaminated - restricted use
- Remediated for restricted use

Western Australian Roads

- Freeway / Highway
- Main Road
- Minor Road

LOCALITY



0 50 100 150 200 250 km

CONTAMINATED SITES

Environmental Assessment and Management Plan

C-Wise
320 Gull Road
Keralup WA 6182

N 0 500 1,000 1,500 2,000 m

Coordinate System: GDA2020 MGA Zone 50
Scale @ A3: 1:50,000

Prepared:	E Jackson	Date:	12/10/2023
Reviewed:	T Hunter	Revision:	A
Project:	TW21124		

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Figure 07

Data source: Roads - Landgate, 2023. Contaminated Sites Database - DWER, 2023. Imagery: Landgate, 2023.

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LEGEND

- Site Boundary
- Groundwater Contour (min, m AHD)

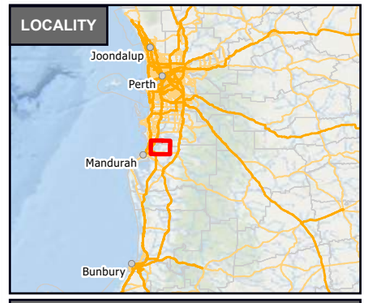
WIN Monitoring Sites

- WIN Monitoring Sites within 1km
- WIN Monitoring Sites outside 1km

Western Australian Roads

- Minor Road
- Other

LOCALITY



0 50 100 150 200 250 km

LOCAL GROUNDWATER

Environmental Assessment and Management Plan

C-Wise
320 Gull Road
Keralup WA 6182

N 0 200 400 600 800 m

Coordinate System: GDA2020 MGA Zone 50
Scale @ A3: 1:20,000

Prepared:	E Jackson	Date:	12/10/2023
Reviewed:	T Hunter	Revision:	A
Project:	TW21124		

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Figure 08

Data source: Roads - Landgate, 2023. Groundwater Contours - DWER, 2016. WIN Monitoring Sites - DWER, 2020. Imagery: Landgate, 2023.

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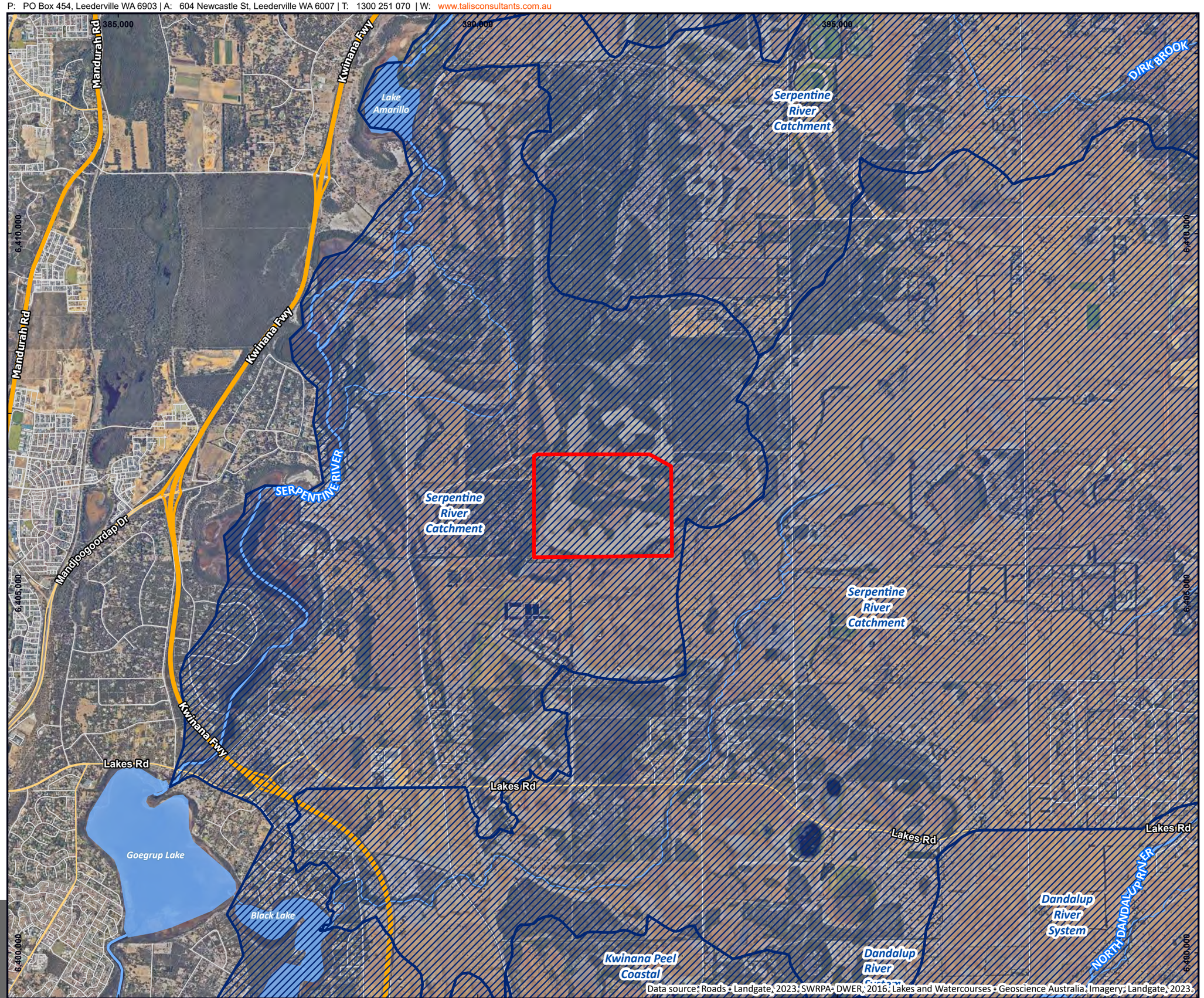


Data source: Roads - Landgate, 2023. SWRPA- DWER, 2016. Lakes and Watercourses - Geoscience Australia. Imagery: Landgate, 2023.

LEGEND

- Site Boundary
- Surface Water Resource Proclaimed Area (RWI Act)

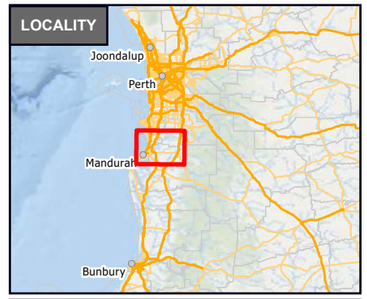
Hydrography

- Lakes
- Major Watercourse
- Minor Watercourse

Western Australian Roads

- Freeway / Highway
- Main Road
- Minor Road

LOCALITY



0 50 100 150 200 250 km

WATERCOURSES

Environmental Assessment and Management Plan

C-Wise
320 Gull Road
Keralup WA 6182

N 0 500 1,000 1,500 2,000 m

Coordinate System: GDA2020 MGA Zone 50
Scale @ A3: 1:50,000

Prepared:	E Jackson	Date:	12/10/2023
Reviewed:	T Hunter	Revision:	A
Project:	TW21124		

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Figure 09

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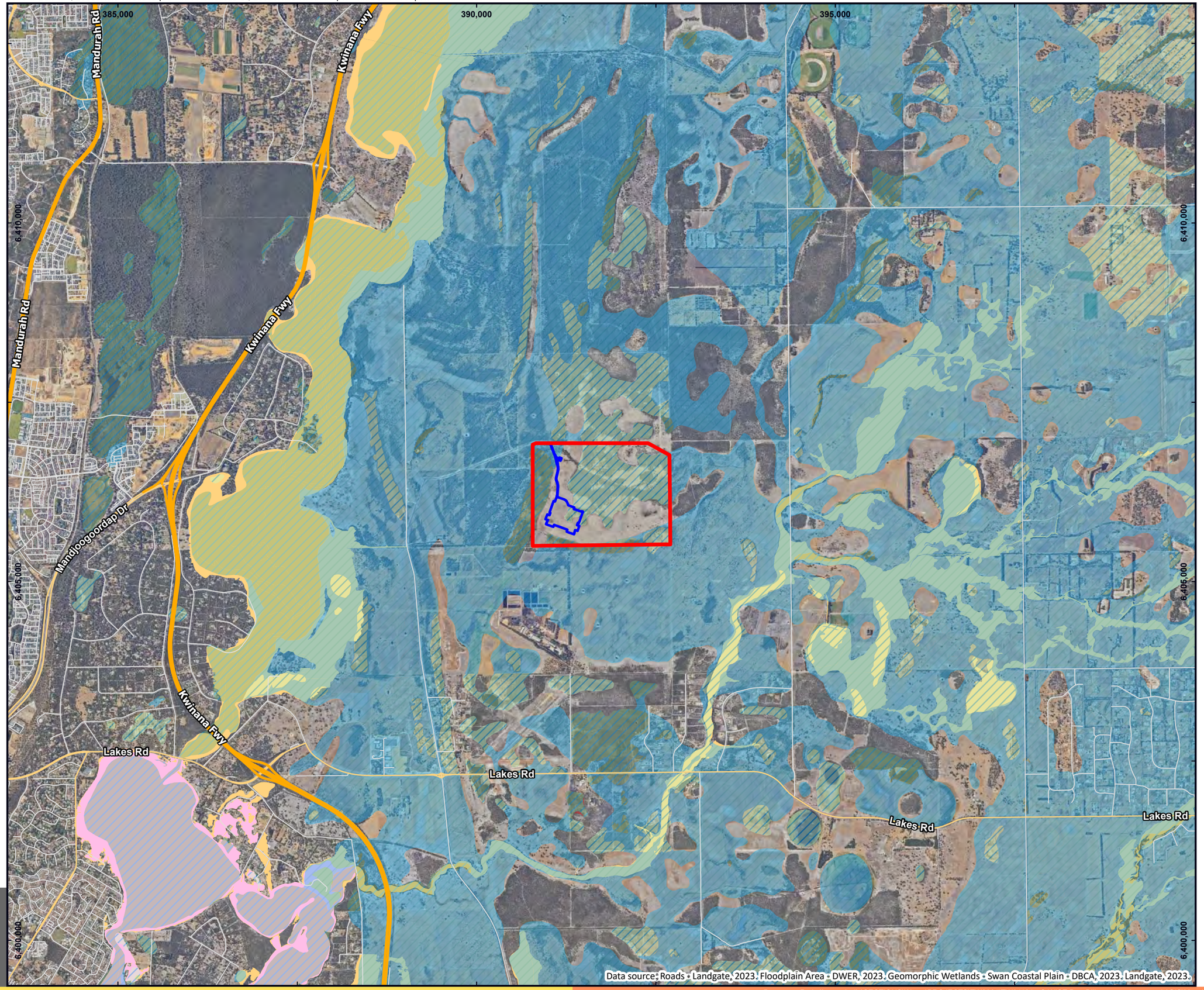


LEGEND

- Site Boundary
- Development Envelope

Geomorphic Wetlands - Swan Coastal Plain

- Conservation
- Multiple Use
- Resource Enhancement
- Not Applicable

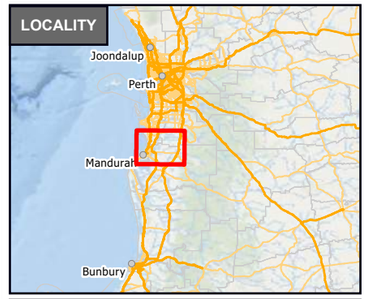
Floodplain Area

- 1 in 10 (10%) AEP floodplain
- 1 in 100 (1%) AEP floodplain

Western Australian Roads

- Freeway / Highway
- Main Road
- Minor Road

LOCALITY



0 50 100 150 200 250 km

WETLANDS AND FLOOD MAPPING

Environmental Assessment and Management Plan

C-Wise
320 Gull Road
Keralup WA 6182

N

0 500 1,000 1,500 2,000 m

Coordinate System: GDA2020 MGA Zone 50
Scale @ A3: 1:50,000

Prepared:	E Jackson	Date:	12/10/2023
Reviewed:	T Hunter	Revision:	A
Project:	TW21124		

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Figure 10

Data source: Roads - Landgate, 2023. Floodplain Area - DWER, 2023. Geomorphic Wetlands - Swan Coastal Plain - DBCA, 2023. Landgate, 2023.

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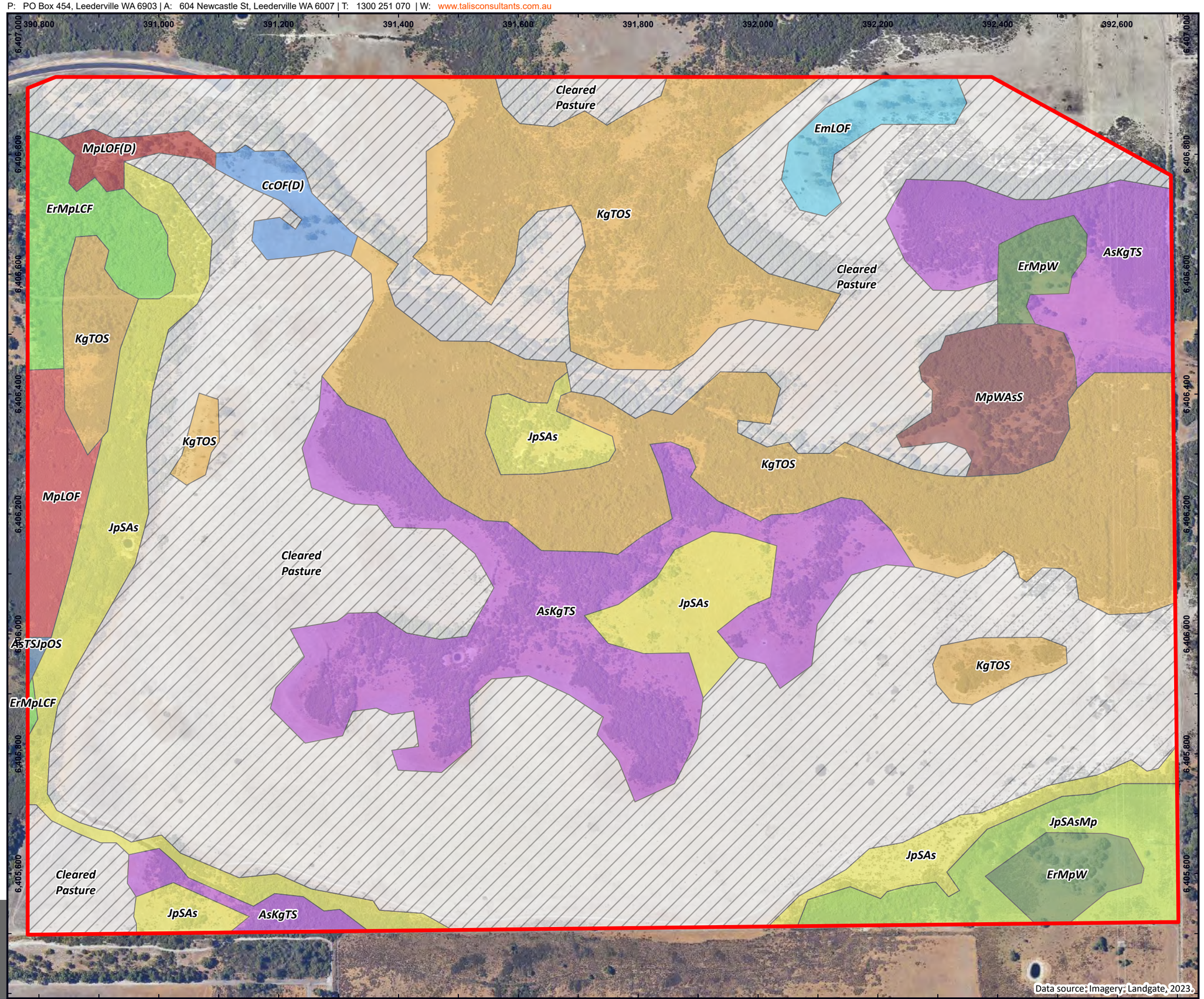


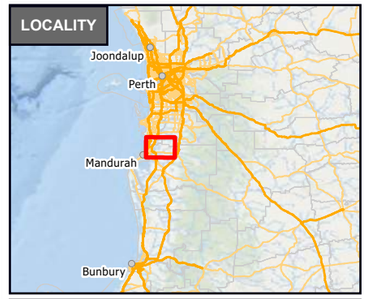
LEGEND

- Site Boundary

Vegetation Unit

- AsKgTS
- AsTSJpOS
- CcOF(D)
- EmLOF
- ErMpLCF
- ErMpW
- JpSAs
- JpSAsMp
- KgTOS
- MpLOF
- MpLOF(D)
- MpWAsS
- Cleared Pasture

LOCALITY



0 50 100 150 200 250 km

VEGETATION UNITS

Environmental Assessment and Management Plan

C-Wise
320 Gull Road
Keralup WA 6182

N

0 50 100 150 200 250 m

Coordinate System: GDA2020 MGA Zone 50
Scale @ A3: 1:6,000

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Figure 11

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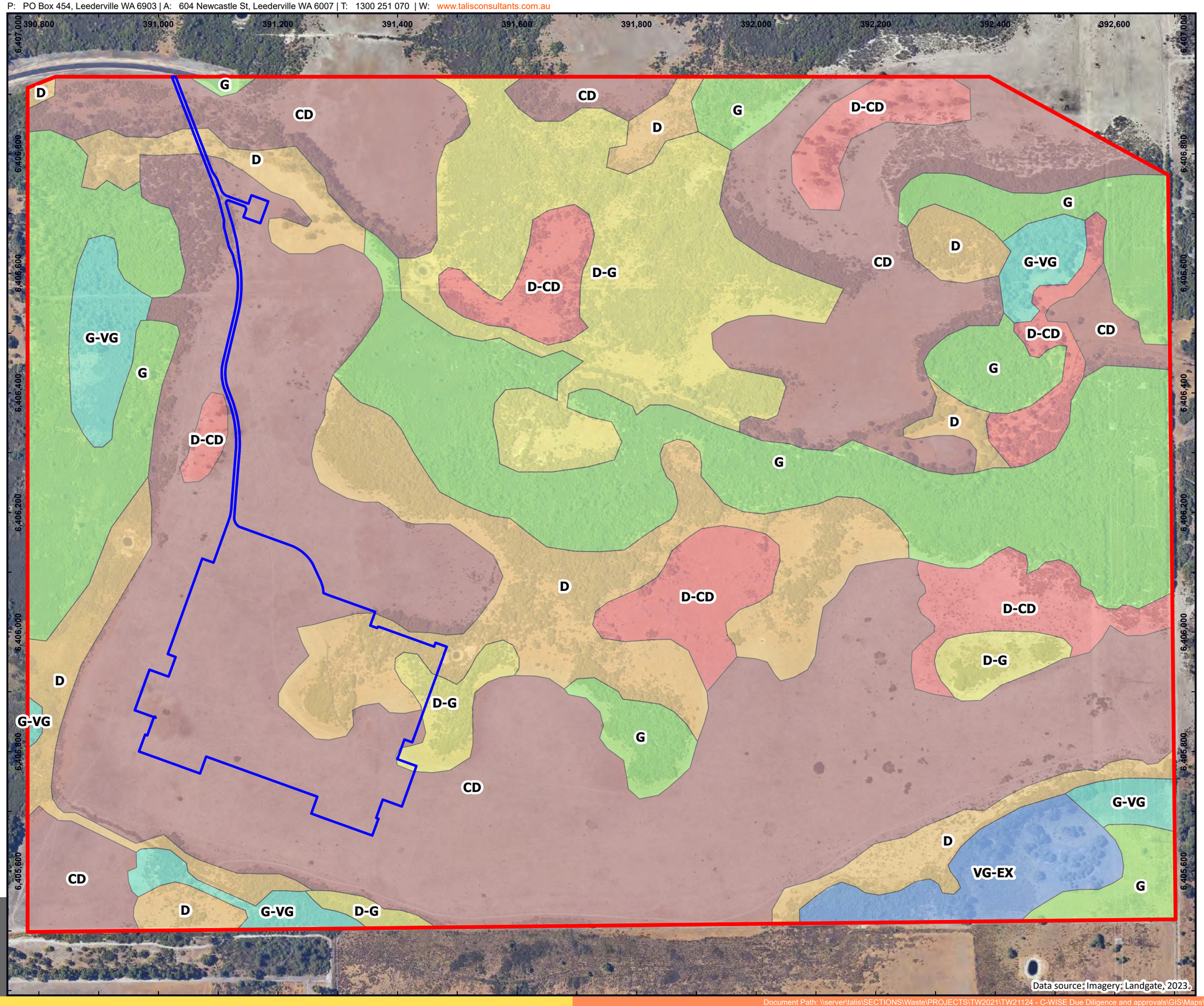


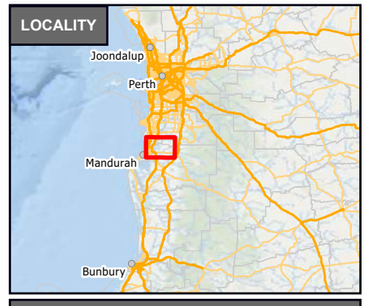
LEGEND

- Site Boundary
- Development Envelope

Vegetation Condition

- (VG-EX) Very Good to Excellent
- (G-VG) Good to Very Good
- (G) Good
- (D-G) Degraded to Good
- (D) Degraded
- (D-CD) Degraded to Completely Degraded
- (CD) Completely Degraded

LOCALITY



VEGETATION CONDITIONS

Environmental Assessment and Management Plan

C-Wise
320 Gull Road
Keralup WA 6182

N
0 50 100 150 200 250 m

Coordinate System: GDA2020 MGA Zone 50
Scale @ A3: 1:6,000

Prepared:	E Jackson	Date:	12/10/2023
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Figure 12

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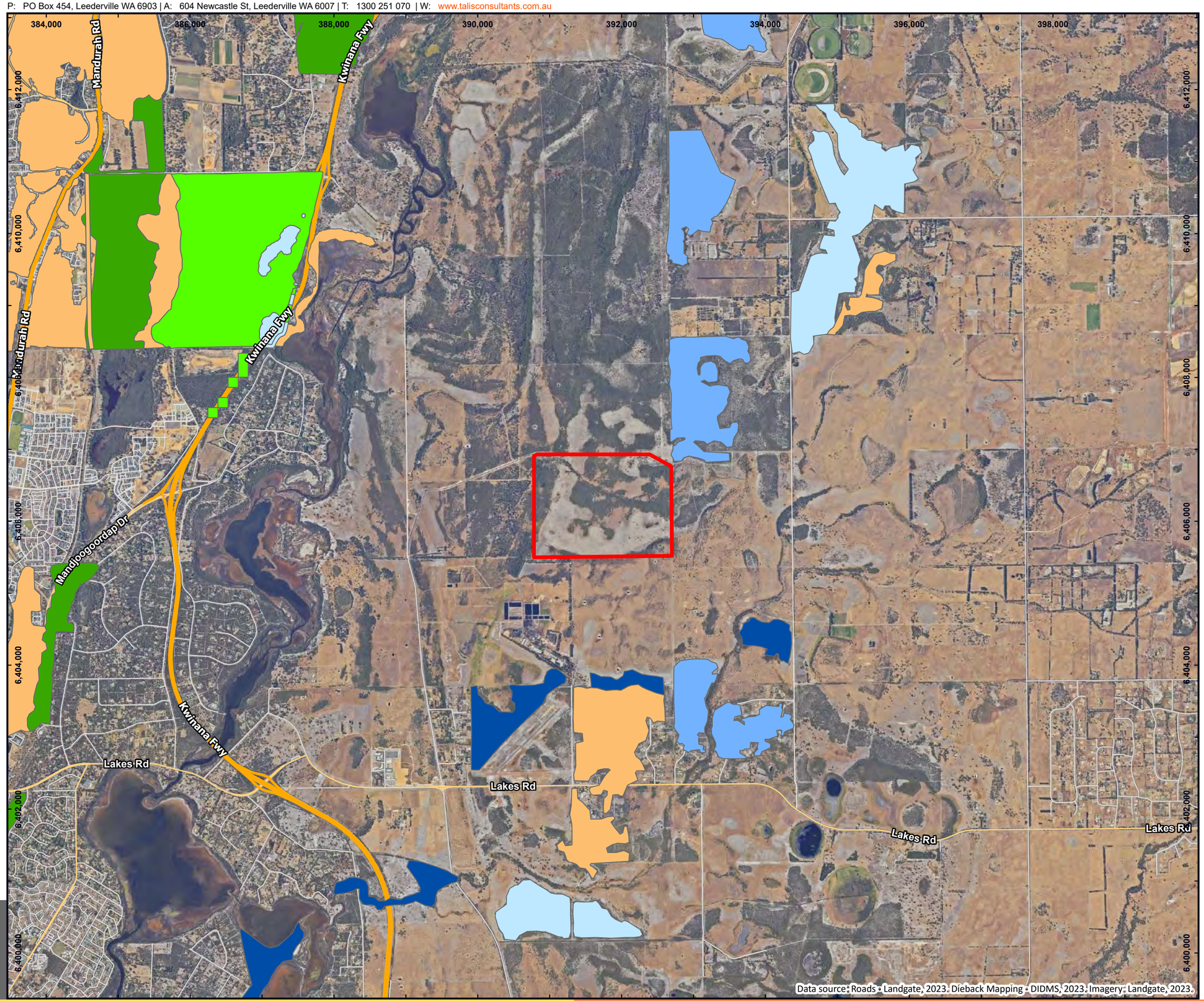


LEGEND

- Site Boundary

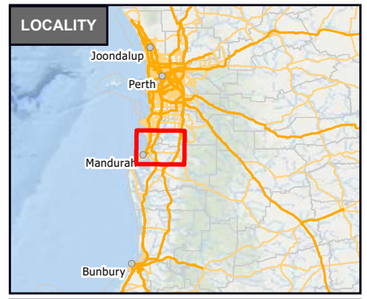
Dieback Confidence Mapping

- Infested; confirmed or likely, Presence of P. cinnamomi most likely, degraded vegetation, strong pattern & chronology of deaths, vector present, positive sample and or previously interpreted infested
- Infested; considered likely, Degradation present, vector present, weak to moderate pattern evident, or previously interpreted suspect
- Infested; likely but lower confidence, Location in the landscape, drainage line, high annual rainfall, extrapolated down slope from infestations, no pattern evident, small area difficult to interpret
- Uninfested; most confident, Large area, little or no signs of disturbance, healthy vegetation, P. cinnamomi very unlikely, previously interpreted uninfested
- Uninfested; least confident, Location in the landscape, low annual rainfall, small area difficult to interpret, lack of vegetation, disturbance present
- Uninterpretable; Natural areas where susceptible plants are absent, or too few to determine P. cinnamomi disease status

Western Australian Roads

- Freeway / Highway
- Main Road
- Minor Road

LOCALITY



0 50 100 150 200 250 km

DIEBACK CONFIDENCE MAPPING

Environmental Assessment and Management Plan

C-Wise
320 Gull Road
Keralup WA 6182

N 0 500 1,000 1,500 2,000 m

Coordinate System: GDA2020 MGA Zone 50
Scale @ A3: 1:50,000

Prepared:	E Jackson	Date:	12/10/2023
Reviewed:	T Hunter	Revision:	A
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Figure 13

Data source: Roads - Landgate, 2023. Dieback Mapping - DIDMS, 2023. Imagery: Landgate, 2023.

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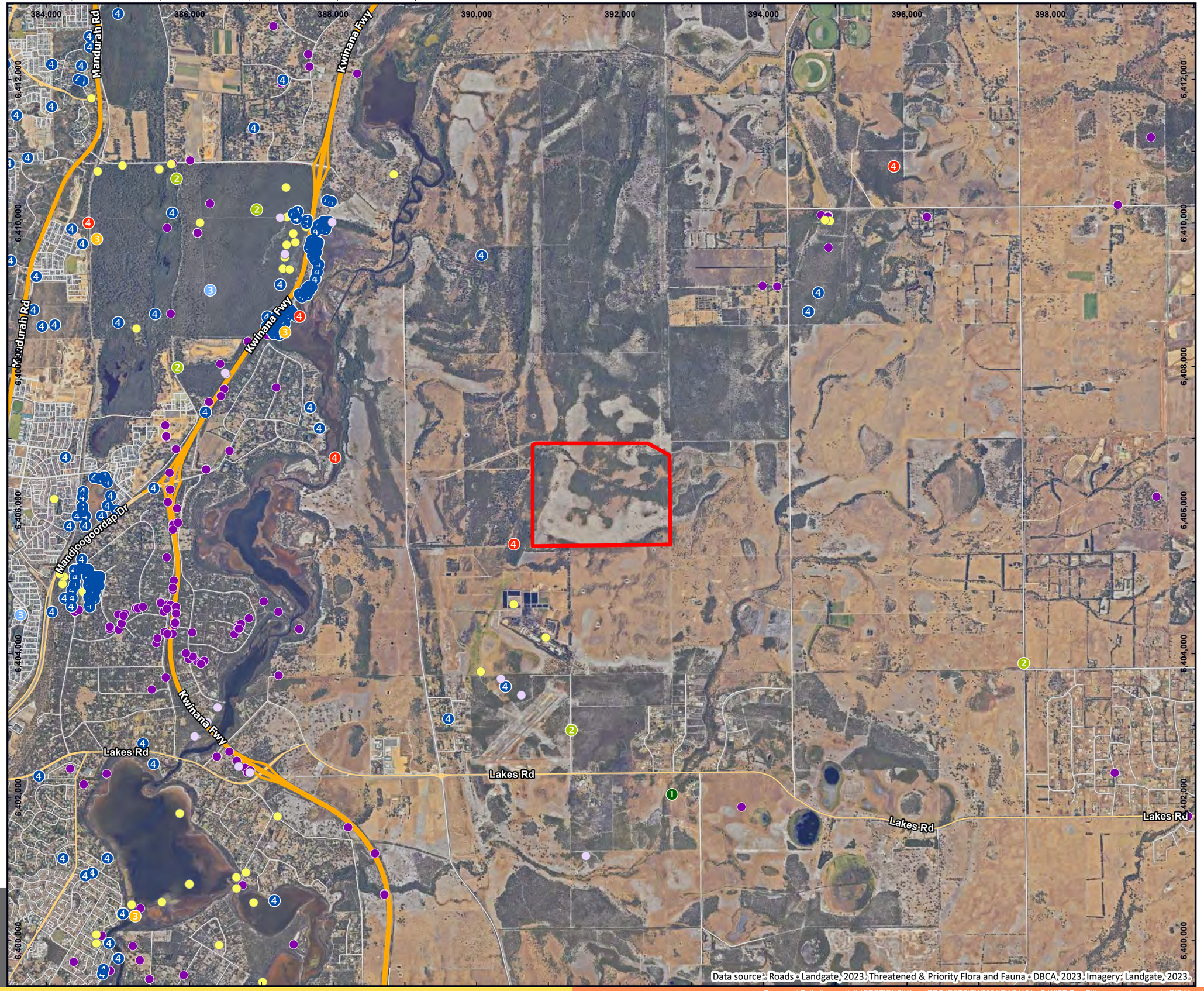


Data source: Roads - Landgate, 2023. Threatened & Priority Flora and Fauna - DBCA, 2023. Imagery: Landgate, 2023.

LEGEND

- Site Boundary

Threatened and Priority Flora

- Priority 1
- Priority 2
- Priority 3
- Priority 4
- Threatened species

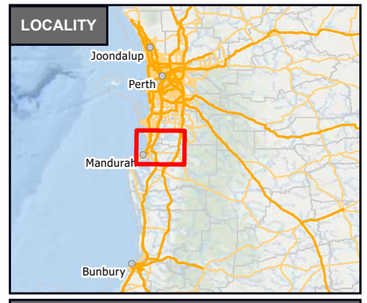
Threatened and Priority Fauna

- Priority 3
- Priority 4
- Specially protected species
- Threatened species

Western Australian Roads

- Freeway / Highway
- Main Road
- Minor Road

LOCALITY



0 50 100 150 200 250 km

THREATENED AND PRIORITY FLORA AND FAUNA

Environmental Assessment and Management Plan

C-Wise
320 Gull Road
Keralup WA 6182

N 0 500 1,000 1,500 2,000 m

Coordinate System: GDA2020 MGA Zone 50
Scale @ A3: 1:50,000

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Figure 14

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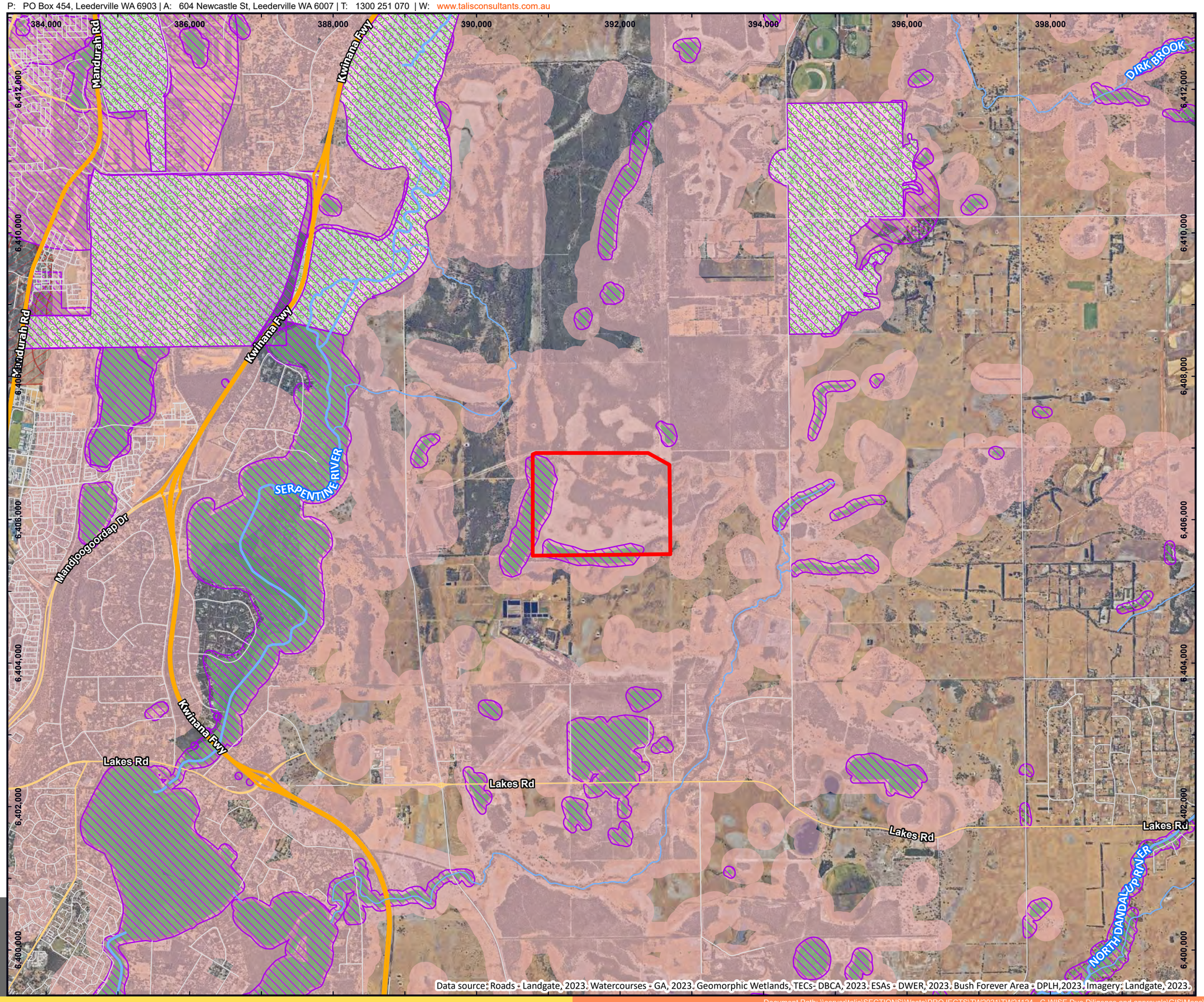


Data source: Roads - Landgate, 2023. Watercourses - GA, 2023. Geomorphic Wetlands, TECs- DBCA, 2023. ESAs - DWER, 2023. Bush Forever Area - DPLH,2023. Imagery: Landgate, 2023.

LEGEND

- Site Boundary
- Environmentally Sensitive Areas
- Bush Forever Areas

Geomorphic Wetlands - Swan Coastal Plain

- Conservation

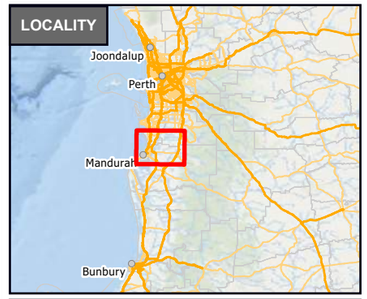
Threatened Ecological Communities

- Priority
- Threatened

Western Australian Roads

- Freeway / Highway
- Main Road
- Minor Road

LOCALITY



0 50 100 150 200 250 km

THREATENED ECOLOGICAL COMMUNITIES & CONSERVATION RESERVES

Environmental Assessment and Management Plan

C-Wise
320 Gull Road
Keralup WA 6182

N 0 500 1,000 1,500 2,000 m

Coordinate System: GDA2020 MGA Zone 50
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Figure 15

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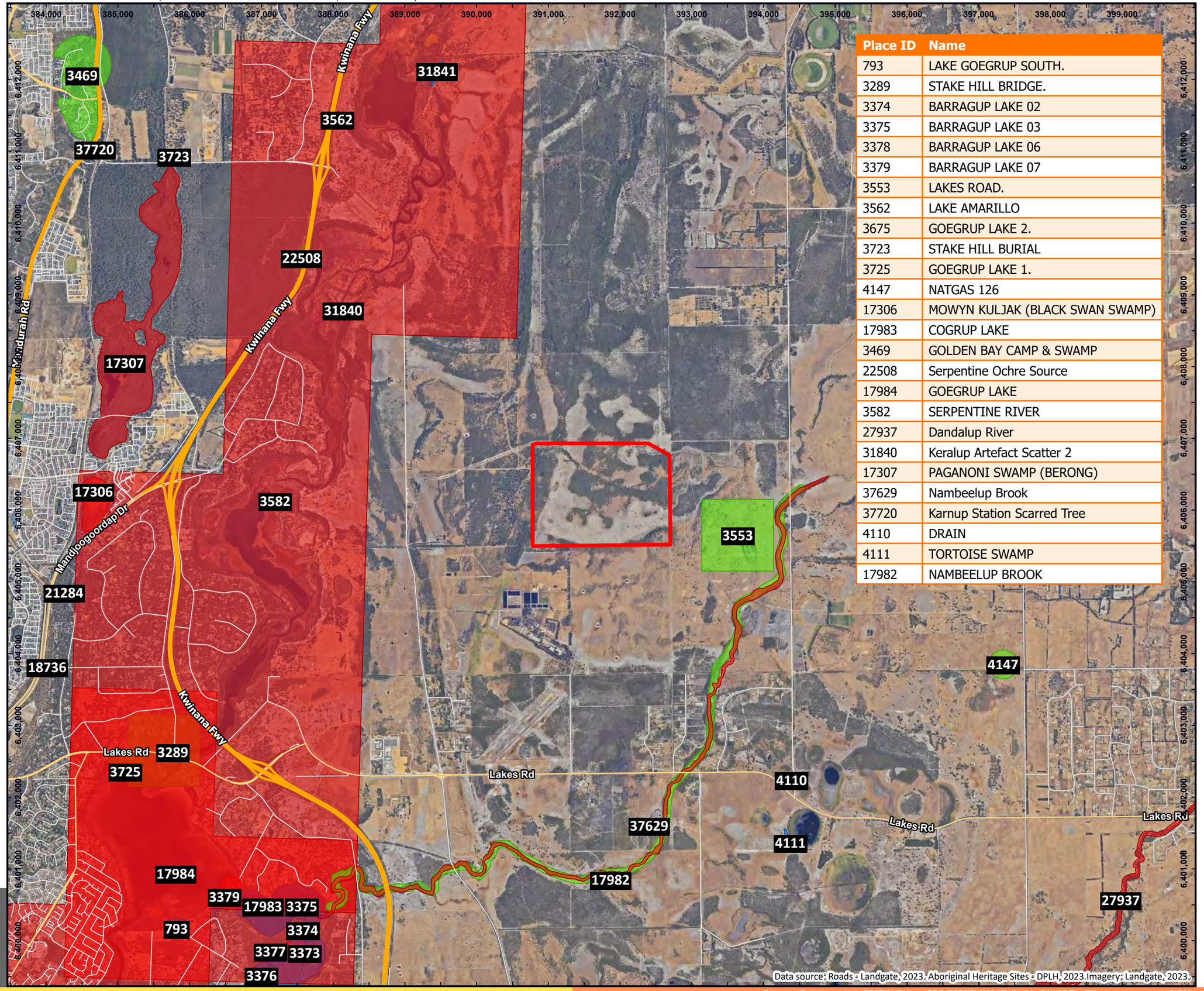


Place ID	Name
793	LAKE GOEGRUP SOUTH.
3289	STAKE HILL BRIDGE.
3374	BARRAGUP LAKE 02
3375	BARRAGUP LAKE 03
3378	BARRAGUP LAKE 06
3379	BARRAGUP LAKE 07
3553	LAKES ROAD.
3562	LAKE AMARILLO
3675	GOEGRUP LAKE 2.
3723	STAKE HILL BURIAL
3725	GOEGRUP LAKE 1.
4147	NATGAS 126
17306	MOWYN KULJAK (BLACK SWAN SWAMP)
17983	COGRUP LAKE
3469	GOLDEN BAY CAMP & SWAMP
22508	Serpentine Ochre Source
17984	GOEGRUP LAKE
3582	SERPENTINE RIVER
27937	Dandalup River
31840	Keralup Artefact Scatter 2
17307	PAGANONI SWAMP (BERONG)
37629	Nambeelup Brook
37720	Karnup Station Scarred Tree
4110	DRAIN
4111	TORTOISE SWAMP
17982	NAMBEELUP BROOK

LEGEND

- Site Boundary

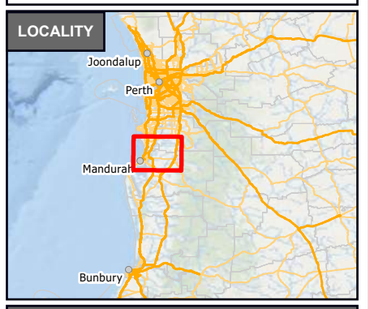
Aboriginal Heritage

- Lodged
- Registered Site
- Stored Data / Not a Site

Western Australian Roads

- Freeway / Highway
- Main Road
- Minor Road

LOCALITY



0 50 100 150 200 250 km

ABORIGINAL HERITAGE

Environmental Assessment and Management Plan

C-Wise
320 Gull Road
Keralup WA 6182

N 0 500 1,000 1,500 2,000 m

Coordinate System: GDA2020 MGA Zone 50
Scale @ A3: 1:50,000

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Project:	TW21124		

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Figure 16

Data source: Roads - Landgate, 2023. Aboriginal Heritage Sites - DPLH, 2023.Imagery: Landgate, 2023.

APPENDIX A
Drawings

APPENDIX B

Groundwater Control Level Study

APPENDIX C

Odour Impact Assessment

APPENDIX D

Community Engagement Report

APPENDIX E

Surface Water and Leachate Management Plan

APPENDIX F

Leachate & Surface Water Technical Specification and CQA Plan

Assets | Engineering | Environment | Noise | Spatial | Waste

Talis Consultants
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EAQ Consulting

ODOUR IMPACT ASSESSMENT OF PROPOSED CARBON RECYCLING FACILITY

C-WISE: LAKES ROAD, NAMBEELUP

C-Wise: Lakes Road, Nambeelup

Odour Impact Assessment of Proposed Carbon Recycling Facility

Prepared for:

Project Ref: EAQ-22024

November 2023

EAQ Consulting

Environment | Air Quality

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Report Revision(s)				
Version(s)	**Description**	**Date**	**Author(s)**	**Reviewer(s)**
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Draft_1.0	Released to Client	15.11.2023	J. Hurley	C-Wise, Talis
Final		27.11.2023		

Approved for Release		
Name	**Position**	**File Reference**
John Hurley	Principal Consultant	EAQ23024-C-Wise-OdourImpactAssessment-Final

Signature

This document presents the outcomes of a Desktop Emissions Modelling Assessment using the AERMOD Dispersion Model. All emissions inputs into the model were sourced from previous site-specific measurements and/or sourced from public domain data, except where detailed otherwise herein. EAQ has not attempted to verify the data beyond its use herein. The modelling assessment has been prepared using the best available information provided by the Client and in conjunction with regulatory guidance from the appropriate regulatory jurisdiction(s). EAQ has exercised its diligence and due-care in delivering the outcomes of the assessment according to accepted assessment practices and techniques. EAQ disclaims any and all liability and responsibilities for damages of any nature, to any party, which may be caused from misapplication or misinterpretation by third parties of this assessment

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Table 7-2: Operational Odour Analysis of Proposed Facility 36

1 Background

Environmental & Air Quality Consulting Pty Ltd (EAQ) was engaged by C-Wise Holdings Pty Ltd (C-Wise) to undertake an Odour Impact Assessment (the Assessment) of C-Wise's proposed Carbon Recycling Facility (the Facility).

The Assessment will support C-Wise's Works Approval Application (the Application).

The Facility is to be located at 320 Gull Road, Keralup, a portion of Lot 9500 on Deposited Plan 414516 (the Site). The Site is situated approximately 11 kilometres (km) northeast of the Mandurah town centre. The total area of the Site is approximately 269.4 hectares (ha) of which the Development Footprint occupies approximately 17.12 ha.

The Facility is proposed to be sited immediately north and adjacent to C-Wise's existing organics recycling and composting facility.

C-Wise has been operating its existing composting facility in Nambeelup for 25 years and has been proactive in continually enhancing its composting technique and environmental management measures to achieve the best possible environmental and social outcomes. This includes the development of a technology that incorporates their own Mobile Air Floor System (MAFS) in combination with other known and proven techniques to produce compost.

Recognising that the remaining lifetime of the existing composting facility is limited, C-Wise has been actively seeking an alternative long-term location to establish a modern, better practice facility for over a decade. The Site was determined to be a suitable location for a new facility due to its proximity to C-Wise's existing operations and the large extent of historically cleared land, which provides an opportunity to significantly expand C-Wise's current production capacity.

Operation of the Facility will support the diversion of organic waste from landfill, including the implementation of Food Organics and Garden Organics (FOGO) kerbside collections in the Perth and Peel regions.

Due to the activities of the Facility, it will be classified as a Prescribed Premises under Part V of the *Environmental Protection Act 1986* (EP Act) and therefore requires approval from the Department of Water and Environmental Regulation (DWER) prior to construction and operation. This Assessment has been developed to support an Environmental Assessment and Management Plan (EAMP), that is being provided by Talis Consultants, and subsequent Works Approval application to the DWER and the Development Approval from the Shire of Murray.

The Assessment was commissioned to deliver predictions of odour emissions' impacts and further identify the odour risks associated with the Facility for the purposes of ensuring that any risk of odour impacts at the nearest sensitive receptor is acceptable.

The Facility will be constructed in two stages, with Stage 2 being a mirror image of Stage 1. Stage 1 will reduce the throughput of composting from the existing C-Wise activities. At the completion of Stage 2,

the existing C-Wise activities will be decommissioned, and all C-Wise's composting activities will take place at the Facility.

2 Locality and Meteorology

2.1 Nambeelup

The Nambeelup locality of the Facility is within existing *Rural* land uses to the north, east and west. Southwest of the Facility is the Peel Business Park comprising of existing and future commercial and industrial land uses. Also, to the southwest are *Special* land uses consisting of kennels.

The nearest sensitive receptor is a rural residence located approximately 2.57 kilometres (kms) southeast of the Development Footprint.

The Facility's proposed location is northeast of the nearby residential City of Mandurah and its residential suburbs. Gull Road intersects with Lakes Road, which connects directly with the Kwinana Freeway which will likely be the main transport route for commercial deliveries to and from the Facility (**refer Figure 2-1**).

Figure 2-2 illustrates the development footprint and concept design for the Facility.

Industrial activities separate to the new Peel Business Park already exist within the locality namely a Piggery and the existing Costa Group Mushroom Compost Production Facility. These activities take place adjacent to C-Wise's existing composting activities and represent high strength and large volume odour emissions currently existing within the locality.

Murrayfield Airpark is due south from the Facility as well as the kennels and other smaller activities. These activities pose no risk of any odour nuisance within the locality.

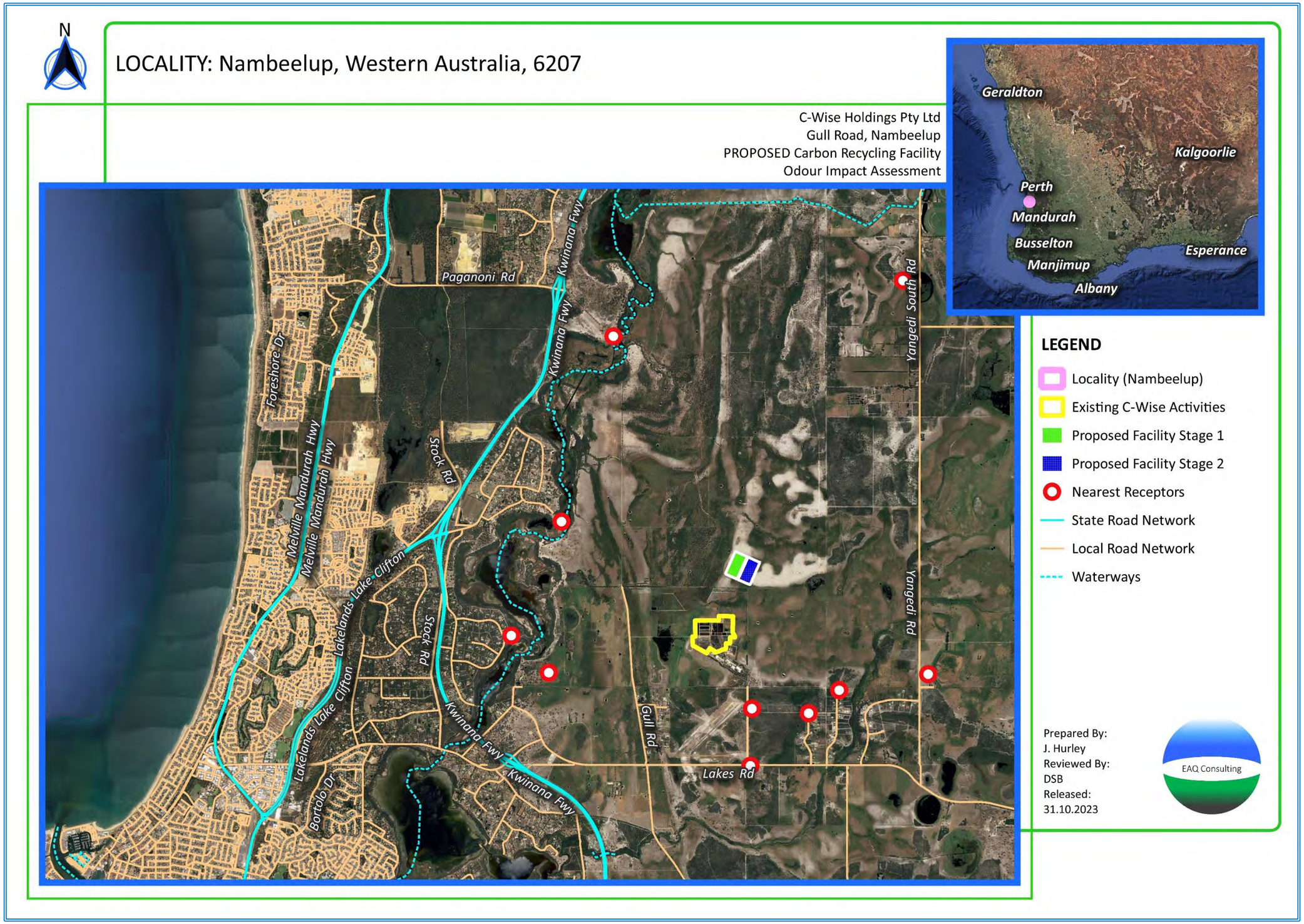


Figure 2-1: C-Wise Holdings Pty Ltd - Nambeelup Locality Map

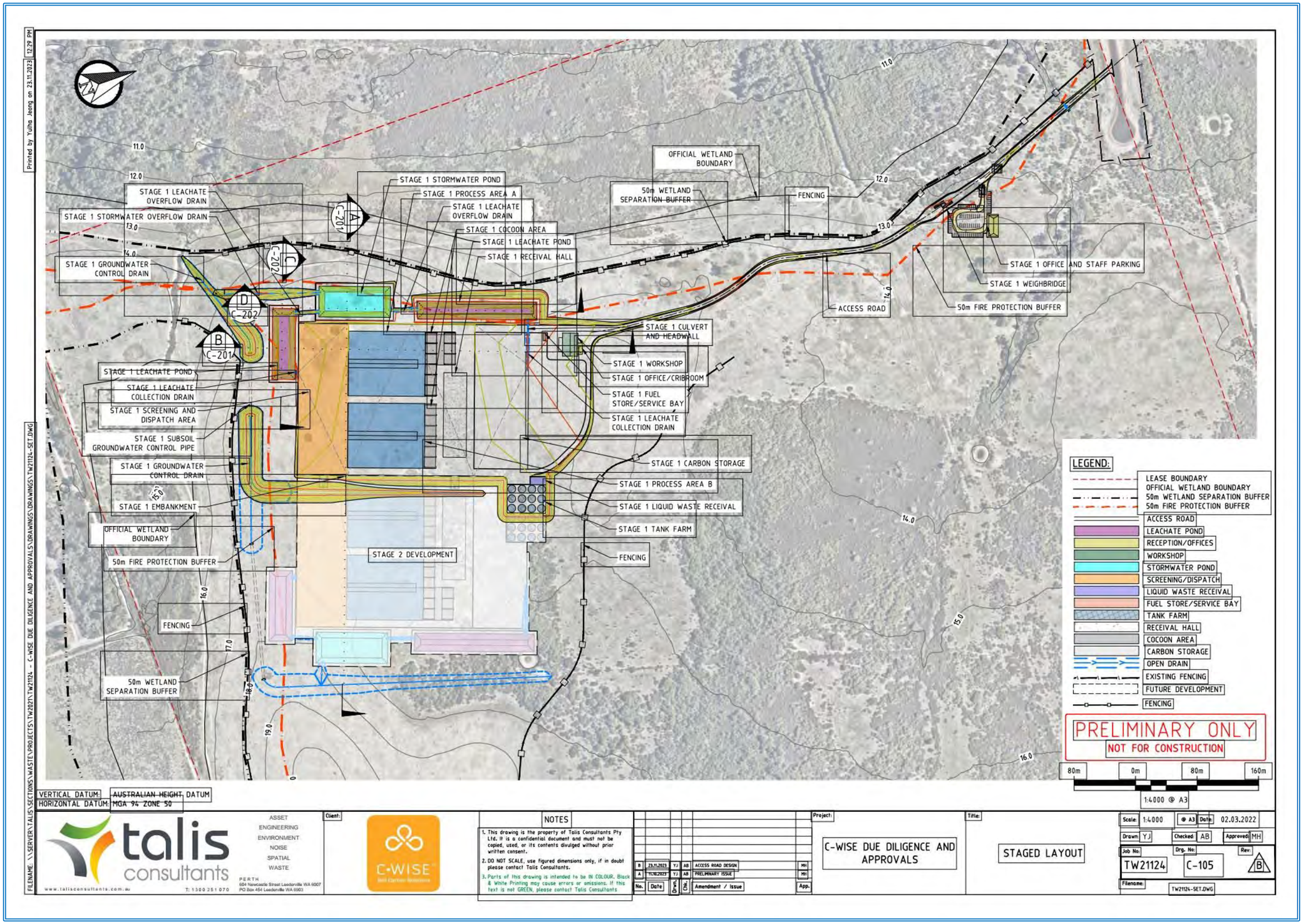


Figure 2-2: C-Wise Holdings Pty Ltd Facility Design Concept – Nambeelup

2.2 Locality Meteorological Trends

EAQ has reviewed the locality availability of BoM AWSs in proximity to the Facility. The Mandurah BoM AWS is the nearest station, however; the Mandurah AWS represents meteorological (met) trends along the coastline. These met trends will be characteristic of coastal sea breeze effects and less likely to represent those land breezes typically observed as one moves further inland.

Notwithstanding, the Mandurah met trends will be representative of some conditions, in particular wind direction, rainfall and temperature (among others), within the Nambeelup locality.

The Facility is approximately 12 kms east, northeast of the Mandurah AWS. The next closest BoM AWS is the Dwellingup AWS which is approximately 32 kms south-east of the Facility and situated on the Darling Escarpment (the Scarp). The Dwellingup AWS is therefore unrepresentative of locality met characteristics.

The Mandurah AWS trends for the last five calendar years (2018 - 2022) were reviewed and sorted to remove any erroneous data points. Each of the five years was then compared to the five year trends for wind direction and speed and a statistical analysis using the *chi-squared* relationship (goodness-of-fit) and Mann-Whitney test was undertaken.

The method for determining the representative met year, and subsequent development of the met dataset is presented in Appendix A.

The most representative annual dataset was found to be 2021 from the recent five year met trends.

To represent the met trends closer to the Facility, EAQ has utilised CSIRO's v4.0.4 The Air Pollution Model (TAPM) to derive an annual met dataset directly 'above' the Facility.

Although there is comparability of the met trends between the Mandurah AWS and that of the TAPM prognostic predictions above the Facility, EAQ has nonetheless merged both datasets using the Calmet module of the Calpuff dispersion model. The Calmet processor incorporates the surface observations from the Mandurah AWS together with the upper air prognostic met data from the TAPM output, whilst also accounting for terrain and surface roughness.

The comparison of wind direction for the Mandurah BoM AWS surface observations versus the Calmet Hybrid (Mandurah BoM + TAPM 2021) derived observations above the Facility are illustrated in **Figures 2-3 and 2-4**. The comparability of the wind direction based on actual observations versus the Hybrid met output demonstrates a strong correlation, however; as expected the further inland the observations (Calmet Hybrid) the higher the frequency of land breeze conditions typically originating from the east quadrants, and lesser wind speeds from the west quadrants when compared to the coastal Mandurah BoM Aws observations.

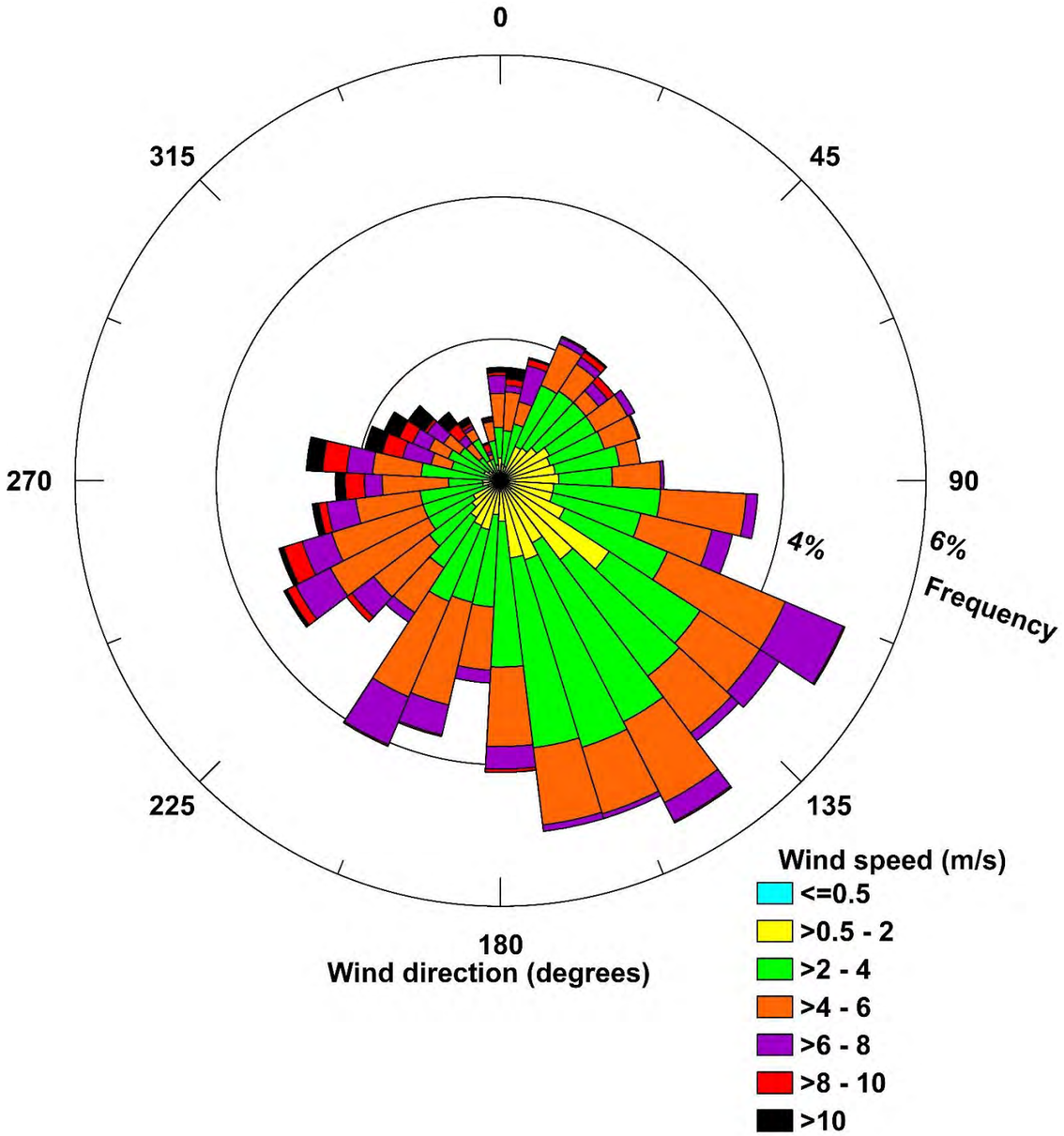


Figure 2-3: Mandurah BoM 2021 Surface Observations (WS & WD)

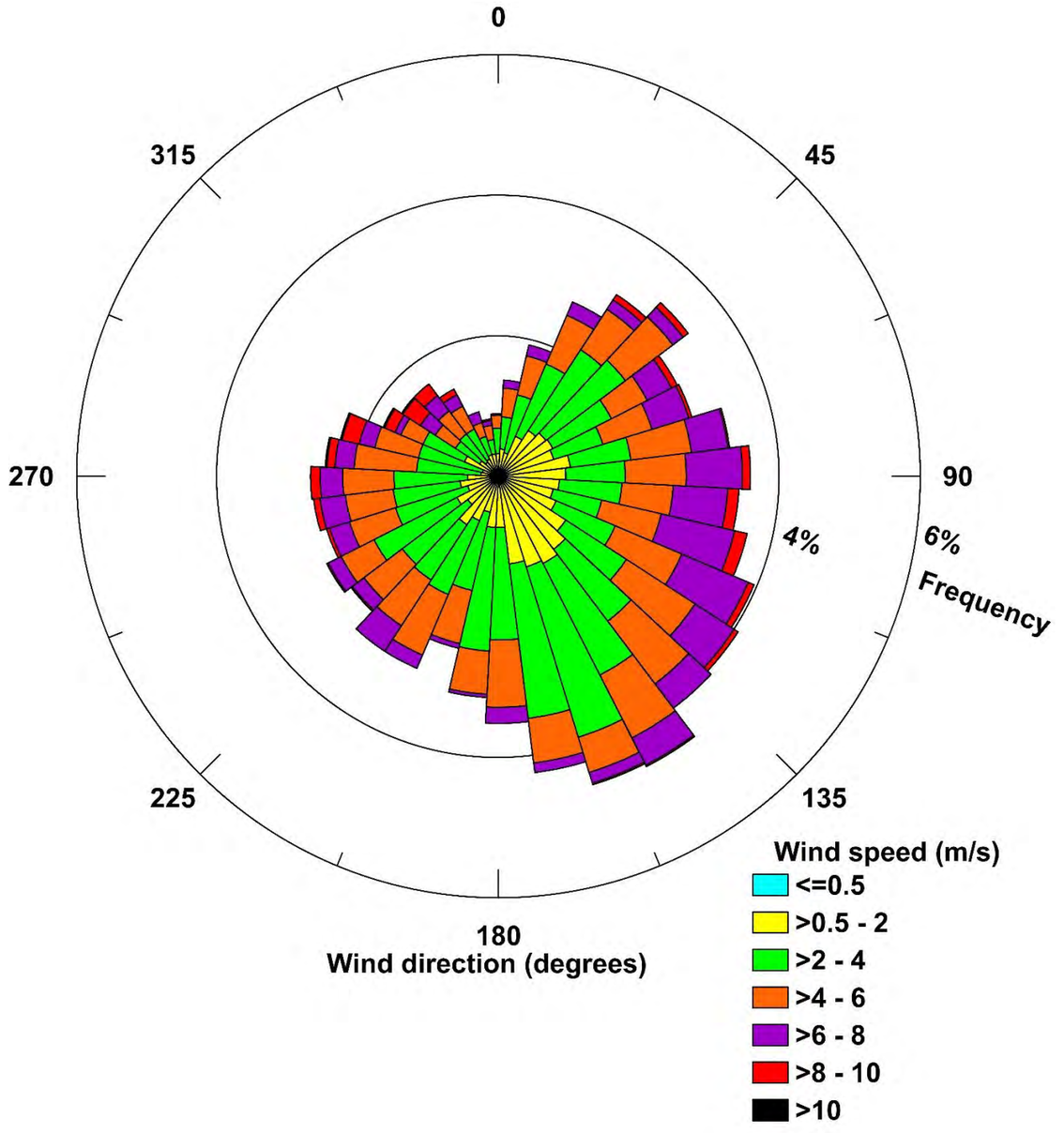


Figure 2-4: Calmet Hybrid (Mandurah BoM + TAPM) 2021 Dataset (WS & WD)

The settings within the Calmet configuration allows for met characteristics at the surface station to be considered when hybridising the two met datasets into a single met dataset representative of the Facility's locality.

2.3 Meteorological Trends transporting Facility Emissions

The nearest sensitive receptors surrounding the Facility are mainly in the westerly and south-to-southeast directions.

The annual wind characteristics where those wind speeds are most conducive for odour impacts are typically 4 m/s or less (≤ 14.4 km/hr). These wind speeds represent a *Gentle Breeze* or less according to the Beaufort Scale. Winds ≤ 4 m/s represents approximately 62 % of the annual wind trends across the locality.

At wind speeds greater than 4 m/s the persistent wind velocity, coupled with convective turbulence during daytime hours and mechanical turbulence due to surface roughness within the locality, odour plumes are more readily dispersed and the risk of a persistent odour impacts (frequency), intense odours (strength due to poor dispersion) and subsequent offensiveness of the odour is diminished.

Figure 2-5 shows the relationship of winds ≤ or ≥ 4 m/s for the locality.

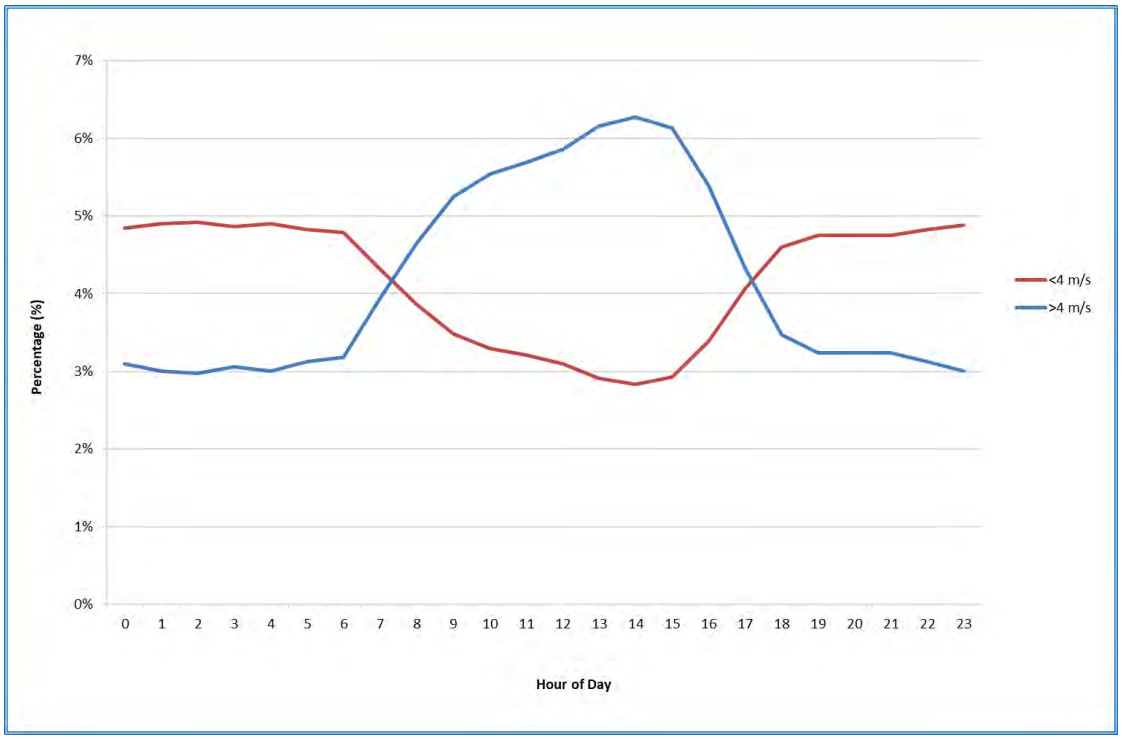


Figure 2-5: Diurnal Trends of Wind Speeds < 4 m/s & > 4 m/s

It can be seen from **Figure 2-5** that between approximately 6:30AM and 5:30PM (i.e., daytime hours) the frequency of wind speeds > 4 m/s begins to increase whilst wind speeds < 4 m/s decrease. Therefore, the percentage of those more problematic winds of ≤ 4 m/s occurs, in general, outside of daytime hours as expected.

The nexus points between daytime and nighttime hours of approximately 6:30AM and 5:30PM, in particular during the cooler seasonal periods of late autumn, winter and early spring, represent a higher risk of odour impacts at the nearest sensitive receptor due to (among others) lower wind speeds across the locality.

Dispersive conditions based on the vertical met profile can also be illustrated using the diurnal stability relationship.

Figure 2-6 illustrates the diurnal trends of atmospheric stability during annual wind conditions across the locality, by plotting the averaged inverse Monin-Obukhov length (m) against Stability Class for each hour of the day.

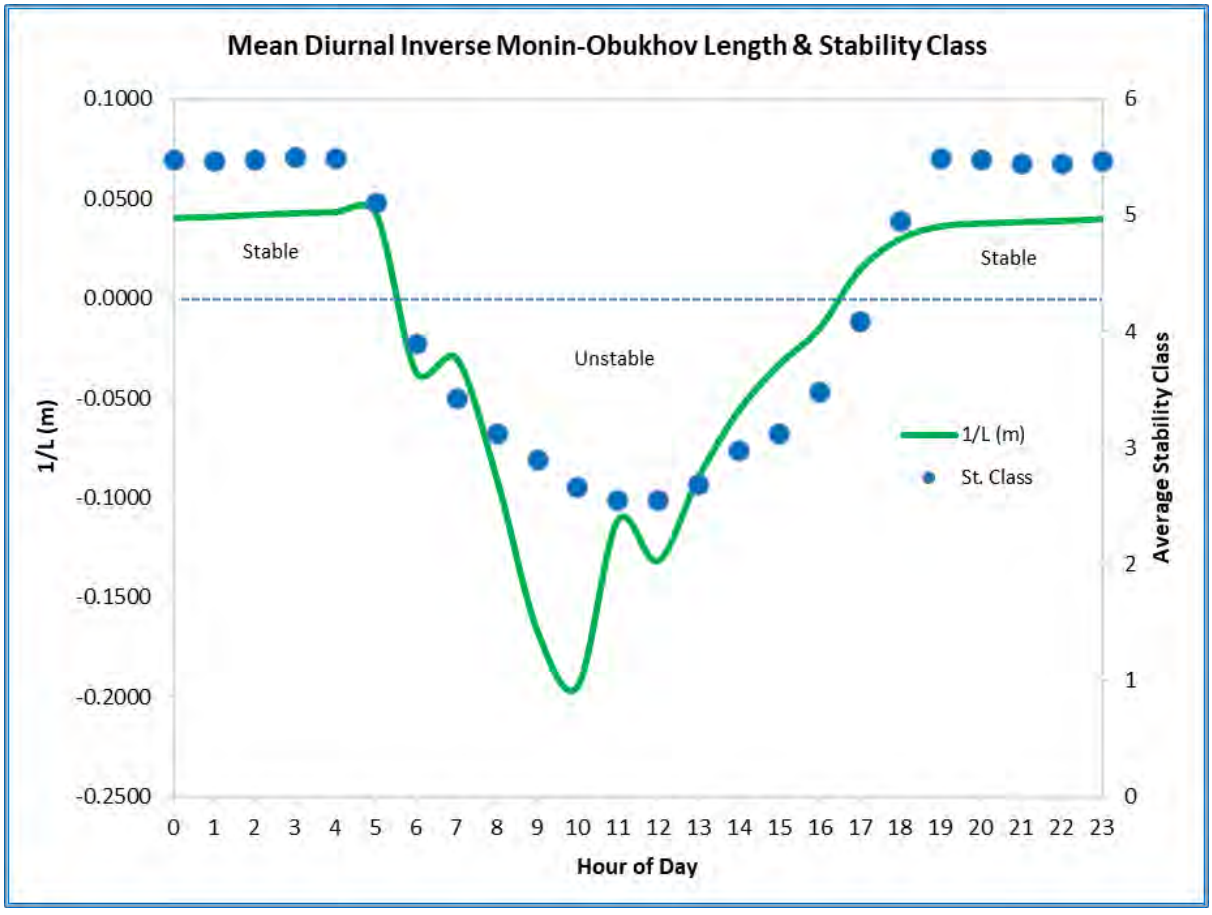


Figure 2-6: Diurnal Trends of Atmospheric Stability for locality (modelled)

The Monin-Obukhov length describes the effects of buoyancy on turbulent flows, which can simply be defined as the height at which turbulence is generated more by buoyancy than by wind shear, that is; the prominent vertical movement of air during daytime convective conditions generates turbulence and therefore increases dispersion.

As previously discussed, stability refers to the atmosphere's ability to resist or enhance vertical motion resulting in turbulence. These trends show that unstable conditions begin around approximately 5:00AM and continue through until approximately 6:00PM.

Where odour emissions are released outside of these daytime hours i.e., early morning and evening-nighttime hours, those odour emissions are more likely to impact nearby sensitive receivers. In the case of the Facility, the existing separation distance will be sufficient due to the proposed controls and containment design for primary odour generation at the Facility.

Additionally, urban receivers in the far-field are unlikely to observe odours from the Facility given the larger separation distances between odour source and receiver.

3 C-Wise Existing Activities

The existing composting activities are proposed to be transferred into C-Wise's new Facility at stage 2 of the Facility's construction.

The proposed Facility proposed to increase its production of solid organics by more than double its current licensed capacity with a focus on increasing its capacity to process Food Organics Garden Organics (FOGO).

The proposed Facility will provide a considerably higher level of control, both in batch composting and in emissions control.

The Facility proposes to capture and either re-use or treat the primary odour emissions from the composting activities. The re-use will involve the odours being extracted from the covered composting cocoons and the airstream recirculated back into the MAF system to be used as aeration.

The aeration of the odours will be treated within the composting piles. Importantly, the nearest sensitive receptor (rural residence) is approximately 2.57 kms southeast of the Development Footprint. According to the Odour Guideline, the recommended screening distances for a Category 61 Prescribed Premises is 1,000m and is on a case-by-case basis for a >50,000 tonne per annum (tpa) Category 67A Prescribed Premises with outdoor covered windrows and continuous aeration. As a result of the separation distance from the Site to the nearest sensitive receptor, the risk of impacts from odours generated at the Site is considered to be low.

Notwithstanding the 'remoteness' of the Facility's location with respect to the nearest sensitive receptors, odour extraction and odour treatment of emissions is proposed to a best-practice outcome with respect to primary odour emission sources.

3.1 Existing C-Wise Activities

The existing activities at the current C-Wise composting facility comprise of the greenwastes receivals (raw materials) stockpiling area, the waste organics (raw materials) bunded area upon the existing hardstand, the mixing and composting pad (hardstand), together with the mobile aeration floor (MAF) composting area, final compost screening and stockpiling, waste liquid treatment and disposal ponds.

The current licenced production capacity for solids and liquid waste streams are:

- Category 61 – Liquid waste facility: 93,300 tonnes per annum (tpa); and
- Category 67A – Compost manufacturing and soil blending: 90,000 tpa.

The composting hardstand and MAF area is approximately 6,000 m^2 in area, although this allows for the total surface area where MAF composting is undertaken rather than just the aerated compost piles themselves.

The process and waste liquid treatment and storage dams comprise an approximate area of 11 ha, where the primary treatment dams represent approximately 16 % of this total area.

The Raw Materials Bund is the process area where organic wastes, to include liquid wastes, are introduced to shredded green wastes and mixed ready for composting. The Raw Materials Bund process area, to include overflow and spillage/seepage, is approximately 850 m^2.

The overall total composting area, encompassing all composts and raw materials but excluding the liquor ponds, is approximately 7 ha, with the coverage across that total area at an estimated 50% where piles of compost, compost overflow and leachate are present.

Within that estimated 3.5 ha of odour emitting product (raw, compost, leachate runoff) the compost piles are volumes of odour emissions rather than flat area sources. In this case many of the odour emissions are elevated where the compost piles emit odours from the top portions of these piles, and centred within the piles, based on temperature profiles within the compost piles.

The activities are continuous within the existing composting facility and odour emissions are therefore continuous and uncontained, although activities such as construction of windrows, windrow turning and composting screening and stockpiling only take place during daytime hours of operations.

The current composting activities provide negligible odour control and nil odour treatment, subsequently the odour footprint has the potential to be far-reaching under worst-case processing and meteorological conditions.

Notwithstanding, the existing composting activities have existed at the current location for an extended period and have co-existed within the locality with respect to the nearest receptors.

Given the changes in landuses proposed in the locality, to include the Peel Business Park to the south and southwest of the Site, the need for improved process control and importantly odour emissions controls, capture and treatment are now required to elevate C-Wise into a best-practice carbon recycling operation.

4 C-Wise Proposed Facility

The proposed Facility is currently in a conceptual design stage with design drawings utilised to support the various approval Applications. As part of the conceptual design works, specific focus was given to the environmental engineering and operational management controls for the Facility, which are discussed further within this Assessment.

It is anticipated that there may be some changes to the design of the Facility arising from the detailed design phase. However, C-Wise can confirm that there will be no significant alterations to the design intent or performance standards of the environmental engineering controls included within the conceptual designs and as outlined within this Assessment.

The proposed Facility will initially accept approximately 100,000 tpa of solid organic materials for processing, increasing to a total of 200,000 tpa as the Stage 2 development is delivered. In addition to this, 30,000 tpa of liquid wastes will be accepted initially, increasing to 60,000 tpa once the Stage 2 development has been completed. This represents the generation of approximately 70,000 tpa of composted products in the initial stage, and 140,000 tpa once the Stage 2 development is complete.

The Stage 1 development of the Facility will be used primarily to process FOGO materials. At Stage 2 the entire existing facility activities will be moved across to the new Facility.

The key infrastructure to be constructed for each stage is listed in **Table 4-1**.

Table 4-1: Proposed Staged Infrastructure

Stage 1	Stage 2

• Access road
• Weighbridge
• Administration office
Composting infrastructure, comprising:
• Carbon storage area
• Liquid waste receival area and tanks
• Receival building
• Process area, comprising:
  • Cocoons (fully enclosed)
  • MAF area (under cover)
  • Final maturation area (under cover)
• Screening and dispatch area
• Two leachate ponds
• Stormwater pond
• Wetland fencing and firebreaks
• Fuel store and service areas
• Workshop, crib room and office
	Composting infrastructure, comprising:
	• Carbon storage area
	• Liquid waste tanks
	• Receival building
	• Process area, comprising:
	  • Cocoons (fully enclosed)
	  • MAF area (under cover)
	  • Final maturation area (under cover)
	• Screening and dispatch area
	• Two leachate ponds
	• Stormwater pond

The composting process will be completed in several stages, each of which will be fully enclosed to minimise potential odour emissions and to assist in the management of leachate. These stages include: Receival;

- Receival;
- Stage 1 – Cocoon system (10-14 days);
- Stages 2-4/5 – Pasteurisation (10-14 days each)
- Stage 5/6 – Settling (2-4 days); and
- Screening and Dispatch

Composting will be completed in general accordance with the Organics Recycling Guideline to ensure that the finished product will satisfy various market requirements.

4.1 Carbon Storage Area

Low risk feedstocks such as greenwaste, forestry residues and natural fibrous organics (such as cereal waste) will be stored in the carbon storage area. The carbon storage area is located on the northern side of the composting infrastructure, near the access road, to minimise the distance that waste delivery vehicles need to travel and limit the potential for vehicle interactions with Site personnel. It will consist of a compacted limestone hardstand that is graded to the north to direct all leachate towards the nearby leachate management pond, rather than the surrounding environment. Bunding will be installed at the edge of the hardstand to assist in directing leachate toward the pond.

A second carbon storage area will be constructed as part of the Stage 2 development, also consisting of a compacted limestone hardstand, graded to the associated leachate ponds. It is important to note that in accordance with Table 4 of the Organics Recycling Guideline, leachate generated in this area is defined as low-risk, as it is generated from low-risk feedstocks. Low risk feedstocks will be received directly on the hardstand and will be transported to the Receival Building prior to being blended into the pre-treated compost mix. Occasional wetting of materials using stormwater or groundwater will occur on this hardstand to minimise wind-driven dispersion of finer materials, and to pre-wet materials prior to inclusion in the composting process.

4.2 Receival Building

High risk feedstocks such as FOGO will be delivered by waste vehicles to the receival building and pre-sorted to remove contamination prior to composting. The receival building will be enclosed and roofed to eliminate the risk of clean stormwater coming into contact with waste materials and generating high-risk leachate. Doors will be installed and kept closed when waste materials are not being delivered to minimise the uncontrolled release of odours from the building. A mechanical ventilation system will be installed in the receival building to meet the minimum required four air changes per hour.

The receival building will include a FOGO receival area for vehicles to place waste materials and internal processing equipment for pre-sorting and the removal of contamination. There will also be a processing plant to ensure all materials are a consistent and/or suitably sized before progressing into the composting

process. Mixers will combine the FOGO stream with materials from the carbon storage area, where appropriate, producing a blend suitable for inclusion in the composting process. A second receival building will be constructed as part of the Stage 2 development and is expected to contain similar infrastructure, equipment and operations.

Organic materials will be delivered directly to the receival hall for pre-treatment. An initial inspection will be undertaken for all waste loads entering the Site to ensure that the material will be suitable for composting and does not contain unreasonable levels of contamination. Once they have been deposited in the receival building, organic materials will be fed via a hopper into a further sorting process to remove contamination. The material will then be passed through a size-separation process before being stored in a FOGO bunker within the hall. Materials from the carbon storage area will also be brought into the receival building for storage in the material cocoons prior to inclusion in the process, when required.

The organic materials, once mixed and blended inside the receivals building, will then be transferred to the cocoons to commence the composting process. The receival building will be run with a 'clean floor' policy, with all materials processed and removed from the receival building by the end of each working day.

4.3 Liquid Waste Receival Area and Tanks

Liquid wastes will be accepted at the liquid waste receival area for blending into compost products. The liquid waste receival area will and bunded, which minimises the risk of liquid wastes entering the environment in the event of a spill or leak.

The Stage 1 development will include twelve storage tanks, with each tank having a storage capacity of 340,000 L. The tanks within the farm for each stage will be arranged in banks of three. The tanks will also be equipped with monitoring equipment (e.g., high-level alarms) to ensure that they do not overfill. Three of the storage tanks located in this area will be reserved for the temporary storage of high-risk leachate generated from the receival building, cocoon area and process area. An additional 12 storage tanks will be installed directly to the east of the existing tanks as part of the Stage 2 development, with three reserved for management of high-risk leachate generated in Stage 2. No additional liquid waste receival area will be constructed as part of the Stage 2 development and the existing liquid waste receival area from the Stage 1 development will be used to service all liquid waste tanks.

Vehicles delivering liquid wastes to the Facility will do so in the liquid waste receival area. Liquid wastes will be released into an in-ground pit that contains a pump and filter to separate any solids. The liquid waste will be stored in the adjacent liquid waste storage tanks to minimise potential odour emissions. Liquid waste accepted at the Site, and leachate stored within the tank farm, will be used in the compost manufacturing process.

4.4 Cocoons

As part of the C-Wise Smart Composting project, a proprietary composting system using custom-built composting cocoons has been developed for the initial stage of composting for the Project. Both Stage 1

and Stage 2 developments will feature 12 composting cocoons located between the receival building and MAF area within the process area, with an additional three cocoons for surge capacity located adjacent to the receival building.

The cocoons will be fully enclosed and can be managed and operated individually. They will include a tension fabric roof with a structural insulated panel system to protect the piles from contact with stormwater and to minimise leachate generation. The cocoon system is suspended underneath each tension fabric roof and will be lowered over the piles of organic material in the initial stages of the process. Each cocoon will have a capacity of 500m_3 and be constructed over an effectively impermeable bunded concrete hardstand to minimise the risk of leachate entering soils. The concrete floor of each cocoon will be graded towards a collection pit to allow the extraction of high-risk leachate for storage in the tank farms and will not allow any high-risk leachate to escape.

The initial composting process will take place in the cocoons, which are fully enclosed to minimise odour emissions and the risk of leachate being released into the environment. Air exchanges will occur throughout the process to maintain aerobic conditions and minimise odour generation, with air removed from the process being pumped through the initial MAF compost stack to act as a biofilter and further mitigate odour generation.

This initial composting and pasteurisation stage is expected to take between 10-14 days to complete during which the piles will be subject to temperatures in excess of 55^0C to ensure pasteurisation. This is similar to how enclosed tunnel composting systems work, wherein the initial stage is used for pasteurisation. Following this stage, the partially processed compost will be transferred to the MAF area for additional processing and maturation.

4.5 Process Area

Two processing sheds for each stage will be constructed to host the composting process after the material has gone through the initial processing within the cocoon system. Each processing shed will feature a roof, located approximately 6m above the ground level. This roof is a critical and key environmental control at the Site, effectively eliminating rainfall-driven generation of high-risk leachate from the composting process. To allow for operational flexibility, each shed will not have permanent sidewalls, however a series of precast retaining cocoons walls will be used for each stage of the composting process to contain the stockpiles and minimise any rainfall-drive leachate generation.

The floor within each processing shed will be made of an effectively impermeable concrete hardstand and will feature bunds and slopes to contain any leachate generated within and drain it towards leachate collection pits. The concrete floor shall be designed so that the fall ensures no leachate will escape the processing shed. Leachate will then be pumped from the collection pits for storage in the tank farm or for reuse in the composting process. Each process shed will host five additional stages of the composting process, using a combination of MAF and passive composting maturation to deliver a final compost material to the screening and dispatch area.

4.5.1 MAF Area

Following the initial process within the cocoons, the maturation phase of the composting process will take place in the MAF area, directly south of the cocoons. Though the number of MAF stages will vary depending on operational requirements, it is anticipated that a minimum of three MAF stages will occur as part of the regular composting process. Each stage is anticipated to take between 10-14 days to complete.

The MAF system comprises a perforated pipe which is laid on top of the hardstand processing shed floor prior to the placement of organic material. This will force air through the pile and achieve aeration without the need for turning. At the end of each stage the compost material is inspected and moisture levels are assessed.

Master Units (MU) and Subunits (SU) are disconnected, and any damage or faults are addressed before being placed into position for the next stage of the composting process. Air Supply (AS) Pipes are extracted from underneath the current pile and moved into position with MAF MU and SU units at the next stage.

Once connected and tested for correct operation, the compost stockpile is moved from previous MAF stage to this next stage. The front-end loader movement of the compost pile involves additional mechanical breakdown and mixing of the material when transferring to the subsequent MAF stage. This mixing also facilitates additional pasteurisation to that achieved in the cocoon composting stage and further maturation of the compost.

The piles will be monitored to ensure that appropriate temperature and moisture levels are maintained to ensure pasteurisation and achieve further maturation. The MAF stages following the cocoon phase of the composting, allow C-Wise to control the maturity of the compost to be meet its intended market. High maturity composts will require longer maturation times and therefore additional composting stages. Lower maturity composts will have lower timeframe demands.

Any leachate generated during this phase of the composting process will drain across the concrete floor of the processing shed to a collection pit for collection prior to temporary storage in the tank farm.

The pasteurisation process is used to kill plant and animal pathogens, parasites and weeds/seeds within the compost. This stage of the process will occur in the MAF area. Pasteurisation via the MAF system will be completed across a minimum of three stages, between which the piles will be manually turned to ensure that the outer layers of compost reach pasteurisation temperatures. Each stage is anticipated to take between 7-10 days to complete. Once pasteurisation is complete, the pasteurised compost will be transferred to the final maturation area for settling.

The same MAF system and process will be utilised in all process areas across Stage 1 and 2.

4.5.2 Final Maturation Area

The final stages of the composting process before screening and dispatch will see the final maturation of the compost product in the southmost stages of the processing shed. The product will come from the MAF Area and be formed into stockpiles underneath the processing shed roof, where it will be left to

passively sit and settle on the concrete hardstand. As in all areas of the processing shed, any leachates generated from this process will drain to the collection pits for pumping to the tank farm.

It is anticipated that each stage of this process will occur for a minimum of 2-4 days, after which the product will be moved to the screening and dispatch area before ultimately being removed from Site.

The maturation area process and infrastructure will be the same in both the Stage 1 and Stage 2 developments.

4.5.3 Screening and Dispatch Area

The screening and dispatch area is where the finished compost product will be stored prior to removal from Site. It is located south of the MAF and final maturation areas, towards the back of the Facility. As this area will only be used for the storage of the finished compost product, it will not be roofed. It will consist of an effectively impermeable bunded asphalt hardstand in accordance with the Organics Recycling Guideline. Any leachate generated in this area will be classified as low-risk in accordance with the Organics Recycling Guideline and will be directed towards the adjacent leachate management pond within each stage.

Once the composting process has been completed, the compost product will be screened to grade the product according to size, as well as allow for the removal of any remaining physical contaminants.

The final product will be tested and classified in accordance with the Organics Recycling Guideline to ensure that it is fit-for-purpose and of a sufficient quality. At this stage, it is unknown if the outputs from the Facility will be classified as either Category A or Category B products, as this is dependent on the feedstocks used to create the products, as outlined in the Organics Recycling Guideline. The quality and type of feedstocks used to create compost at the Facility will be confirmed during operations through appropriate and regular testing. It is noted that C-Wise has a proven history of sourcing appropriate feedstocks for market requirements at its existing Nambeelup composting facility and therefore it is anticipated that both Category A and Category B products may be generated at the Facility.

The final product will be stored in the screening and dispatch area prior to being loaded into vehicles for transport to appropriate markets.

5 Regulatory Guidance for Odour Impact Assessment

As part of C-Wise's Application the Western Australian (WA) Department of Water and Environmental Regulation (DWER) Guideline "Better practice organics recycling" December 2022 is referred to given the nature of the activity undertaken at the Site.

Under Section 51 (s.51) of the WA Environmental Protection Act (EP Act), *"operators of facilities must take all reasonable and practicable measures to prevent or minimise emissions. Under s.51 of the EP Act, it is an offence for occupiers of prescribed premises not to take these measures".*

The Better practice organics recycling guideline:

- Sets environmental performance objectives (EPOs), which are the outcomes that must be achieved ;
- Identifies benchmark controls as the standard for operators to demonstrate they have achieved the EPOs; and
- Allows for alternative controls to achieve the EPOs, consistent with a risk-based approach and to support effective and innovative site-specific solutions.

Subsequently, DWER will apply controls to meet the EPOs, whether benchmark or operator-proposed alternatives, as conditions within approvals granted under Pt V Division 3 of the EP Act.

The EPOs most relevant to this odour Assessment are tabled below.

Table 5-1: Environmental performance objectives

Aspect	Environmental performance objective
Emissions to land and water	Protect the environment by preventing and, where that is not possible, minimising emissions to land and water that may cause pollution or environmental harm.
Odour	Protect the environment by preventing and, where that is not possible, minimising odour emissions that may cause pollution or environmental harm.

DWER provides "Benchmark controls" that serve to achieve the applicable EPOs, these are grouped into the following types:

- Planning: these controls refer to what operators are to prepare and act on to effectively implement infrastructure, equipment, process and management requirements;
- Infrastructure and equipment: these controls refer to design and installation specifications; and
- Operations: these controls refer to process and management requirements, including maintenance, monitoring and response measures.

DWER also supports that operators can implement suitable alternative controls in place of the benchmark controls.

This odour Assessment additionally refers the most recent WA DWER Guideline "Odour emissions" June 2019 document where the Guideline provides assessment methods for delivering adequate odour data and information to the DWER for the assessment of applications under Part V of the EP Act; where, *"Part V Division 3 of the EP Act provides the Department with mechanisms for regulating odour, by way of conditions on works approvals and licences applied to prescribed premises".*

The DWER employs a risk-based approach to its assessment of applications for instruments under Part V of the EP Act.

In determining the risk posed by odour, DWER considers:

- the location, proximity and sensitivity of receptors;
- the management of odour sources and activities;
- the intensity and offensiveness of the odour;
- potential odour impacts from other nearby sources;
- the topography and complexity of terrain;
- the size and / or complexity of the facility when compared with other Australian operations;
- any unusual configuration of odour sources or technology compared with other Australian operations;
- whether the proposal is located in a Strategic Industrial Area (SIA);
- the presence of multiple industry categories which may emit odours on the same site;
- current and cumulative impacts from odour; and
- pathways and impacts on sensitive receptors.

6 Proposed Facility's EPO's & Benchmark Controls

6.1 Feedstock

In accordance with the DWER's feedstock risk categories, **Table 6-1** lists those feedstock waste types, risk category and benchmark controls to achieve EPO's for *Emissions to land and water*, and *Odour*.

Feedstocks that are not classified as a *known* source or are a new source of influent wastes are inspected prior to Site delivery by way of a review of the wastes components to include laboratory analysis of the wastes (where applicable) and subsequent determination of the variability of waste composition, and/or certification of the waste sources' origin with respect to its viability for organics composting.

As part of C-Wise's operational and compliance systems, the controlled waste tracking system stores all incoming waste volumes, dates of receivals and their respective waste classification types.

C-Wise will refuse all wastes that do not meet the waste classifications required for the Facility and/or any contaminated wastes outside of the waste acceptance procedures and individual contaminant limitations.

Table 6-1: EPOs & Benchmark controls

Waste type	Standard feedstock	DWER Risk category	EPO	Benchmark controls
Greenwastes	Greenwaste (low contamination), natural fibrous organics, forestry residues.	Low	Emissions to land and water, Odour	Raw organic waste materials receival building is an enclosed containment area/s (infrastructure), composting process areas on hardstand and under-roof, with fully enclosed primary composting cocoons, and hardstand graded to contain and divert leachates to collection pits (infrastructure). Clean, bulk sized greenwastes held in separate location for re-sizing (management and process). Council collection greenwastes as part of the FOGO stream received through the receival building which is enclosed. Co-mingled wastes/FOGO wastes accepted through pre-arranged scheduling to ensure immediacy of receival and management controls where wastes inside the receival building are incorporated into the primary composting cocoons in a choreographed manner. Pre-cocoon compost piles mixing and odour containment (planning and operations). Building and roofed areas are hardstand, with engineered leachate fall, containment pits and dedicated bunded and process areas to maximise production and minimise contamination between process stages. Cocoons are enclosed and the forced-aeration systems (MAFs) either re-use the filtered air by diversion and aeration into adjacent cocoon piles, or, extraction of aeration air and divert to dedicated treatment biofilter/s.
Garden organics (GO)	Household kerbside collections, source-separated commercial collections.	Moderate		
Food wastes and food organics (FO)	Food, kitchen and garden putrescible wastes from household kerbside collections, source-separated commercial food wastes.	High		

Liquid wastes	Putrescible and organics from animal effluent and residues, grease interceptor and traps, liquid food beverages and processing wastes.	High		Liquid wastes accepted on a contractual arrangement and in compliance with the Facility's waste acceptance categories and procedures. Waste liquids are received into the liquid waste receival area and liquid wastes will be released into an in-ground pit that contains a pump and filter to separate any solids. The liquid waste will be stored in the adjacent liquid waste storage tanks to minimise potential odour emissions. Liquid waste accepted at the Site, and leachate stored within the tank farm, will be used in the compost manufacturing process. Liquid waste storage Tanks and within a bunded area with an overflow capacity of 110%. Composting hardstand/s are designed and constructed to divert liquid waste runoff and process leachates to containment pits and subsequently repel leachate infiltration into terrestrial and groundwater environments. A Surface Water and Leachate Management Plan (SWLMP) has been developed for the Site, which outlines the approach to eliminating and reducing the generation of high-risk leachate, and the management and control of low-risk leachate. Where possible, surface water will be diverted from areas with the potential to generate leachate. Staged development of the Facility will feature roofed processing areas to eliminate rainfall-driven generation of high-risk leachate, and hardstands and collection pits for the collection of high-risk leachates prior to transport to the tank farm for each stage. Construction Quality Assurance (CQA) plans for leachate ponds/dams' infrastructure at the Site will be undertaken and approved (infrastructure). A water balance will/has been undertaken at each new infrastructure design and construction step.

6.2 Emissions to Land and Water

Facility wastes that may cause emissions to terrestrial lands and water, primarily, are liquid wastes. These liquid wastes can be *lost* to the receiving environment through runoff and leachate flows into surface water sources and/or ingress into the water table.

Surface water runoff and process leachates, to include liquid wastes' spill runoff are retained at the terrestrial surface by appropriately designed and constructed working hardstands, bunded areas, containment pits and liquid waste tank farm.

6.2.1 Carbon Storage Area

Any leachate runoff from the carbon storage area will be low risk given the feedstock itself is low risk for odour generation and subsequent contamination from emissions.

The carbon storage area will consist of a compacted limestone hardstand that is graded to the north to direct all leachate towards the nearby leachate management pond, rather than the surrounding environment. The limestone material will be applied in a minimum 300 mm thick layer, which has been shown to achieve an effective permeability of $2.8x10^{-8}$m/s. Any leachate generated at the carbon storage area will freely flow across the surface of the hardstand, which will be maintained to ensure ponding of leachate on the surface does not occur. Bunding will be installed at the edge of the hardstand to assist in directing leachate toward the pond.

6.2.2 Facility Enclosed Receival Building

The Facility will be a concrete hardstand construction with engineered drainage fall in all leachates generating areas to capture, divert and contain leachate runoff.

Additionally, the roofed construction will capture and divert rainfall to avoid additional leachate generation that would otherwise occur within an open-air composting design – which is the current activity at the existing C-Wise operations.

6.2.3 Surface Water & Leachate Ponds

As part of the SWLMS, one surface water pond and two leachate management ponds will be constructed to support each stage of the Project. Clean surface water will be directed away from Facility processing building, cocoons and receival hall roofs, and into the surface water ponds to eliminate the rainfall-driven generation of high-risk leachate within these areas.

The surface water ponds will consist of:

- A 300mm compacted subgrade layer using onsite soil material; and
- A 2mm High Density Polyethylene (HDPE) Geomembrane.

Each surface water pond has been sized to a 1-in-20-year, 24-hour storm event in accordance with the Organics Recycling Guidelines and will include a passive spillway that allows for a controlled release of stormwater offsite.

The leachate management ponds will be used to capture any low-risk leachate generated from the carbon storage area and the product screening and dispatch area. Any high-risk leachate generated at the Site will be collected in a series of collection pits under the roofed area and then pumped to the liquid waste tanks for storage prior to reuse in the composting process.

To prevent low-risk leachate stored in the ponds from percolating into the groundwater system, the ponds will be lined in general accordance with the Composting Guidelines:

- A 300mm Compacted Subgrade Layer;

- A 2mm High Density Polyethylene (HDPE) Geomembrane; and
- Geosynthetic Clay Liner (GCL).

Technical Specification and Construction Quality Assurance (CQA) Plan for the ponds and swales has also been developed.

7 Odour

7.1 Detailed Analysis

The proposed composting processes will not differ materially from what is currently undertaken at C-Wise's operations other than to increase overall throughput, and importantly to vastly improve containment, control, and subsequent odour treatment of process odour emissions.

The proposed Facility will be operated within a heavily contained composting environment, with multiple high-level process controls, that will provide a more useful process working environment allowing phased composting processes to move through the Facility in a well-choreographed manner.

Initial phase composting and pasteurisation will be the most odorous. This takes place in the enclosed cocoons. Additional maturation follows where the compost is removed from the cocoons and transferred onto a MAF system for continued maturation, followed by settling/storage, before final dispatch.

The maturation phase is considerably less odorous than the initial initial/pasteurisation composting phases and therefore does not require a cocoon system. Importantly though, maturation and settling/storage will also take place beneath the roofed Facility.

By minimising the manual handling of the composting process, which is achieved through the cocoon and maturation areas, compost piles can be left to process and decompose to their final product without having to be excessively handled during the process.

The Facility design will comprise of composting cocoon 'modules' of a specific size, constructed of a mid-height concrete structure with a geofabric cover (or similar) that will encapsulate aeration flows. The aeration of the piles inside the cocoons is 'pulsed' i.e., intermittent, and the volume of air used to aerate will not penetrate the covering system.

At final construction of the Facility, the cocoons from Stages 1 and 2, and the receivals building and supporting infrastructure will be mirror-image of each other with odour capture, extraction, re-use and/or odour treatment via biofiltration. Process water/leachate collection is achieved through the floor of the cocoons via runoff, and leachates are diverted to a common pit and/or recycled as introduced nutrient rich water to a newly laid compost pile.

Each composting cocoon is independent of all others, self-operating through automated parameterised settings, and comprises an air duct system, sub-floor blowers, process/leachate water collection and leachate recycling/addition systems and process control features for temperature, pressure, oxygen levels, moisture etc. The cocoon floor design allows the inflow of process water/leachates and outflow of air into the composting material.

The raw waste material is placed into each cocoon individually and removed at the end of the composting timeframe by front-end loader.

Process odours generated from the composting piles, due mainly to forced aeration in timed intervals, are retained within the cocoon and under the covers which remain in place for the duration of the cocoon composting cycle.

If/as required, a fit-for-purpose biofilter will be installed to receive and treat cocoon and maturation MAF process odours.

However, it is envisaged that the cocoon air will be captured under the covers and re-used as recycled aeration air for other cocoons.

The proposed Facility at Stage 2 will in effect double the volume of organics received and composted at the Site. However, at Stage 1 there will be Facility process odours as well as odours from the existing C-Wise facility. To this end the odour profile will increase commensurate with those Facility composting activities most likely to generate malodour.

As previously mentioned, the existing and future separation distance from the current and future Facility are ample and afford a large level of protection from malodour impacts at the nearest receptor. Despite this significant separation distance, C-Wise's proposed Facility will control, contain and treat primary and secondary odour emissions to further limit potential risks to amenity at those nearest sensitive receptors.

FOGO materials acceptance and pre-treatment occurs indoors in the enclosed receival building, which will include a mechanical ventilation system to meet a minimum four air changes per hour to mitigate odour stagnation and subsequent odour plume development within the Facility.

The initial stage of the composing process will occur under a cocoon system, which will contain odours during the most volatile stage of the process. Air will be removed from the cocoons and be pumped through compost in subsequent stages of the process, minimising odours generated by a 'biofilter' effect.

As a result of these controls and the re-use or treatment of the primary odour emissions, the odour footprint from the Project will not be of the same magnitude as the existing CWise activities to the south of the Site. Therefore, the cumulative odour footprint arising from the Stage 1 development is unlikely to increase the odour risk profile from existing and proposed C-Wise composting activities.

When the Facility achieves completion at Stage 2, all existing odour generating activities at the current C-Wise facility will cease and the odour footprint will be reduced from all C-Wise carbon recycling activities.

C-Wise will implement the following management measures to ensure that odour emissions are minimised as far as practicable:

- Highly putrescible organic materials such as FOGO, which will generate the most odour emissions, will be processed in an enclosed composting system;
- Less putrescible organic materials that produce fewer odour emissions, such as greenwaste, will be stored in the carbon storage area;
- Organic materials will be delivered to the receival building for initial inspection, which is enclosed and roofed to minimise potential odour releases;

- The receival building will include doors that will be kept closed at all times when waste is not being delivered;
- The receival building will also operate with a 'clean floor' policy, with all received wastes removed by the end of each working day;
- The initial composting stage will occur in the cocoons, which will be fully enclosed. Odorous air will be extracted from the cocoon process and used in the MAF processing area which will provide a biofilter effect;
- The use of the MAF system during the pasteurisation phase will reduce odour emissions through the continuous operation of windrows;
- The MAF and final maturation areas will be roofed to provide optimal processing conditions to mitigate the potential for odour emissions arising from poor maturation;
- Liquid waste accepted at the Site will be stored in enclosed tanks, which will minimise potential odour emissions;
- Vehicles transporting waste materials to the Site and compost products away from the Site will be required to be covered at all times; and
- A complaints register will be maintained and, in the event that a complaint is received, CWise will investigate the source and implement appropriate management controls.

7.2 Operational Odour Analysis (OOA)

Table 7-1 below lists the existing process activities, controls, pollution responses and contingencies in the form of an Operational Odour Analysis (OOA)**.** The final columns are risk evaluation recommendations for residual odour impacts at the nearest sensitive receiver. The residual odour is the odour emissions that remain following all controls and mitigative measures to reduce odour emissions from the existing C-Wise composting activities.

Table 7-2 details the OOA for the proposed activities following approval of the Facility. This OOA Table details the processes surrounding the receivals building, composting cocoons, maturation MAFs, waste liquids and leachate management, and (if/as required) biofiltration.

Table 7-1: Operational Odour Analysis of Existing Activities

Odour Source	Source of Odour Emissions	Process Control	Triggers & Corrective Actions	Corrective Action Evaluation	Contingency Actions	Residual Odour Impact Potential			
						Consequence	Likelihood	Impact Potential (onsite)	Impact Potential (receiver)
Raw Materials	Green Waste (shredding and grinding activities).	• Incoming materials are inspected to ensure compliance with licence conditions, stockpiled, then ground/shredded on as needs basis, and then transferred to the mixing area for inclusion with solid and liquid wastes as required; • Greenwaste is held back from the composting process and only incorporated into the batch process as required; and • These batches of material are then immediately moved to the open-air MAF area to commence the composting process.	• Incoming liquid wastes, food wastes and controlled wastes are added to shredded greenwaste in mixing area on arrival by utilisation of a 'carbon' bund where for e.g., liquid wastes are poured into the bunded area to 'soak' into the carbon based substrate; and • Runoff liquids from the composting process are contained within the hardstand runoff and drain to the catchment drains before diversion to the primary leachate dam system.	• Not required due to: • Greenwaste remains in the stockpile until required, when it is then moved to the mixing area for batch processing; and • Liquid and food wastes are incorporated into the greenwaste, inside the carbon 'bunded' formation, and the batch once readied further mixed, then moved to the composting MAF area.	• The existing separation distance is ample and adequate, however: • The capacity of the infrastructure onsite has been designed to cater for a higher level of throughput to that which prevails i.e., provision of adequate space; • The compost processing and associated control systems have been designed, and operationally managed to cater for large volumes, and therefore large contingency exists within the operational systems where there is adequate capacity to handle short-term variations in production; and • There are negligible sensitive receptors in proximity of the operations with many of these receptors representing single rural residences. Far field residences are adequately protected by larger separation distances.	Moderate	Possible	**Medium**	
	Liquid Wastes (during delivery release malodour due to agitation, and whilst being ab/adsorbed into the awaiting greenwaste swale).	• Unloaded directly into a greenwaste bunded swale for immediate incorporation into the batching process. These batches of material are then moved to the MAF composting slabs to commence the composting process.							
	Solid Wastes (odours associated with food wastes and solid waste types.								
Site Run-off	Site Run-off – leachate generation	• Hardstand has been designed and constructed to capture run-off into drains, which then flows to onsite primary leachate ponds/dams; • Swales, channels and catchment drains are designed for direct runoff to the onsite ponds/dams; • All sloping areas onsite are contained by swales, drains, formed embankments, to ensure that runoff is contained onsite; and • The leachate runoff ponds/dams are lined to ensure moisture is contained within the structure.	• The level of the pond/dam is monitored to ensure that water levels remain within control. Excess leachates can be removed through gravity overflow pathways and/or mechanical pumping to adjacent primary/secondary leachate ponds/dams.	• The layout of the operational area of the site is designed such that runoff falls towards the swales, drainage channels, containment drains, storage ponds/dams, to ensure that runoff does not escape the boundaries of the overall site.	• Several pond/dams are in operation allowing for gravity feed to downstream pond/dams, to include oversupply capacity of leachate and site runoff due to rain events.	Slight	Rare	**Low**	**Low**

Composting Windrows	Composting of greenwaste and food and/or liquid wastes on MAFs – odours produced during the composting cycle.	• Active windrows are sub-floor forced aerated which minimises anaerobic decomposition and alleviates the requirement for manual turning as the only form of aeration; and • Automated control systems for windrow temperature, oxygen and moisture levels trigger the aeration system to operate, through a PLC, thus adding oxygen to the windrows.	• Automated process control system for maintaining windrow temperature, oxygen and moisture levels trigger the aeration fans, as required.	• Daily checks of windrows and aeration fans; and • Live monitoring and alarms alert onsite operators of any fan or trigger failures where in that instance the fan or probe is replaced with stand-by unit(s).	• Composting windrows are only established when both liquid waste and greenwaste are available; and • Process batches are produced only when there are windrow slabs, covers and control system infrastructure available to accommodate compost production levels.	Moderate	Possible	**Medium**	
Leachate	Composting runoff via hardstand swales, drains, etc., where leachate is contained and directed to the primary pond/dams.	• Leachate from the composting process is captured within the composting pad, before being diverted to the onsite leachate containment system;	• The leachate pond/dams system is monitored daily and inflows can be directed towards the secondary pond systems, in the event that the primary pond/dams reach capacity.	• The primary leachate ponds/dams have inbuilt design capability, whereby excess inflows are directed to the secondary ponds/dams, etc.	• Various options are available to maintain the level of leachate within the freeboard of the Leachate Ponds, including pumping leachate back onto the composting piles and/or ceasing the receivals of liquid waste.	Minor	Unlikely	**Medium**	**Low**

Table 7-2: Operational Odour Analysis of Proposed Facility

Odour Source	Source of Odour Emissions	Process Control	Triggers & Corrective Actions	Corrective Action Evaluation	Contingency Actions	Residual Odour Impact Potential			
						Consequence	Likelihood	Impact Potential (onsite)	Impact Potential (receiver)
Materials Receival Building	Volume source fugitive emissions in the event that the building doorways remain opened.	• Automated pressure pads/sensors allowing ingress/egress via doorways; • 4-air changes per hour for internal comfort, and, for extraction and subsequent dilution of residual odorous air to ensure no ground level odour plume stagnation; and • Clean-floor policy ensures that the receival building is clear and cleaned daily such that after-hours odours cannot persist, not stagnate.	• Scheduled delivery of materials; • Weighbridge and materials acceptance/refusal; • Diversion of wastes if/as required to offsite disposal location.	• N/A	• Shut down of receival building and diversion of wastes away from the Facility.	Moderate	Unlikely	**Medium**	**Low**
Cocoons	Composting of greenwaste and food and/or liquid wastes, including FOGO, within the Cocoon system which is covered, aerated, and the residual odour emissions captured and re-used and/or treated within a dedicated biofilter. Cocoon cocoons are concrete bunded walls, enclosed and forced aerated through sub-floor fans that are built into the hardstand providing 'pulses' of aeration air through the windrows to encourage composting, microbial growth and control process composting temperatures. Odorous emissions generated during composting inside these cocoons are retained inside the covered cocoons with negligible fugitive losses through small gaps along the cover.	• All compost windrow piles are inside the concrete cocoons and covered. • Windrows are sub-floor forced aerated to control aerobic/anaerobic conditions, compost pH and temperatures to maximise the composting process. • Automated control systems for windrow temperature, oxygen and moisture levels trigger the aeration system to operate, through a PLC, thus adding oxygen to the windrows and extracting odorous air, simultaneously. • Each cocoon system is allowed to process the compost from start to finish, before removal to maturation, without the need to manually handle the compost pile during composting i.e., no requirement to manually turn the windows thus removing the bulk fugitive odour losses that occur during turning. • Fit-for-purpose odour extraction attached to each cocoon allows the process air to be extracted and re-used as aeration within another cocoon, and/or treated via a dedicated odour treatment biofilter.	• Automated process control system for maintaining windrow temperature, oxygen and moisture levels trigger the aeration & extraction fans, as required. • Shutdown of cocoon/s as required and retained containment of the compost pile, with odour extraction to the re-use and/or biofilter, whilst process systems are managed and rectified.	• Daily checks of cocoons and MAF/aeration/extraction fans; and • Live monitoring and alarms alert onsite operators of any fan or trigger failures where in that instance the fan or probe is replaced with stand-by unit(s).	• Composting windrows are only established inside the cocoons when both liquid waste and greenwaste are available; and • Process batches are produced only when there are available cocoons, covers and control system infrastructure available to accommodate compost production levels.	Minor	Unlikely	**Medium**	**Low**

Biofilter (if/as required)	Treated odour emissions emanate from the surface of the biofilter at an exit velocity less than 0.5 m/s at any given point i.e., negligible vertical velocity. Odours from the biofilter are treated and not considered malodour unless the biofilter inlet condition is poorly maintained.	• Biofilter is monitored via the PLC systems for inlet airflows, temperature, pressure and relative humidity (%RH). • Inlet %RH is controlled by supplementary inline misting sprays (small droplets) to improve humidity into the biofilter to a minimum of 85 %RH or greater. • Inlet temperatures are controlled by the %RH to ensure temperatures are not elevated.	• PLC monitored inlet parameters are alarmed to alert the operations of poor inlet %RH, elevated temperatures and/or increasing pressures indicating, in the case of back pressure, there are blockages, drainage issues, or the biofilter requires refurbishment of the treatment media.	• Daily checks of biofilters and cocoon and ancillary air extraction system. • Live monitoring and alarms alert onsite operators of any fan or trigger failures where in that instance the fan is replaced with stand-by unit(s), or the airflow diverted to another cocoon extraction line.	• The biofilter is sized with redundancy to allow for variability of fluctuating daily airflows due to the intermittent aeration timeframes within each of the composting cocoons.	Slight	Rare	**Low**	**Low**

7.3 Summary of OOA and Risk Determination

The OOA Tables above show that the existing receivals, handling and composting processes onsite are not materially changing, albeit the proposed upgrades within the Facility will provide a considerably higher level of process control, automation, response and contingency and overall improvement in odour management and subsequent mitigation of offsite odour impacts.

The proposed increase in waste acceptance and subsequently an increase in composting throughput will in turn increase the odour footprint, however; the increase in the odour footprint is overcome by (among others) the high-level upgrades that are proposed at the Facility, and, coupled with the larger separation distances surrounding the Facility.

These separation distances are generous given that the primary odour emissions from the Facility will confined to the receival building and composting cocoons. Secondary odour emissions from maturation, settling/storage and the leachate ponds/dams (ignoring the leachate tanks) are well managed and as a result will produce minimal odour emissions even in those worst-case process conditions given the contingency proposed.

It will be incumbent on C-Wise to maintain, and/or reduce, the Site's existing odour footprint and improve its footprint where required to ensure that the proposed upgrades do not unreasonably cause odour nuisance at the nearest sensitive receiver.

Based on the upgraded processes, system automation and automated responses and the upgraded technologies proposed, C-Wise can continue to operate in a manner that will not increase its existing odour footprint at the Site, and most importantly; the proposed Facility will overall reduce the malodour footprint within the locality.

7.4 Comparative Odour Dispersion Modelling

Appendix A presents the Calmet meteorological development methods, together with the TAPM setup and representative met year derivation. This dataset was then fed into the Aermet module of the Aermod dispersion model to produce surface (.SFC) and profile (.PFL) met datasets for subsequent use in Aermod to predict annual ground level odour pollutant predictions as follows:

To further understand the potential of the existing odour footprint compared to that of the estimated odour footprint, comparative dispersion modelling has been undertaken.

Previously, EAQ has undertaken some dispersion modelling of the existing operations by use of theoretical odour concentrations derived from surrogate primary pollutants that have been continually measured by C-Wise.

These surrogate pollutants have been measured using continuous electrochemical detector instruments. The raw data has been subsequently developed to derive odour concentrations based on those measured pollutants, and the odour strengths compared to historically measured odour emissions data.

Appendix B presents two (2) C-Wise internal documents for odour emissions dispersion modelling reports that have developed 'theoretical' odour emission rates using the continually measured electrochemical data for surrogate odorants of Hydrogen sulphide (H_2S) and Methyl mercaptan (CH_4S).

The outcomes of the comparative dispersion modelling using theoretical odour relationships illustrates a useful comparison as to what the existing odour footprint is likely to be (**refer Figure 7-1**).

The theorised odour footprint shows round level concentrations of a modelled prediction strength of 7 odour units that extend out to a maximum distance of approximately 3 kms or more to the southwest and northwest of the existing facility. This 'shape' is based on the shape of the meteorology within the locality. Frequency of winds pushing odours to the south and east are less frequent than those prevailing winds from the southeast that push odours toward the northwest.

The theoretical predictions are an overstatement of actual odour observations given that if the scenario were real, there would be notable odour complaints from surrounding sensitive receptors.

Alternatively, **Figure 7-2** represents the existing MAF odour footprint, which is more likely to be aligned with actual odour observations from current observations.

The MAF emissions sources from current operations represent primary, aerated odour emissions.

In consideration of the proposed Facility, the existing odour footprint at its current location will decrease by some percentage as raw materials are diverted to the Facility. In this case the cumulative odour footprint would be a combination of the predictions in **Figure 7-2** and a manageable percentage of those odours diverted to the Facility. Given the Facility location is to the northeast of existing operations, the cumulative odour footprint will move to the northeast and its 'impacts' will extend to the northeast and northwest. The odour footprint to the south and southwest is highly unlikely to increase. This represents Stage 1 of the Facility.

At Stage 2 the odour footprint will move entirely to a centralised area above the Facility, and to a northwest shape as per the locality's meteorological characteristics.

Given the Facility's odour controls and subsequent treatment improvements to odour emissions the odour footprint will decrease from that depicted in **Figure 7-2** (and Figure 7-1) and subsequently move away from the nearest existing sensitive receptors.

The result of which will be a vast improvement, and subsequent decrease in the existing odour footprint from C-Wise's carbon recycling activities.

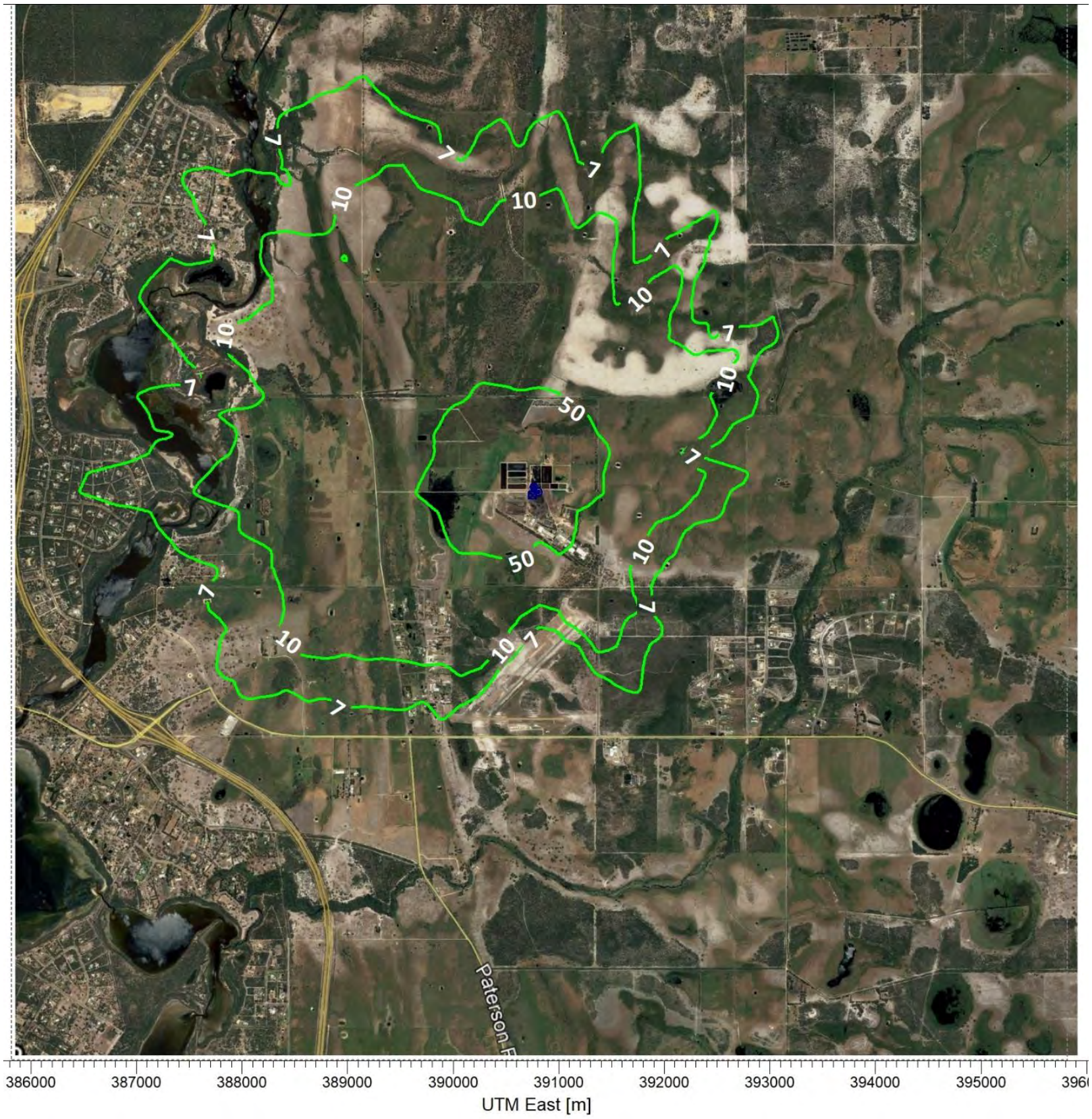
7.5 Evaluation of Odour Risk Profile

The proposed C-Wise carbon recycling Facility will reduce the existing odour footprint to a level that will provide a low risk outcome with respect to existing and future sensitive receptors.

The Facility will operate composting processes to a markedly higher-level that what is being currently undertaken, that is; the proposed composting practices will provide a high-level of odour process control, containment, *in situ* emissions dilution, and overall containment and treatment. This also includes a much

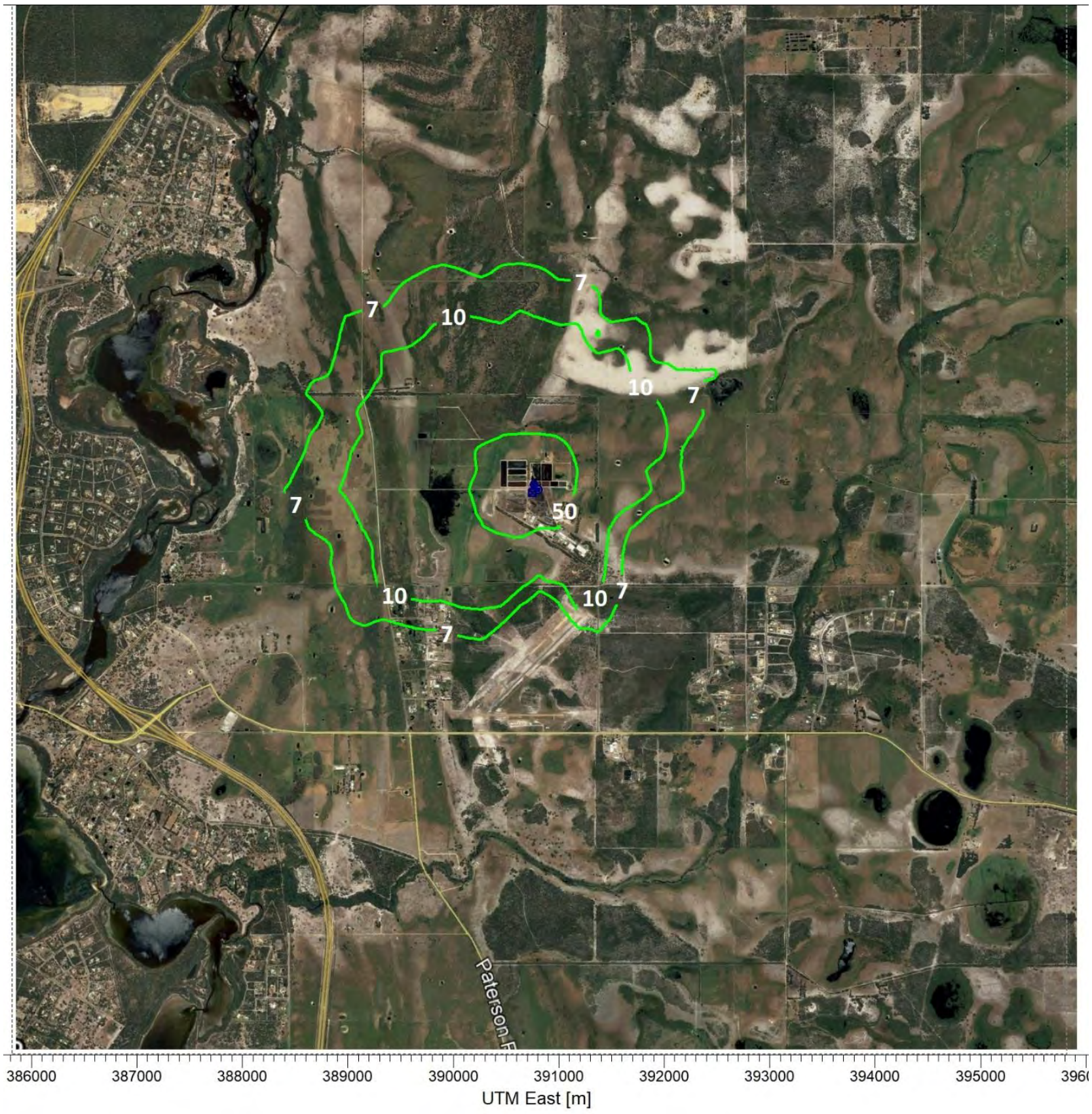
improved process concerning leachate runoff and subsequent containment leading to a reduced odour profile from process leachates.

The Facility will upgrade its existing composting activities, infrastructure, waste containment and storage and overall process control. To this end the Facility poses an obviously lower risk of causing an odour impact offsite compared to that of the open-aired composting processes that are currently undertaken at the C-Wise facility.



EAQ Consulting	Meteorological Data & Assessment Criterion:
	• File: CSIRO TAPM Model 2019 • Modelling Hours Assessed: 44 • Averaging Time: 1-hr • Meteorological Hours: 8,760 • Coordinates: UTM • Assessment Percentiles: 99.5th

Figure 7-1: AVERAGE CUMULATIVE Model Projections (ou.m^3)



EAQ Consulting	Meteorological Data & Assessment Criterion:
	• File: CSIRO TAPM Model 2019 • Modelling Hours Assessed: 44 • Averaging Time: 1-hr • Meteorological Hours: 8,760 • Coordinates: UTM • Assessment Percentiles: 99.5th

Figure 7-2: AVERAGE Model Projections from MAF (ou.m^3)

Appendix A: Meteorological Dataset Development

Appendix B: Theoretical Dispersion Modelling Assessments

EAQ Consulting

UPDATED MODELLING PREDICTIONS OF ODOUR IMPACTS

C-WISE: ORGANIC COMPOSTING FACILITY (NAMBEELUP, WESTERN AUSTRALIA)

C-Wise: Organic Composting Facility (Nambeelup, Western Australia)

Prepared for: C-Wise

Project Ref: EAQ-23024
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1 Introduction

1.1 Preamble

These works were undertaken to update a previous 2019 odour modelling assessment for the purposes of informing C-Wise of their potential odour footprint based on current odour emitting operations. The use of theoretical odour units to further understand the estimated odour footprint has been undertaken to inform the works and allow a more in-depth interpretation of the estimated odour footprint. The works have not been undertaken to satisfy regulatory compliance objectives.

1.2 Background

Environmental & Air Quality Consulting Pty Ltd (EAQ) was engaged by C-Wise (CW) to undertake a predictive modelling assessment (the Assessment) of odour emissions from CW's Nambeelup operations.

The intent of the Assessment was to understand the potential for the estimated odour footprint to have a negative impact on nearby sensitive receptors.

The Assessment plotted ground level odour concentrations (strength), using input odour emission rates, from three discrete composting process areas, being the Mobile Aeration Floor area (MAF), Dam 22 and the Raw Materials mixing area.

The input odour emission rates (OER) were back-calculated by applying a range of OER's to each of the three discrete composting process areas, and comparing the plotted ground level odour concentrations to theoretically derived odour concentrations.

Determining the theoretical odour concentrations was done by using the odour threshold value for surrogate odorants of Hydrogen sulphide (H_2S) and Methyl mercaptan.

These surrogates are currently being measured at multiple static locations throughout the CW site using electrochemical monitors. The surrogates are measured in chemical concentration values of parts per million (ppm).

The odour threshold data for the surrogate odorants was applied to the chemical emissions data collected for these surrogates. In this way the measured chemical concentration of these odorants in ambient air can be converted to a theoretical odour concentration using each odorants threshold odour value.

The derived odour concentrations provide a theoretical conversion from the measured chemical concentration data to an odour concentration at those static monitoring locations.

The odour concentrations are considered theoretical as the odour threshold data is based on pure compounds assessed in a laboratory. Since the ambient chemical concentrations monitored are part of an overall odour matrix (multiple chemical odorant species), the threshold data varies based on the laboratory methods used to derive them.

EAQ utilised the lowest odour detection threshold data found within peer reviewed public domain sources for H_2S.

NOTE: It was determined that the Methyl mercaptan data was considerably larger in concentration than the H_2S and therefore Methyl mercaptan was omitted for the purposes of deriving odour emission rates.

The Assessment utilised the Aermod dispersion model to project ground level odour impacts based on assumed odour emission rates for each of the discrete composting process areas.

The dispersion model converts these input emission rates into downwind, ground level odour concentrations and plots the ground level odour concentrations in odour units ($ou.m^3$). Local representative meteorology was developed to use in the dispersion modelling.

The objective in 2019 was to model multiple odour emission rates for each of the discrete composting process areas that would then be plotted as ground level odour units. Those plotted odour concentrations are then compared to the derived theoretical odour concentrations at those static measurement locations. Where the plots compare to those theoretical odour concentrations, the input odour emission rates therefore represent the mass odour emissions from those discrete composting process areas that would be required to produce concentrations as measured at the static monitoring locations.

1.3 Updated Monitoring Data

Static monitoring data collected by CW for the 2022-23 period was sorted and analysed by EAQ. The data was then extracted for the average and maximum average values (excluding zeros). Peak maximums were ignored as they markedly skewed the predicted odour footprint.

The updated derived theoretical odour units were compared to the values from 2019 and subsequent factors were derived that represent an increase/decrease in the odour emission rates.

For the purposes of updating the 2019 model, the meteorological year used in 2019 was applied herein to enable a like-for-like comparison of the predicted odour footprint.

As was done in the 2019 assessment, the discrete odour sources assessed were the MAF, Dam 22 and the Raw Materials Bund.

2 C-Wise Previous and Updated Emissions

2.1 Chemical Concentration Static Monitoring Data

The average and maximum data (parts per million) and corresponding sampling locations, together with the updated data are listed in the table below.

Table 2-1: Average & Maximum H_2S Chemical Concentrations

Location	Average	Maximum	Average	Maximum	Average Factor	Maximum Factor
	2019		Updated (2023)			
MAF H_2S	0.004	0.135	0.085	1.922	**x 21**	**x 14**
Dam 22 H_2S	0.139	0.480	0.488	0.679	**x 4**	**x 1.4**

2.2 Derived Theoretical Odour Concentrations

For the purposes of this Assessment, EAQ used the lowest odour detection threshold (ODT) for H_2S found within the public domain literature. Using the lowest ODTs ensures that the derived theoretical odour units are the highest i.e. conservative.

To derive a theoretical odour concentration from measured chemical data, the concentration of those compounds measured, in this case H_2S, is divided by the ODT where the result is the theoretical odour concentration.

The lowest ODT value for H_2S was 0.000457 ppm. The derived theoretical odour concentrations are tabled below. An example calculation for Average Derived MAF H_2S is 0.004 / 0.000457 = 8.75 ou.m^3.

Table 2-2: Derived Theoretical Odour Concentrations

Concentration	2019 MAF H_2S	2023 MAF H_2S	2019 Dam 22 H_2S	2023 Dam 22 H_2S
Average (ppm)	0.004	0.085	0.139	0.488
Maximum (ppm)	0.135	1.922	0.480	0.679
Average Derived ou.m^3	**8.75**	**186**	**304**	**1,068**
Maximum derived ou.m^3	**295**	**4,206**	**1050**	**1,486**

2.3 Updated Odour Emission Rates

The updated values have had the multiplicate factors applied listed above in **Table 2-1**. The 2019 and updated 2023 odour emission rates are tabled below.

Table 2-3: Odour Emission Rate Modelling Inputs

Source	2019 Average Odour Emission Rate	2019 Maximum Odour Emission Rate	2023 Average Odour Emission Rate	2023 Maximum Odour Emission Rate
MAF	10,000	100,000	**212,500**	1,423,704
DAM 22	35,000	150,000	**122,878**	212,188
RAW	4,000	15,000	**85,000**	213,556

The AERMOD dispersion model was run using the final 2023 Average Odour Emission Rate inputs in **Table 2-3**.

3 Odour Dispersion AERMOD Modelling Results

The 99.5th percentile was modelled in accordance with the current regulatory guidelines for dispersion modelling of odours.

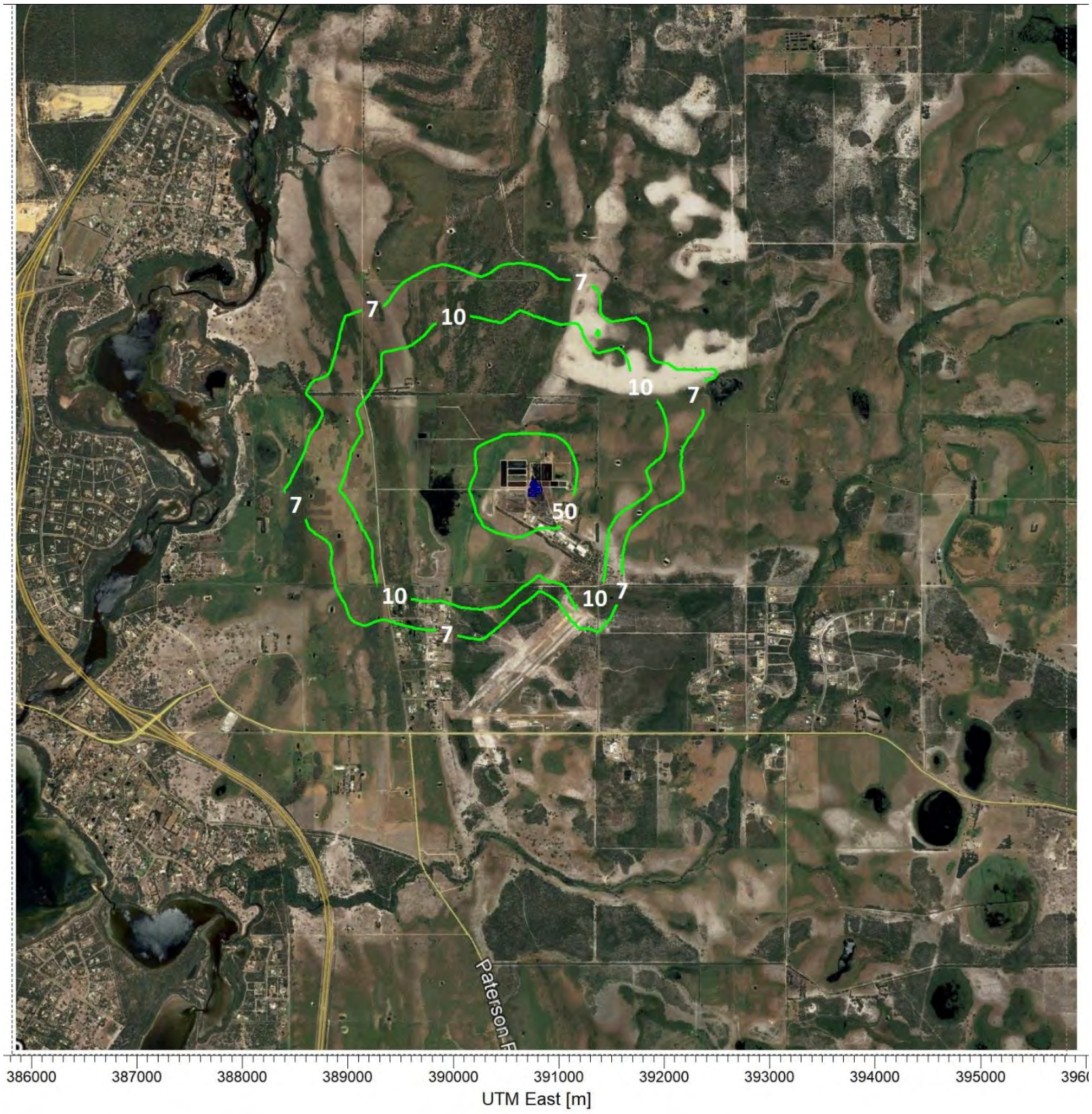
Ground level odour isopleths (plots/contours) are presented as incremental isopleths to show the odour impacts downwind of each discrete composting process area.

Importantly these discrete sources are modelled independent of one another to inform CW of their individual potential for offsite odour impacts.

The theoretical odour concentrations used in deriving mass odour emission rates from the discrete odour sources were based on the odour detection thresholds of the surrogate odorant H_2S.

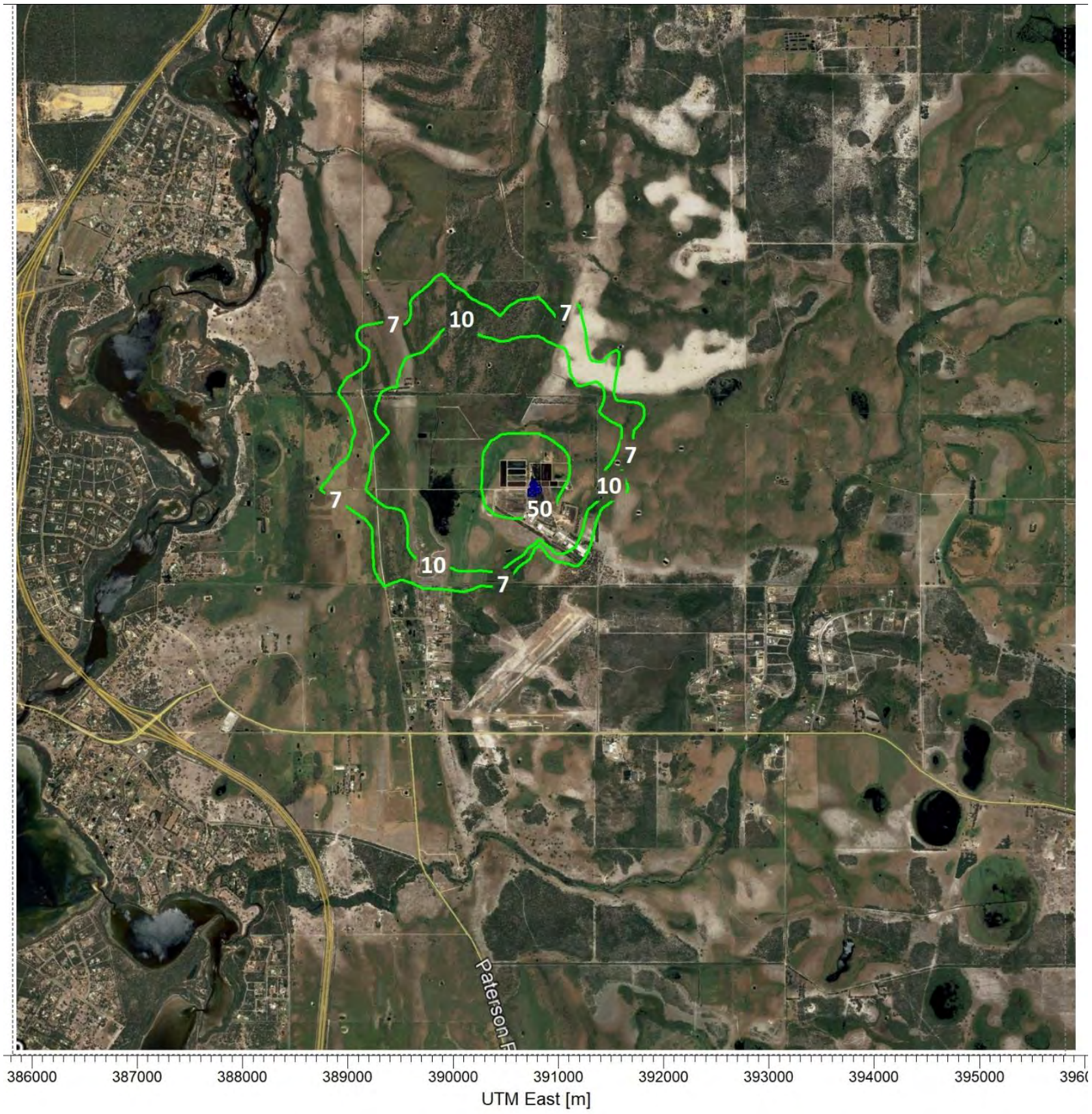
The modelling projections have uncertainty based on typical model limitations (refer Section 4), however; the projections for average impacts illustrated in **Figures 3-1, 3-2** and **3-3** are in EAQ's view a good representation of normal operations' emission impacts from those discrete odour sources. When considering model limitations, these impacts can vary within a factor of 2.

In considering standard modelling conventions where odour impacts are cumulative, the cumulative impacts from the MAF, Dam 22 and Raw Materials Bund are illustrated in **Figure 3-4** which shows a very large odour impact when combining the MAF, Dam 22 and Raw Materials Bund odour sources.



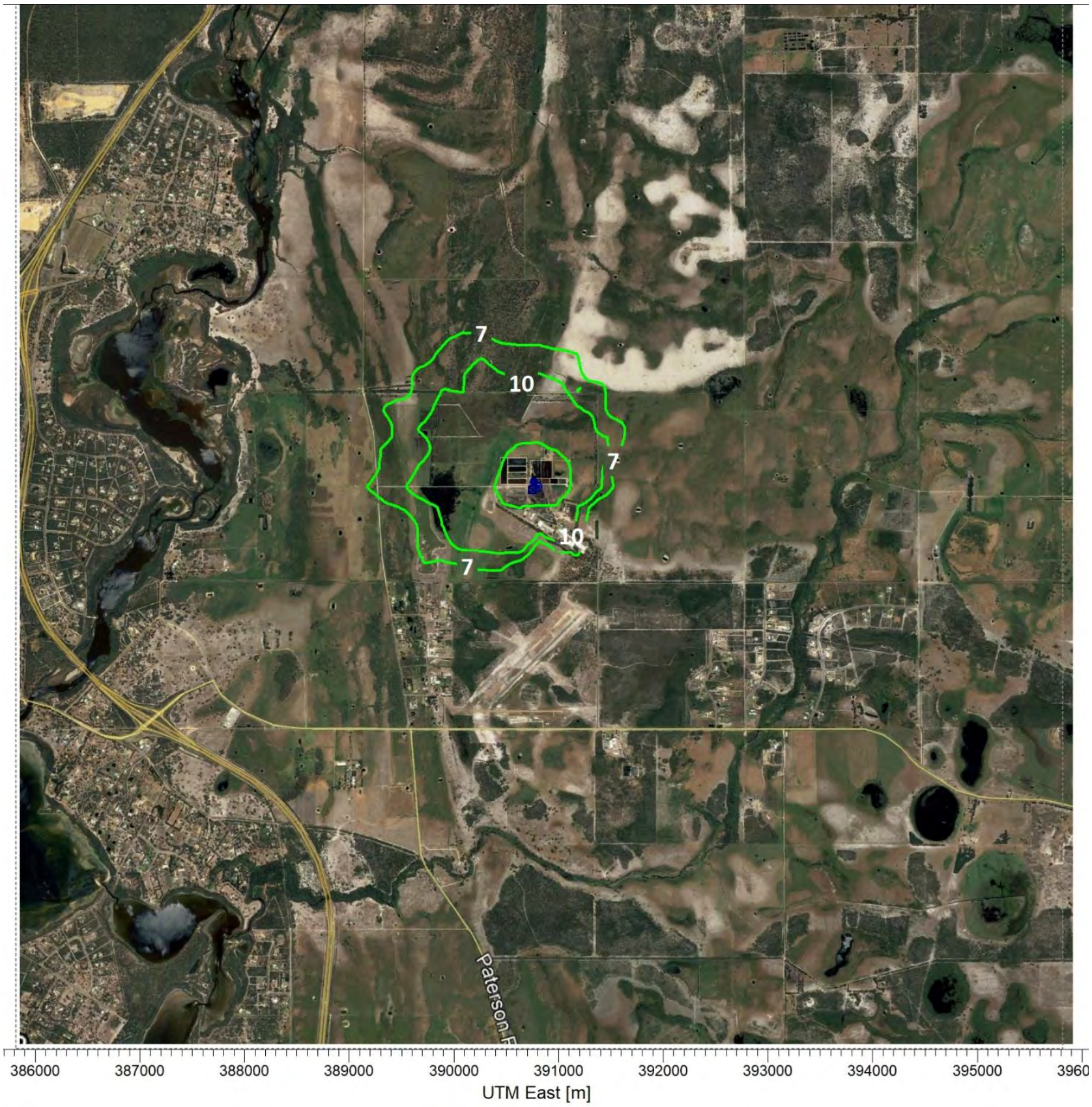
EAQ Consulting	Meteorological Data & Assessment Criterion:
	• File: CSIRO TAPM Model 2019 • Modelling Hours Assessed: 44 • Averaging Time: 1-hr • Meteorological Hours: 8,760 • Coordinates: UTM • Assessment Percentiles: 99.5th

Figure 3-1: AVERAGE Model Projections from MAF (ou.m^3)



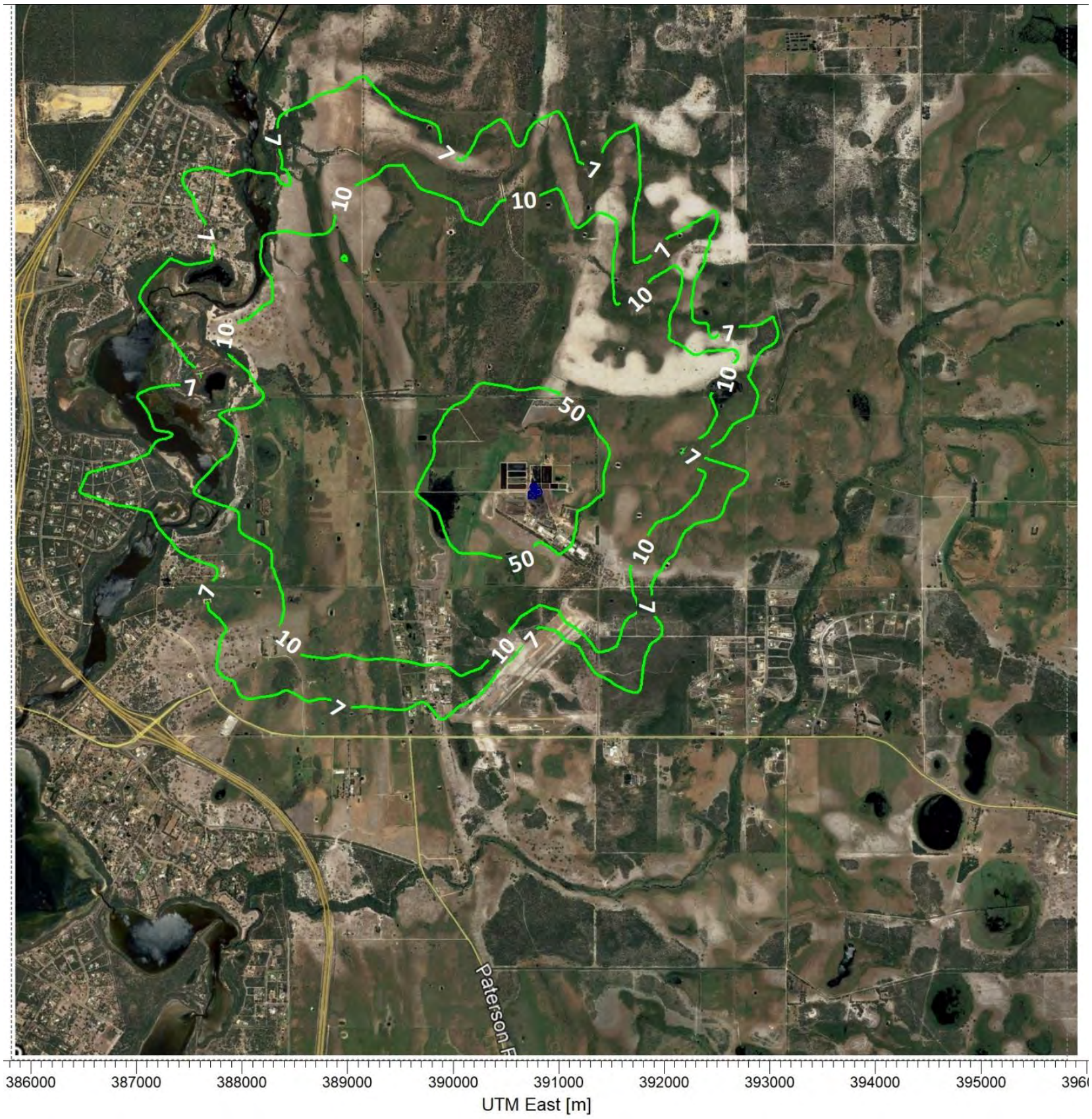
Meteorological Data & Assessment Criterion:		
• File: CSIRO TAPM Model 2019	• Modelling Hours Assessed: 44	• Averaging Time: 1-hr
• Meteorological Hours: 8,760	• Coordinates: UTM	• Assessment Percentiles: 99.5th

Figure 3-2: AVERAGE Model Projections from Dam 22 (ou.m^3)



EAQ Consulting	Meteorological Data & Assessment Criterion:
	• File: CSIRO TAPM Model 2019 • Modelling Hours Assessed: 44 • Averaging Time: 1-hr • Meteorological Hours: 8,760 • Coordinates: UTM • Assessment Percentiles: 99.5th

Figure 3-3: AVERAGE Model Projections from Raw Materials Bund (ou.m^3)



EAQ Consulting	Meteorological Data & Assessment Criterion:
	• File: CSIRO TAPM Model 2019 • Modelling Hours Assessed: 44 • Averaging Time: 1-hr • Meteorological Hours: 8,760 • Coordinates: UTM • Assessment Percentiles: 99.5th

Figure 3-4: <u>AVERAGE</u> CUMULATIVE Model Projections (ou.m^3)

4 Limitations of Dispersion Modelling Assessment

By definition, air quality models can only approximate atmospheric processes. Many assumptions and simplifications are required to describe real phenomena in mathematical equations. Model uncertainties can result from:

- Simplifications and accuracy limitations related to source data;
- Extrapolation of meteorological data from selected locations to a larger region; and
- Simplifications to model physics to replicate the random nature of atmospheric dispersion processes.

Models are reasonable and reliable in estimating the maximum concentrations occurring on an average basis. That is, the maximum concentration that may occur at a given time somewhere within the model domain, as opposed to the exact concentration at a point at a given time will usually be within the ±10% to ±40% range (US EPA, 2003).

Typically, a model is viewed as replicating dispersion processes if it can predict within a factor of two, and if it can replicate the temporal and meteorological variations associated with monitoring data. Model predictions at a specific site and for a specific hour, however, may correlate poorly with the associated observations due to the above-indicated uncertainties. For example, an uncertainty of 5° to 10° in the measured wind direction can result in concentration errors of 20% to 70% for an individual event (US EPA, 2003).

EAQ Consulting

MODELLING PREDICTIONS OF ODOUR IMPACTS USING ODOUR THRESHOLD RELATIONSHIPS

C-WISE: ORGANIC COMPOSTING FACILITY (NAMBEELUP, WESTERN AUSTRALIA)

C-Wise: Organic Composting Facility (Nambeelup, Western Australia)

Prepared for: C-Wise

Project Ref: EAQ-20015
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1 Background

Environmental & Air Quality Consulting Pty Ltd (EAQ) was engaged by C-Wise (CW) to undertake a predictive modelling assessment (the Assessment) of the potential for odours from discrete CW operations to impact offsite sensitive receptors.

The Assessment plotted ground level odour strengths, using input odour emission rates, from three discrete composting process areas, being the Mobile Aeration Floor area (MAF), Dam 22 and the Raw Materials mixing area.

The input odour emission rates (OER) were back-calculated by applying a range of OER's to each of the three discrete composting process areas, and comparing the plotted ground level odour concentrations to theoretically derived odour concentrations.

Determining the theoretical odour concentrations was done by using the odour threshold value for surrogate odorants of Hydrogen sulphide (H_2S) and Methyl mercaptan.

These surrogates are currently being measured at multiple static locations throughout the CW site using electrochemical monitors. The surrogates are measured in chemical concentration values of parts per million (ppm).

The odour threshold data for the surrogate odorants was applied to the chemical emissions data collected for these surrogate odorants. In this way the measured chemical concentration of these odorants in ambient air can be converted to a theoretical odour concentration using each odorants threshold odour value.

The derived odour concentrations provide a theoretical conversion from the measured chemical concentration data to an odour concentration at those static monitoring locations.

The odour concentrations are considered theoretical as the odour threshold data is based on pure compounds assessed in a laboratory. Since the ambient chemical concentrations monitored are part of an overall odour matrix (multiple chemical odorant species), the threshold data varies based on the laboratory methods used to derive them. EAQ utilised the lowest odour detection threshold data found within peer reviewed public domain sources for each of the surrogate odorants.

The Assessment utilised the Aermod dispersion model to project ground level odour impacts based on assumed odour emission rates for each of the discrete composting process areas.

The dispersion model converts these input emission rates into downwind, ground level odour concentrations and plots the ground level odour concentrations in odour units ($ou.m^3$). Local representative meteorology was developed to use in the dispersion modelling.

The objective was to model multiple odour emission rates for each of the discrete composting process areas that would then be plotted as ground level odour units. Those plotted odour concentrations are then compared to the theoretical odour concentrations at those static measurement locations. Where the plots compare to those theoretical odour concentrations, the input odour emission rates therefore

represent the mass odour emissions from those discrete composting process areas that would be required to produce odour impacts comparable to the static monitoring locations.

The scope of works for the Assessment was as follows:

- Run a TAPM Prognostic Meteorological (met) Model for the C-Wise Site to develop a 2019 met dataset;
- Determine theoretical odour thresholds for the analytes of H_2S and Methyl mercaptan to subsequently determine useful odour concentrations for these analytes based on;
    - Measured onsite data for both analytes.
- Using the theoretical odour data derived from the analytes back calculate a source odour emission rate for these analytes and model using AERMOD;
    - The model will be run to project those ground level concentrations that reflect the onsite chemical monitors;
- The model will then be run for odour impacts using the theoretical odour unit relationship to project downwind odour impacts as a maximum impact.

2 C-Wise Discrete Odour Sources

The discrete odour sources assessed are the MAF, Dam 22 and the Raw Materials Bund.

The MAF, according to aerial photos, is approximately 6,000 m^2 in area, although this allows for the total surface area where MAF composting is undertaken rather than just the aerated compost piles themselves.

Dam 22 is approximately 2,000 m^2 in surface area. This represents the Dam being filled to peak volume.

The Raw Materials Bund is the process area where organic wastes, to include liquid wastes, are introduced to shredded green wastes and mixed ready for composting. The Raw Materials Bund process area, to include overflow and spillage/seepage, is approximately 850 m^2.

Any overestimation of the total surface area for these discrete composting process areas allows for overflow of the process and/or surface leachates from those processes.

Other odour sources within the CW site are liquor ponds (primary, secondary and evaporation), organic wastes stockpiles, raw/shredded green wastes, and secondary composting stockpiles before/after screening and final compost stockpiles.

The overall total composting area, encompassing all composts and raw materials but excluding the liquor ponds, is approximately 72,000 m^2, with the coverage across that total area at an estimated 50%, or 36,000 m^2 where piles of compost, compost overflow and leachate are present.

Within that estimated 36,000 m^2 of odour emitting product (raw, compost, leachate runoff) the compost piles are volumes of odour emissions rather than flat area sources. In this case many of the odour emissions are elevated where the compost piles emit odours from the top portions of these piles, and centred within the piles, based on temperature profiles within the compost piles.

2.1 Historic Odour Emissions Data

Odour concentration data has been collected previously from the CW site in 2013. The data derived OERs for those primary odour sources collected in 2013.

Currently the odour sources at the CW site are similar to those in 2013, although the MAF area has expanded since 2013. Based on the 2013 data the Dams presented the highest OERs based on the measured odour data and total surface areas of each odour emitting source, whilst the Raw Materials area presented the highest specific odour emission rate per square metre.

For the purposes of this Assessment the 2013 data that best represents the MAF Area compost, Dam 22 and Raw Materials area have been adopted as the starting OERs for the dispersion modelling.

Table 2-1 lists those OERs collected from the 2013 sampling program.

Table 2-1: Historic Odour Emission Rates

2019 Process Sample	2013 Process	2013 Average Odour Concentration ($ou.m^3$)	2013 Specific Odour Emission Rate ($ou.m^3/m^2/s$)	2013 Total Odour Emission Rate ($ou.m^3/m^2/s$)
Raw Materials Bund (850 m^2)	Organic Pond Stack (400 m^2)	3,170	88,275	35,310
MAF Area (6,000 m^2)	Mushroom Compost / Piggery Sludge Compost / Quicken Stage '0' (5,500 m^2)	453	12,715	23,704
Dam 22	Dam 22	2,670	73,650	136,179

The 2013 Total Odour Emission Rates represent the starting point for the OER inputs into the dispersion modelling.

EAQ modelled these OERs in **Table 2-1** and reviewed the extent of the ground level odour impacts projected in the dispersion model. EAQ then reviewed the modelling projections and subsequently increased/decreased the OERs to produce ground level odour concentrations that compared well to the theoretically derived odour concentrations at those static measurement locations.

2.2 Chemical Concentration Static Monitoring Data

The CW data for H_2S and Methyl mercaptan collected at static sampling locations in and around these discrete odour sources provides a chemical concentration for these surrogate odorants in ppm.

The data provided by CW logged these odorant concentrations in 10-minute sampling intervals from July 2018 to October 2019.

EAQ combined the data from multiple monitoring spreadsheets and derived the average and maximum ppm values for both surrogate odorants of H_2S and Methyl mercaptan.

The average and maximum data and corresponding sampling locations are presented in **Table 2-2**.

Table 2-2: Average & Maximum Chemical Concentrations for Surrogate Odorants

Concentration (ppm)	**MAF** H_2S - ppm	**MAF** Methyl Mercaptan (CH_4S) - ppm	**Dam 22** H_2S - ppm
Average	0.004	0.217	0.139
Maximum	0.135	0.386	0.480

2.3 Derived Theoretical Odour Concentrations

Theoretical odour concentrations can be derived from measured chemical concentrations. The odour detection threshold (ODT) values for specific odour compounds refer to the lowest concentration of any specific chemical or mixture at which it can be ascertained that an odour is present, i.e. the level that produces the first sensation of odour.

This varies not only between different people, but also from day to day for the same individual, depending on factors such as time of day, state of health, whether they are distracted or focused on the odour, whether they are awake or asleep, the presence of interfering odours, the influence of hormones (e.g. ovulation), pregnancy and migraines. Also, the odour sensation threshold usually increases (i.e. the odour sensitivity decreases) with increasing age [1].

The ODT is the concentration where that person can just detect that an odour is present. For populations, the ODT refers to the concentration where 50% of the population can detect an odour is present (under controlled conditions).

Experiments have been carried out to determine values for odour thresholds where the reported results are statistical values based on the average of when the odour becomes detectable to 50% of a panel of trained assessors (population based).

For any chemical compound or mixture the point where odour becomes detectable point, the odour detection threshold, is assigned an odour concentration of 1 ou.m^3. Odour concentrations are then expressed in multiples of this value.

For single odorous chemical compounds (pure compounds) this odour detection threshold can also be expressed in conventional concentration terms (ppm and mg/m^3, or ppb and µg/m^3).

The ODT values for single compounds reported in the literature can show wide differences based on the methods used to determine these threshold values.

For the purposes of this Assessment, EAQ used the lowest ODT's for H_2S and Methyl mercaptan found within the public domain literature. Using the lowest ODTs ensures that the derived theoretical odour units are the highest i.e. conservative.

To derive a theoretical odour concentration from measured chemical data, the concentration of those compounds measured, in this case H_2S and Methyl mercaptan, is divided by the ODT where the result is the theoretical odour concentration.

The lowest ODT values for the surrogate odorants were:

- H_2S 0.000457 ppm
- Methyl mercaptan 0.000174 ppm

[1] Review of odour character and thresholds. Science Report: SC030170/SR2. Environment Agency March 2007. ISBN: 978-1-84432-719-5

Table 2-3 lists those derived theoretical odour concentrations.

Table 2-3: Derived Theoretical Odour Concentrations

Concentration	MAF **H_2S** - ppm	MAF **Methyl Mercaptan** (CH_4S) - ppm	Dam 22 **H_2S** - ppm
Average (ppm)	0.004	0.217	0.139
Maximum (ppm)	0.135	0.386	0.480
Average Derived ou.m^3	**8.75**	**1247**	**304**
Maximum derived ou.m^3	**295**	**2218**	**1050**

An example calculation for Average Derived MAF H_2S is 0.004 / 0.000457 = 8.75 ou.m^3.

The derived odour concentrations for Methyl mercaptan are considerably higher than the H_2S derived odour concentrations. For this Assessment the H_2S derived odour concentrations were used to compare the dispersion modelling plots to those static measured locations of H_2S concentrations given the order of magnitude difference in the maximum derived odour concentration values for Methyl mercaptan compared to H_2S.

Notwithstanding, the measured concentration values for H_2S and Methyl mercaptan, converted to theoretical odour units, represents a considerably large concentration of these surrogate odorants at those static measurement locations. On this basis the potential for large offsite odour impacts are expected.

3 Aermod Dispersion Modelling

The air emissions dispersion modelling impact assessment was carried out using the Gaussian Aermod Modelling System (Version 9.9.0). The methods for undertaking Aermod assessments are in accordance with the Environmental Protection Authority Victoria (VIC EPA) publication documents 1550 and 1551.

Although this assessment has been undertaken for a site in Western Australia, the VIC EPA guidance is relevant in so much as the modelling setup and execution, where the Aermod system is the accepted plume model that supersedes Ausplume according to the VIC EPA as it contains (among others) advanced algorithms accounting for impacts that cause a plume to act in a non-Gaussian manner and more readily reflects emissions impacts affected by terrain within the modelling domain.

The VIC EPA requires that all proponents, new or existing, undertake a site-specific assessment in accordance with *Schedule C* of the *State Environment Protection Policy - Air Quality Management* (SEPP (AQM)) which sets out the minimum requirements for modelling emissions to air and includes specification of the model, Aermod.

The following VIC EPA requirements were covered by EAQ as part of the Assessment works:

- Proponents must use the currently approved version of the regulatory model Aermod, except where the proponent can demonstrate to the satisfaction of the Authority that an alternative model is appropriate, with;
    - A domain size (centered on the emission sources) of up to 10 km for flat terrain, and up to 5 km for elevated terrain;
    - A grid spacing resolution chosen so that the maximum concentration is not significantly underestimated, and not greater than 50m; and
    - Only the use of the Rural mode is approved by EPA Victoria at this stage.
- EAQ constructed a single year of meteorological data for the 2019 year, using the TAPM (v 4.0.4) prognostic model, with;
    - Outer Grid Resolution of 30 km with nesting grids 10 km, 3 km, 1 km and 0.3 km (note that nesting to an inner grid of resolution of 1 km is regarded as appropriate for flat country regions);
    - 41 by 41 horizontal grid points, centered at the location of the required data point;
    - 25 vertical levels;
    - 9-Second terrain height database;
    - TAPM default databases for land use and sea surface temperature (provided with TAPM software). Note that the default vegetation and soil type data may be modified if more representative site-specific data for the locality are available; and
    - Synoptic analysis data for the recommended year.
- TAPM outputs for the 1km grid (flat region radius within 10kms of Facility) were:
        - 10m wind speed (WSPD);

- 10m wind direction (WDIR);
- Screen level Temperature (TEMPSCR);
- Screen level Relative Humidity (RHUM);
- Net Radiation (NETR); and
- Daytime Mixing height (ZMIX) – only to be used when there are no upper air station/s in the region of interest.

The Aermod modelling methodology was based in full upon the EPA Publication 1551 [2].

For this study, the air contaminant was odour, and ground level odour concentrations (ou.m^3) were projected.

3.1 AERSURFACE Processing

Aersurface was run with a data tile imported to depict land use. A single surface sector was assessed to represent a Pasture/Hay land use with a small percentage of sectors representing Open water land use over the annual period.

The single sector for Albedo, Bowen Ratio and Surface Roughness' were 0.18, 0.5 and 0.082 respectively.

3.2 Prognostic Derived Meteorology (2019)

The TAPM (2019) derived meteorological dataset is presented in **Figure 3-1** and exhibits preference to south, south-easterly winds across the locale (154^0 resultant vector).

The nearest Bureau of Meteorology (BoM) Automatic Weather Station (AWS) to the CW site is the Mandurah BoM AWS. Mandurah is a coastal AWS and exhibits similar characteristic to the TAPM 2019 derived dataset, albeit there are less north easterly winds and stronger wind velocities from the north west. The resultant vector for the Mandurah AWS is 173^0 which is closer to a southerly than the TAPM 2019 derived dataset. The comparable wind speed and frequency characteristics between the TAPM 2019 and Mandurah AWS suggest that the TAPM model setup is highly representative of the CW site.

[2] https://www.epa.vic.gov.au/~/media/Publications/1551.pdf

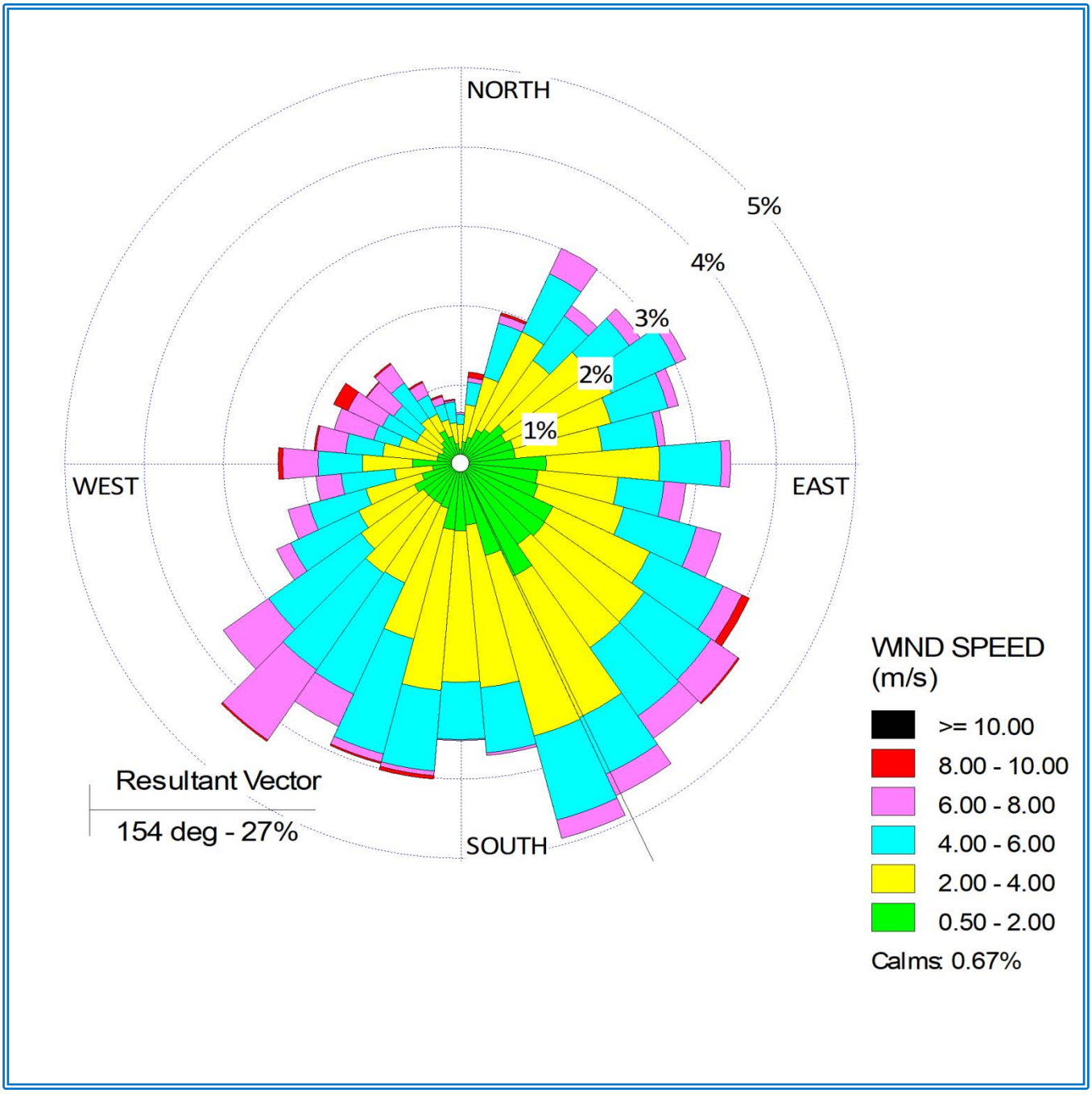


Figure 3-1: TAPM Prognostic derived 2019 meteorological dataset

3.3 Final Modelling Inputs

The dispersion model was run using the final inputs in **Table 3-1**. The final OERs used were modelled and projections of ground level odour concentration (ou.m^3) were plotted. The final OERs in Table 3-1 represent the closet source odour emission rates that give comparable ground level concentrations to those static measurement locations for H_2S.

Table 3-1: Discrete Composting Process Areas' Modelling Inputs

Source	Base Elevation (m)	Release Height (m)	SigmaY (m)	SigmaZ (m)	Length X (m)	Average Odour Emission Rate ($ou.m^3/s$)	Maximum Odour Emission Rate ($ou.m^3/s$)	Source Centre Coordinate (X_m)	Source Centre Coordinate (Y_m)
MAF	16.9	4	16.9605	0.93023	72.93	10,000	100,000	390752.30	6404713.09
DAM 22	19.75	0.5	11.6442	0.23256	50.07	35,000	150,000	390762.64	6404787.65
RAW	25.53	0.5	6.83488	0.23256	29.39	4,000	15,000	390805.63	6404739.22

4 Odour Dispersion Aermod Modelling Results

The Aermod dispersion modelling assessment of the CW site, based on derived theoretical odour concentrations using the relationship between measured concentrations (ppm) of H_2S and Methyl mercaptan and subsequent odour threshold values, has shown that maximum ground level odour impacts from discrete composting process areas are of a high magnitude. Average ground level odour impacts are of a lower impact magnitude.

The 99.5th percentile was modelled in accordance with the current regulatory guidelines for dispersion modelling of odours.

Ground level odour isopleths (plots/contours) are presented as incremental isopleths to show the odour impacts downwind of each discrete composting process area.

Importantly these discrete sources are modelled independent of one another to inform CW of their individual potential for offsite odour impacts.

The theoretical odour concentrations used in deriving mass odour emission rates from the discrete odour sources were based on the odour detection thresholds of the surrogate odorant H_2S. Methyl mercaptan was not referred to when back calculating the odour emission rates given the high variability between Methyl mercaptan and H_2S.

The odour detection threshold does not require identification or recognition of the stimulus. In other words, for example: “I can smell an odour, but I can’t identify where it would be coming from, or recognise the odour character with certainty”.

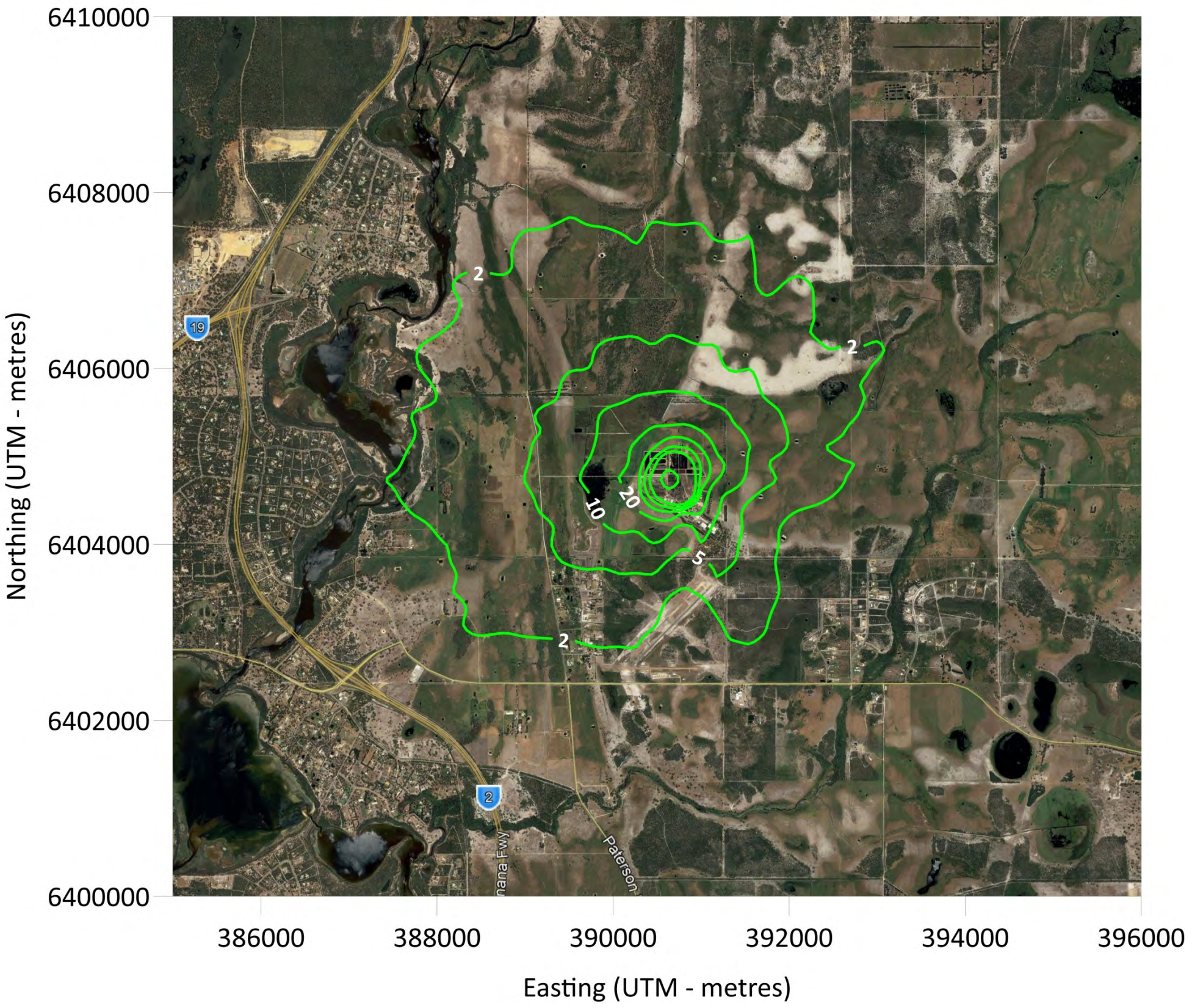
The modelling projections have uncertainty based on typical model limitations (refer Section 5), however; the projections for maximum impacts illustrated in **Figures 4-1, 4-2** and **4-3** are in EAQ’s view a good representation of peak emission impacts from those discrete odour sources.

The maximum impacts projected assume that at any one time during the annual period a maximum odour emission release will produce a ground level impact comparable to these projections. When considering model limitations, these impacts can vary within a factor of 2.

Average odour impacts projected and illustrated in **Figures 4-4, 4-5** and **4-6** are representative of those times where general odour emissions are released (i.e. no peak losses). Again, these average impacts can be within a factor of 2 at any one time and may therefore be higher than projected herein.

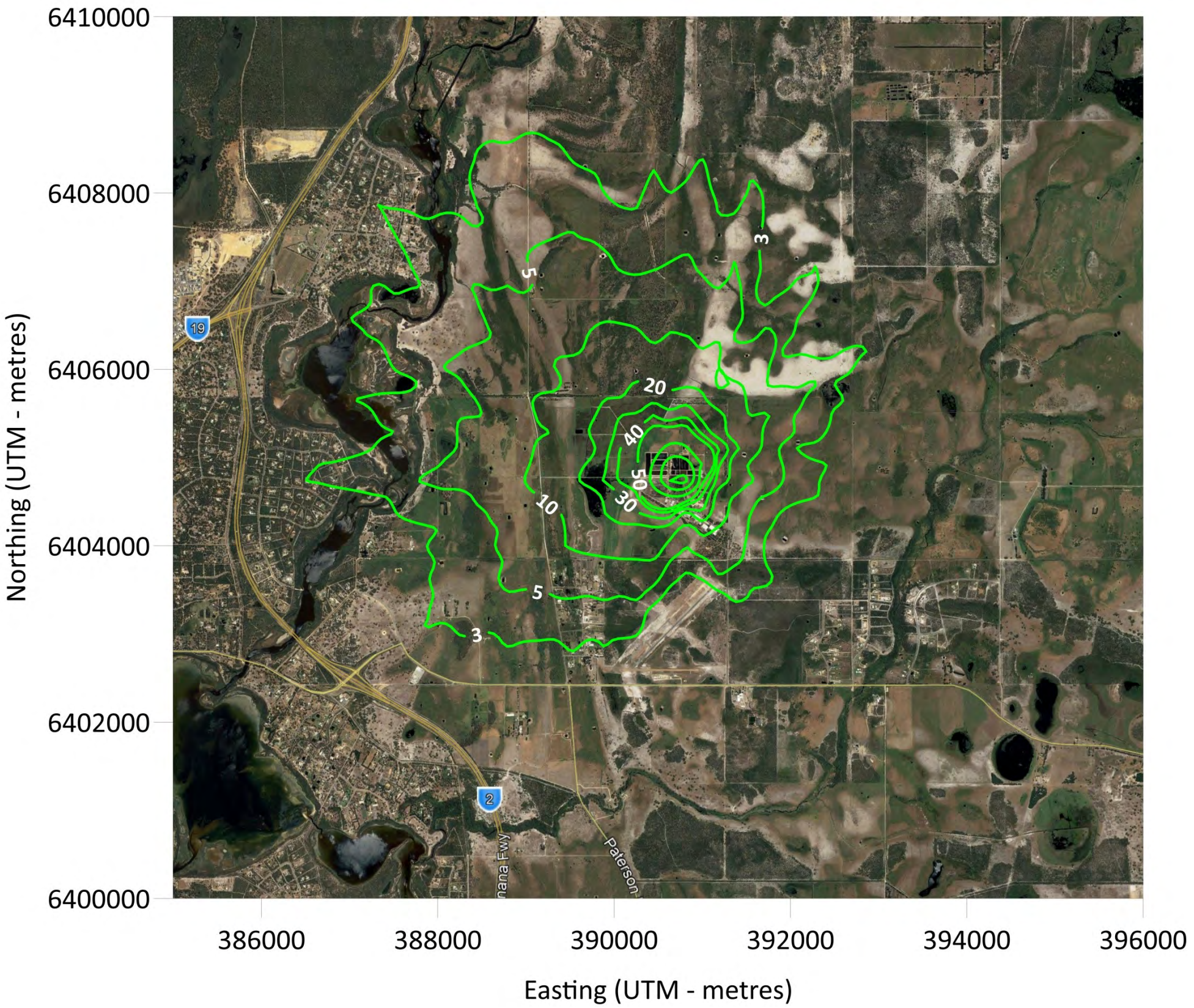
In considering standard modelling conventions where odour impacts are cumulative, the cumulative impacts from the MAF, Dam 22 and Raw Materials Bund are illustrated in **Figure 4-7** which shows a very large odour impact when combining the MAF, Dam 22 and Raw Materials Bund odour sources.

In EAQ’s opinion, the cumulative impacts are likely to represent peak (maximum) impacts from the entire CW site at any one time during a peak odour emissions scenario.



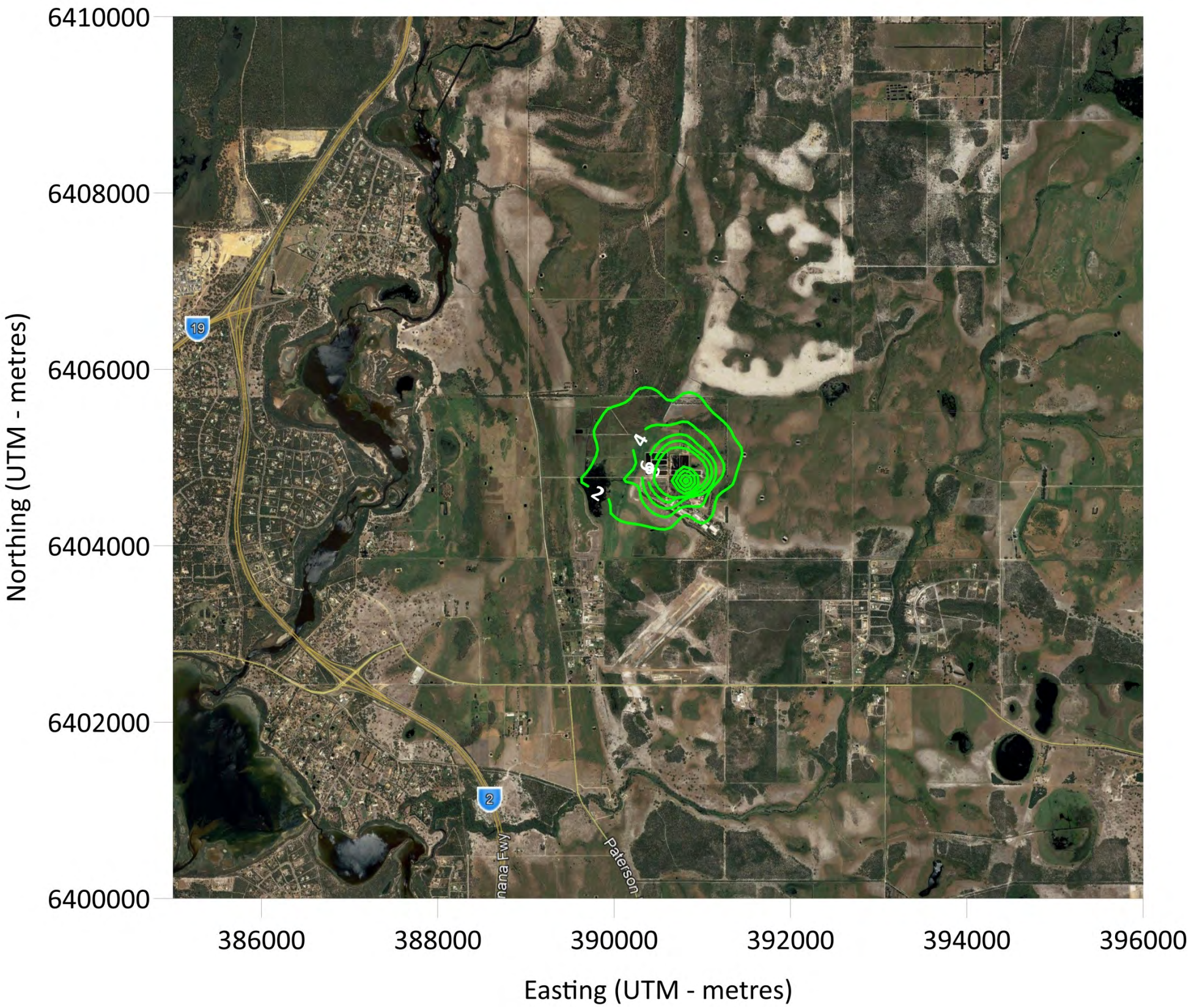
Meteorological Data & Assessment Criterion:		
• File: CSIRO TAPM Model 2019	• Modelling Hours Assessed: 44	• Averaging Time: 1-hr
• Meteorological Hours: 8,760	• Coordinates: UTM	• Assessment Percentiles: 99.5th

Figure 4-1: <u>Maximum</u> Model Projections from MAF (ou.m^3)



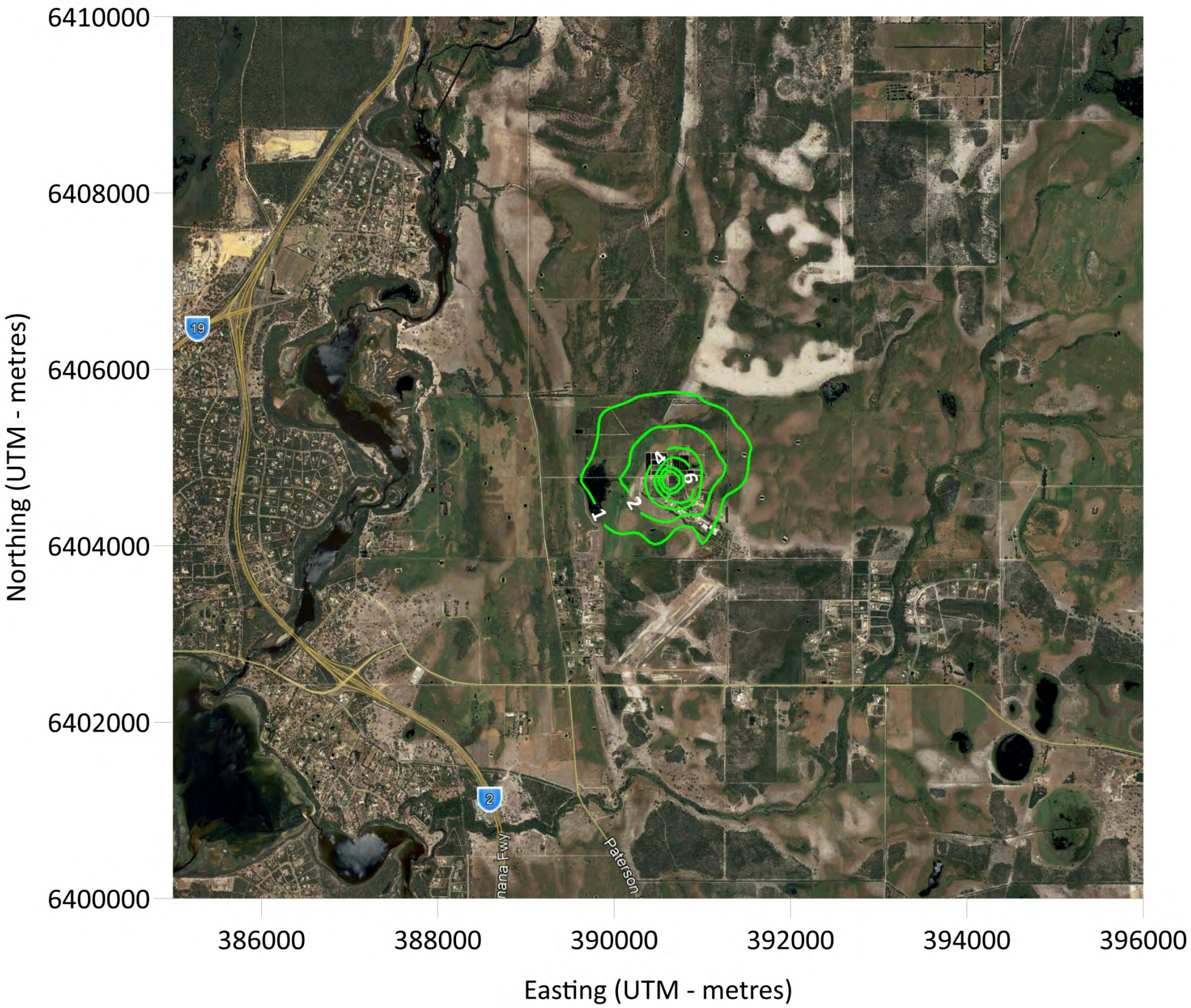
Meteorological Data & Assessment Criterion:		
• File: CSIRO TAPM Model 2019	• Modelling Hours Assessed: 44	• Averaging Time: 1-hr
• Meteorological Hours: 8,760	• Coordinates: UTM	• Assessment Percentiles: 99.5th

Figure 4-2: <u>Maximum</u> Model Projections from Dam 22 (ou.m^3)



	Meteorological Data & Assessment Criterion:
	• File: CSIRO TAPM Model 2019 • Modelling Hours Assessed: 44 • Averaging Time: 1-hr • Meteorological Hours: 8,760 • Coordinates: UTM • Assessment Percentiles: 99.5th

Figure 4-3: <u>Maximum</u> Model Projections from Raw Materials Bund (ou.m^3)



EAQ Consulting	Meteorological Data & Assessment Criterion:
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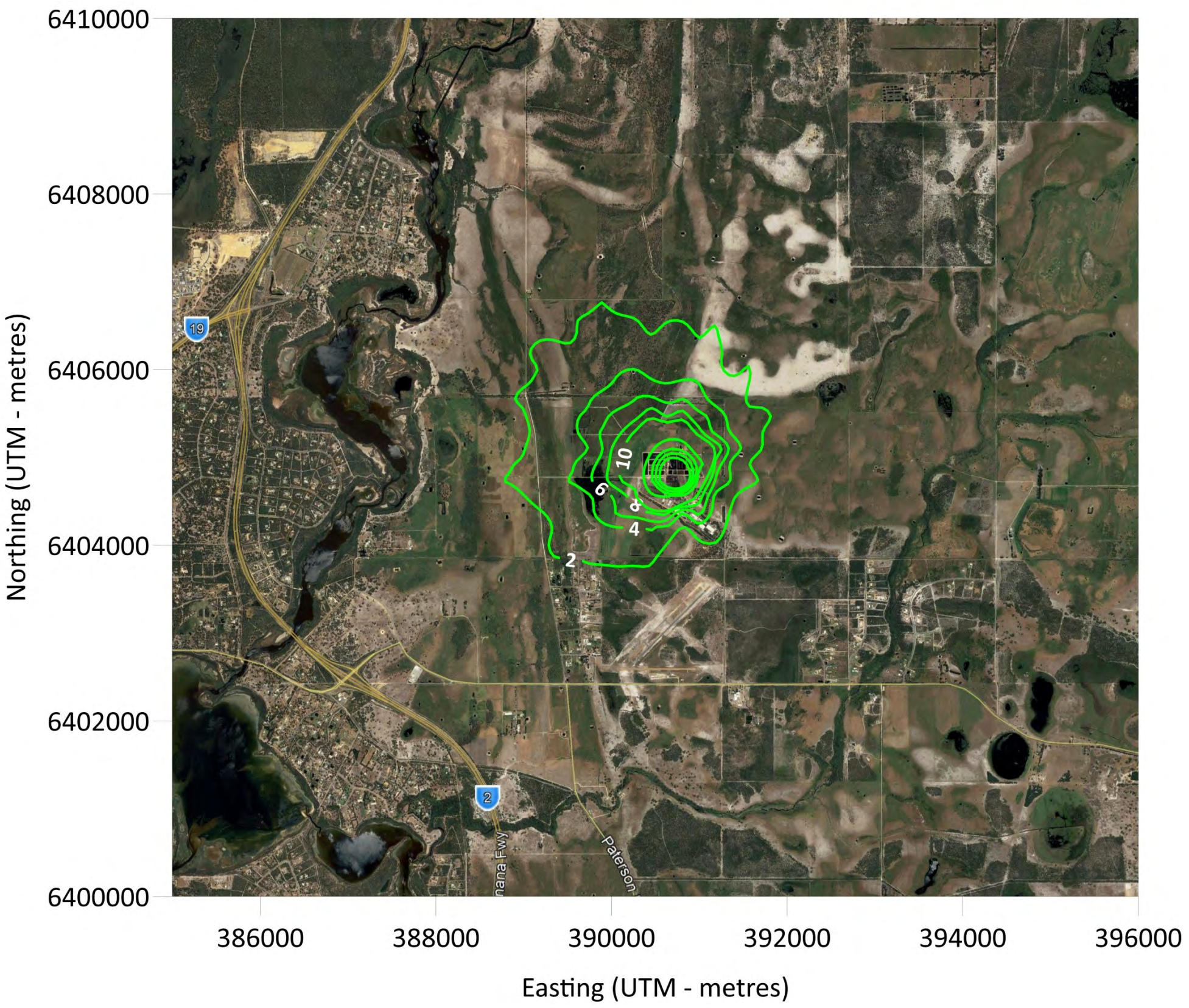
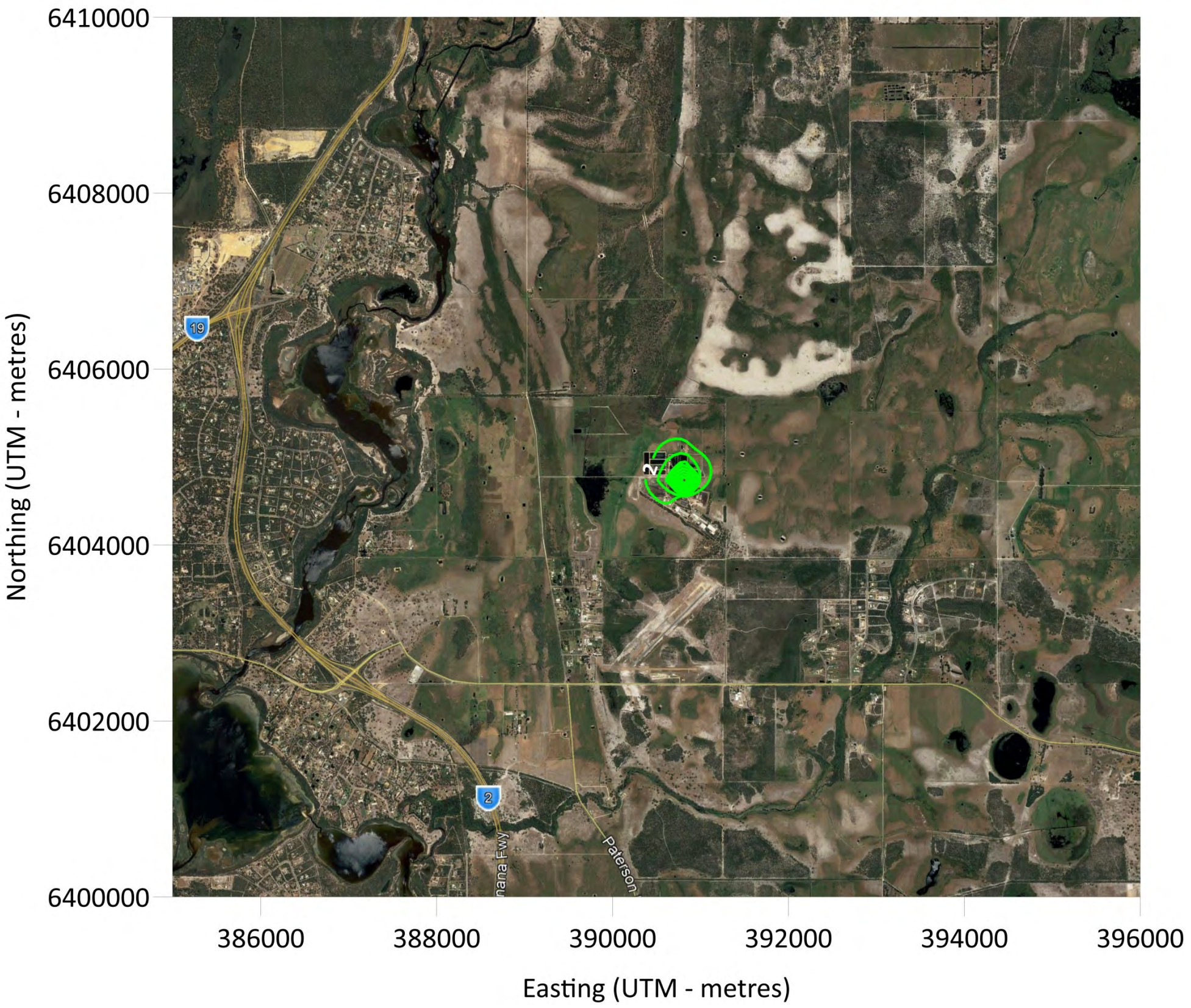
Figure 4-4: AVERAGE Model Projections from MAF (ou.m^3)



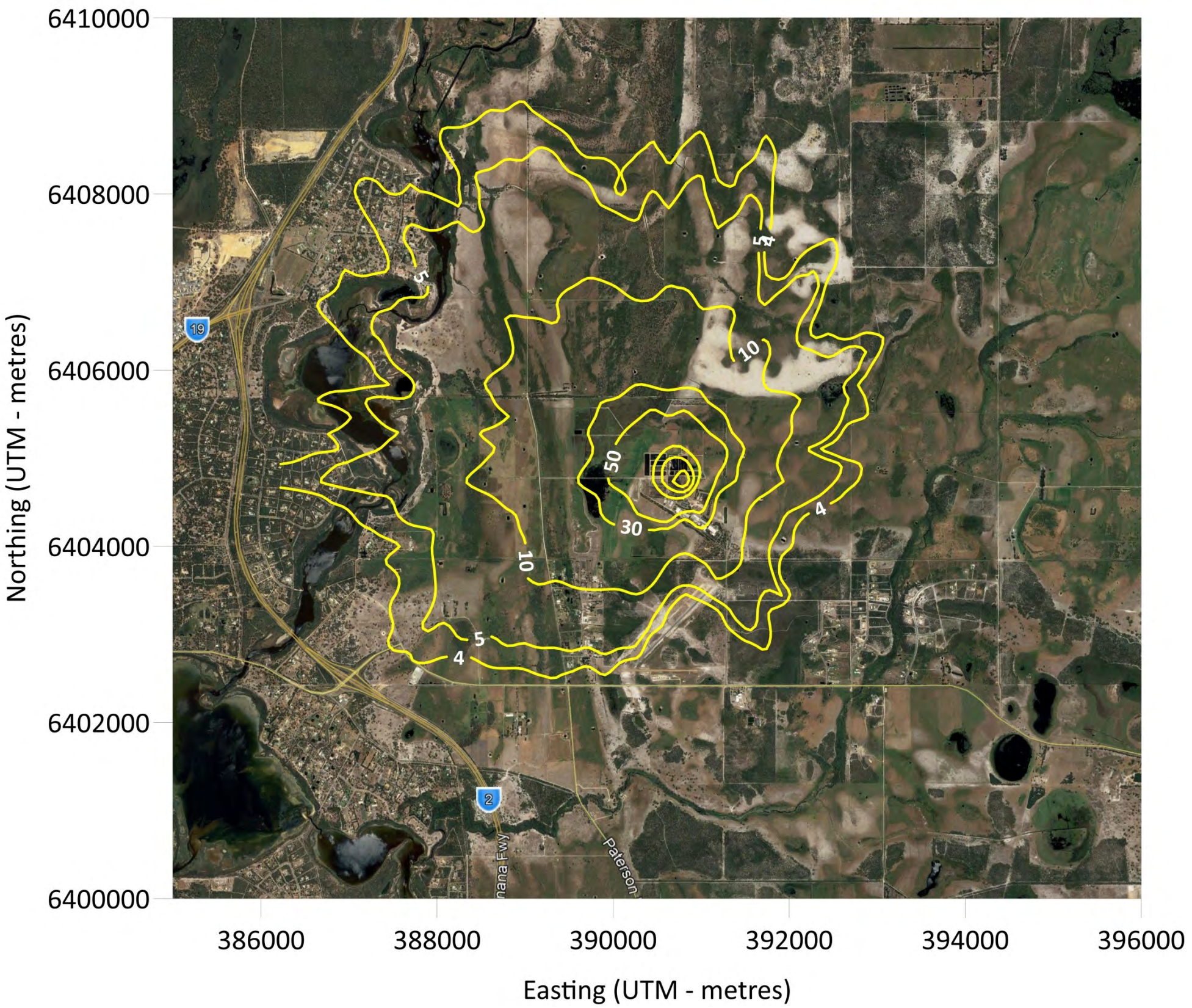
Meteorological Data & Assessment Criterion:		
• File: CSIRO TAPM Model 2019	• Modelling Hours Assessed: 44	• Averaging Time: 1-hr
• Meteorological Hours: 8,760	• Coordinates: UTM	• Assessment Percentiles: 99.5th

Figure 4-5: AVERAGE Model Projections from Dam 22 (ou.m^3)



Meteorological Data & Assessment Criterion:		
• File: CSIRO TAPM Model 2019	• Modelling Hours Assessed: 44	• Averaging Time: 1-hr
• Meteorological Hours: 8,760	• Coordinates: UTM	• Assessment Percentiles: 99.5th

Figure 4-6: AVERAGE Model Projections from Raw Materials Bund (ou.m^3)



EAQ Consulting	Meteorological Data & Assessment Criterion:
	• File: CSIRO TAPM Model 2019 • Modelling Hours Assessed: 44 • Averaging Time: 1-hr • Meteorological Hours: 8,760 • Coordinates: UTM • Assessment Percentiles: 99.5th

Figure 4-7: <u>Maximum</u> CUMULATIVE Model Projections (ou.m^3)

5 Limitations of Dispersion Modelling Assessment

By definition, air quality models can only approximate atmospheric processes. Many assumptions and simplifications are required to describe real phenomena in mathematical equations. Model uncertainties can result from:

- Simplifications and accuracy limitations related to source data;
- Extrapolation of meteorological data from selected locations to a larger region; and
- Simplifications to model physics to replicate the random nature of atmospheric dispersion processes.

Models are reasonable and reliable in estimating the maximum concentrations occurring on an average basis. That is, the maximum concentration that may occur at a given time somewhere within the model domain, as opposed to the exact concentration at a point at a given time will usually be within the ±10% to ±40% range (US EPA, 2003).

Typically, a model is viewed as replicating dispersion processes if it can predict within a factor of two, and if it can replicate the temporal and meteorological variations associated with monitoring data. Model predictions at a specific site and for a specific hour, however, may correlate poorly with the associated observations due to the above-indicated uncertainties. For example, an uncertainty of 5° to 10° in the measured wind direction can result in concentration errors of 20% to 70% for an individual event (US EPA, 2003).

The odour emissions data assessed in this Assessment were taken from a 2013 sampling program at the CW site. The mass odour emissions used were then varied (increased/decreased) to project ground level odour concentrations (isopleths) that compared well to the static locations measuring H_2S and Methyl mercaptan.

The modelling projections for maximum volume source odour impacts show large ground level odour impacts for each of the discrete odour emission sources (MAF, Dam 22 and Raw Materials Bund). This was expected from uncontrolled odour sources where continuous odour emission losses occur.

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1 Meteorological Parameters

- When undertaking dispersion modelling for odour, the wind vector (speed and direction) is critical in determining the magnitude of the odour impacts downwind of an odour emission source(s), where;
  - This vector carries the largest weight in terms of a representative year for odour impacts.
- Temperature is also important within odour dispersion modelling for understanding vertical mixing layers, and inversion layers within the domain assessed by the dispersion model; and
- Rainfall has importance empirically when observing odour impacts at ground level;
  - Relative humidity is also a useful parameter within the dispersion modelling assessment when considering the density of the air within the vertical mixing layers.

1.1 Method

Five (5) years of the latest annual meteorological (met) data is sourced from the nearest, or multiple, Bureau of Meteorology (BoM) Automatic Weather Station (AWS).

The data is arranged into annual observations and the primary *vector* of wind is sorted into 'bins' of wind speed and direction, for example:

Table 1-1: Method of Wind Speed versus Wind Direction

2018		CHECK #	8760			
WD↓ WS→	0	2	4	6	>6	TOTAL
0	0	0	0	0	0	0
90	0	407	457	305	136	1305
180	0	822	1560	919	152	3453
270	0	278	848	1243	527	2896
360	0	124	273	222	487	1106
TOTAL	0	1631	3138	2689	1302	8760

The ***chi-squared*** test shows a statistical relationship between two categorical variables. The statistic is a single number that shows how much difference exists between observed counts and the counts expected if there were no relationship at all in the population.

- For determining the representative met year, each of the annual period five year counts, for grouped wind speed and direction, are compared to the averaged dataset of all five years of grouped wind speed and direction, where;
  - A **low value** for chi-square means there is a high correlation between two sets of data. In theory, if the observed and expected values were equal ("no difference") then chi-square would be zero — an event that is unlikely to happen in real life.

The ***Mann-Whitney U-Test*** is another statistical way of determining differences between values. A null hypothesis is tested where there are no significant differences between two values. In this case, the hourly values within one year compared to the long-term average over five years.

- Mann-Whitney U-Test can be used to determine the representative year based on the *scalar* of temperature.

1.2 Data Recovery

The five (5) annual periods were sorted, and errors, blanks and nil values were removed, to include removing wind speed stalls and directions of '0'.

Once the erroneous data was removed the data recovery was found to be:

Table 1-2: Data Recovery Statistics

Year	Ambient Temp	Wind Direction	Wind Speed (m/s)
2018	99.85%	97.67%	97.15%
2019	97.51%	93.16%	92.71%
2020	97.97%	92.68%	92.27%
2021	96.62%	90.33%	89.87%
2022	98.53%	93.97%	93.50%

1.3 Results

Comparing the annual periods of 2018 – 2022 inclusive for the Mandurah BoM AWS and deriving the representative year based on the vector of wind, the representative year derived using the chi-squared relationship was 2020, **2021**, 2018, 2019 and 2022**.**

Table 1-3: chi-squared outcomes

Annual Period	chi-squared
2018	44.7
2019	71.0
2020	43.9
2021	47.0
2022	87.0

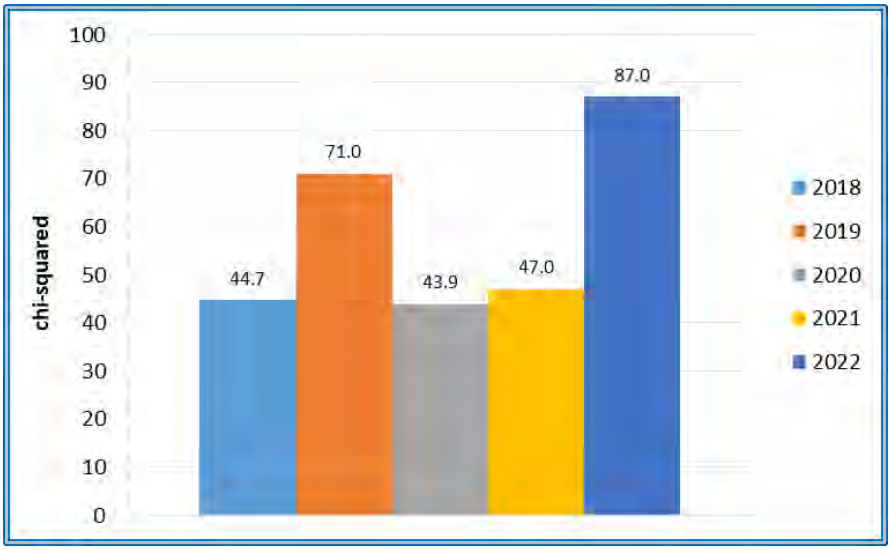


Figure 1-1: chi-squared outcomes

Comparing the annual periods of 2008 – 2022 inclusive for the Mandurah BoM AWS and deriving the representative year based on the scalar of Temperature, the representative year derived using the Mann-Whitney U-Test was **2021**, 2022, 2019, 2020 and 2018.

Table 1-4: Temperature Observations within Degrees (^{0}C) Bins

^{0}C	2018	2019	2020	2021	2022	5-Year
0 - 5	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
5 - 10	2.41%	2.77%	1.71%	2.41%	2.32%	2.32%
10 - 15	20.91%	21.49%	19.59%	21.67%	23.08%	21.35%
15 - 20	43.05%	39.50%	41.45%	39.79%	38.45%	40.46%
20 - 25	24.71%	24.70%	24.26%	22.66%	21.58%	23.59%
25 - 30	7.28%	8.67%	9.98%	9.44%	10.66%	9.20%
30 - 35	1.57%	2.65%	2.67%	3.47%	3.63%	2.79%
>35	0.07%	0.21%	0.34%	0.56%	0.28%	0.29%
TOTAL	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

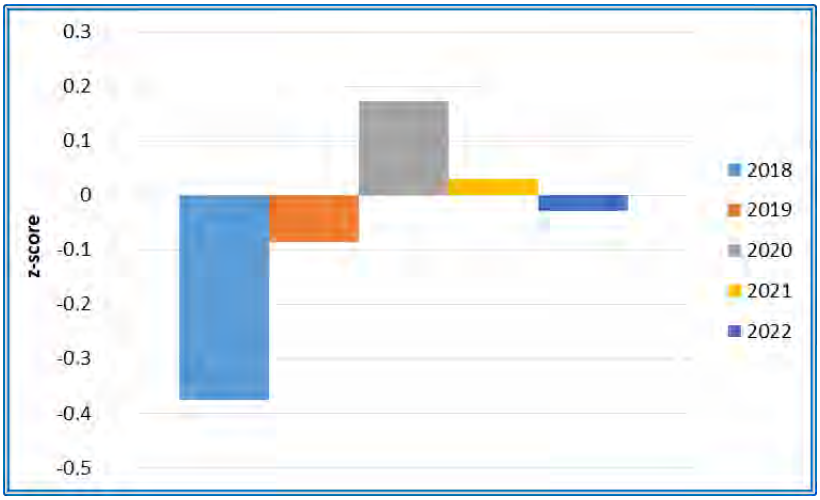


Figure 1-2: Mann-Whitney U-Test z-score outcomes

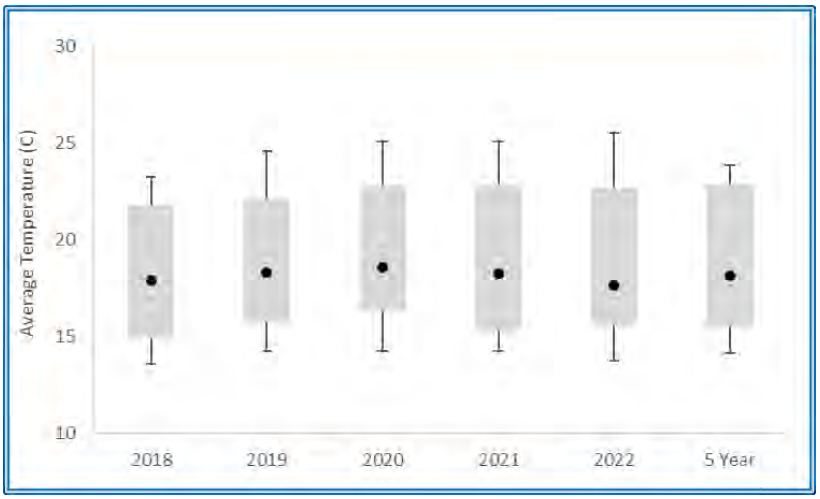


Figure 1-3: Box & Whisker Plot of Temperature (min, Q1, median, Q3, max)

2 Meteorological Dataset Development

2.1 TAPM

2.2 Calmet

The TAPM met data was used to initialise the diagnostic functions of the Calmet module to produce a full 3D meteorology site-representative dataset that was input into the Aermod Modelling Assessment.

Table 2-1 shows key variable fields selected when initialising the Calmet module.

Table 2-1: Calmet Key Variables (Grid Configuration WGS-84 UTM Zone 50S)

100						NX Cells						
100						NY Cells						
0.20						Cell Size (km)						
379.740		6396.870				SW Corner (km)						
11						Vertical Layers						
ZFACE (m)	0	20	40	80	160	320	640	1000	1500	2000	2500	3000
LAYER	1	2	3	4	5	6	7	8	9	10	11	-
MID-PT (m)	10	30	60	120	240	480	820	1250	1750	2250	2750	-

Critical Wind Field Settings			
Value	Found	Typical	Values
TERRAD	6	None	Terrain scale (km) for terrain effects
IEXTRP	-4	4,-4	Similarity extrap. of wind (-4 ignore upper stn sfc)
ICALM	0	0	Do Not extrapolate calm winds
RMAX1	3	None	MAX radius of influence over land in layer 1 (km)
RMAX2	4	None	MAX radius of influence over land aloft (km)
R1	4	None	Distance (km) where OBS wt = IGF wt in layer 1
R2	5	None	Distance (km) where OBS wt = IGF wt aloft

Data Choices			
Value	Found	Typical	Values
NOOBS	1	0,1,2	0=w/Obs; 1=Partial Obs/No-Obs; 2=No-Obs mode
ITPROG	1	0,1,2	0=Obs.; 1=Obs.Sfc/Prog.Upr; 2=Prog. temperatures
ITWPROG	1	0,1,2	0=Obs.; 1=Obs.T_Diff/Prog.Lapse; 2=Prog. Overwater T

The characteristics of the Calmet hybrid dataset for wind direction versus wind speed are illustrated in **Figures 2-1 and 2-2.**

It can be seen from **Figure 2-1** that the characteristics of wind speed and direction (annual and seasonal) have been hybridised well using the Mandurah AWS data (refer main report). **Figure 2-2** shows the hourly met characteristics for the hybrid met dataset.

Other met trends, including stability class frequency, are illustrated in **Figures 2-3 to 2-6** to follow, with **Figure 2-6** showing that F Class Atmospheric Stability (very stable conditions) is prominent.

F Class Stability (very stable) is prominent during the hours of 5PM – 6AM inclusive i.e., during nighttime hours.

Stable and very stable atmospheric conditions typically dominant those nighttime meteorological characteristics within the locality.

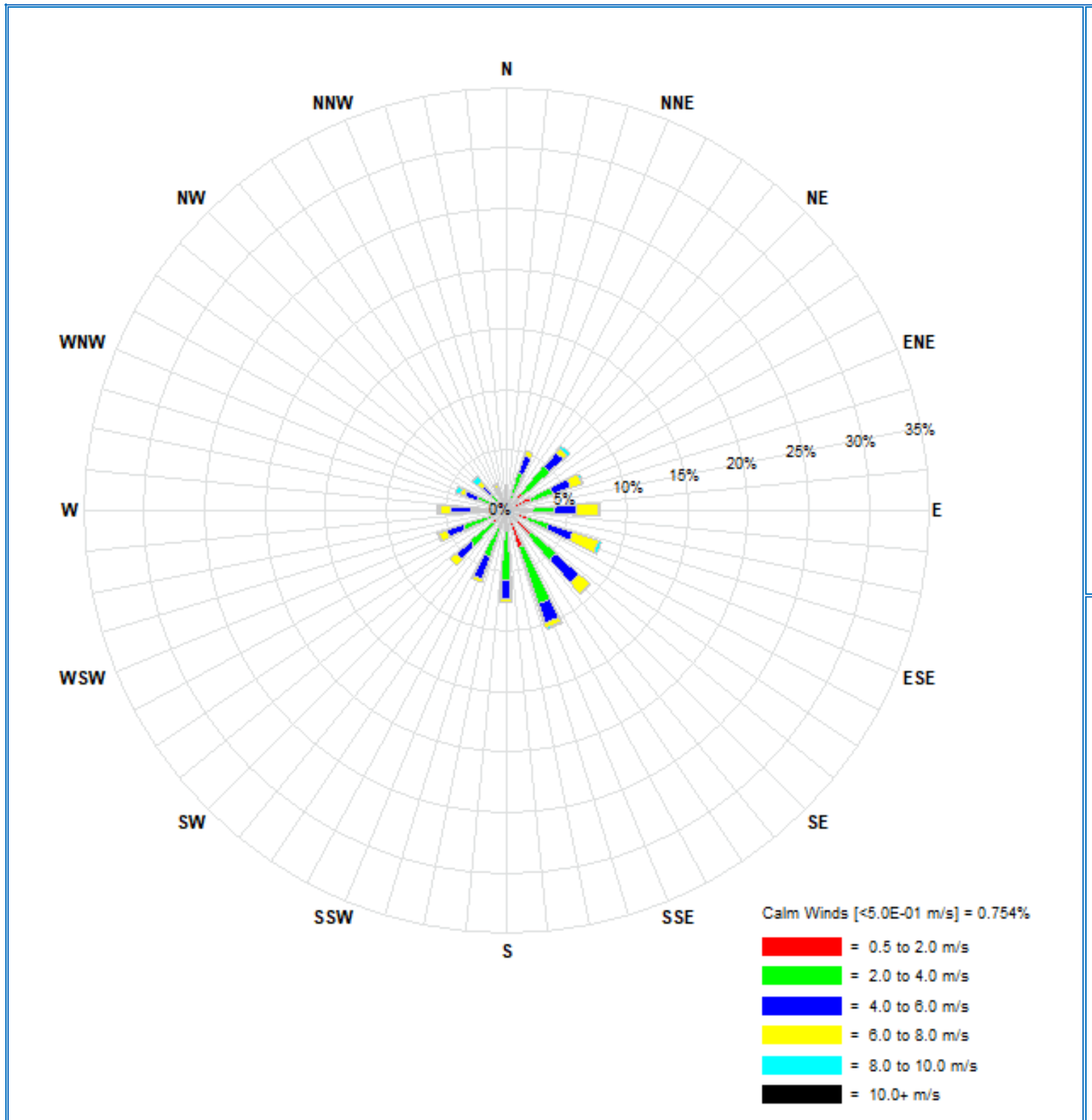
Under stable conditions mechanical dispersion plays a larger role in dispersion and vertical mixing of emission plumes when there is complexity in the terrain and surface roughness. In low surface roughness terrain (as is the Facility's locality), the effects of mechanical turbulence are weakened, to include a decrease in vertical mixing, and ground level emission plumes tend to have larger impacts over longer downwind distances from the emission source.

Stability refers to the atmosphere's ability to resist or enhance vertical motion resulting in turbulence. Stability encompasses (among others) temperature changes with atmospheric height (lapse rate), wind speed and surface roughness. The six classes of stability are:

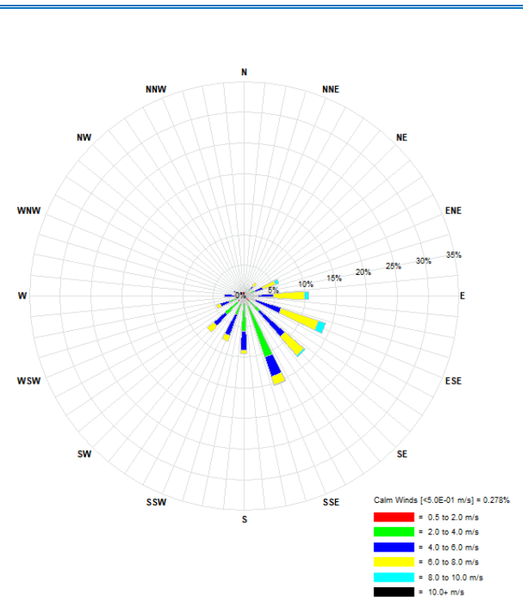
Table 2-2: Stability Classes

A	very unstable
B	unstable
C	slightly unstable
D	neutral
E	stable
F	very stable

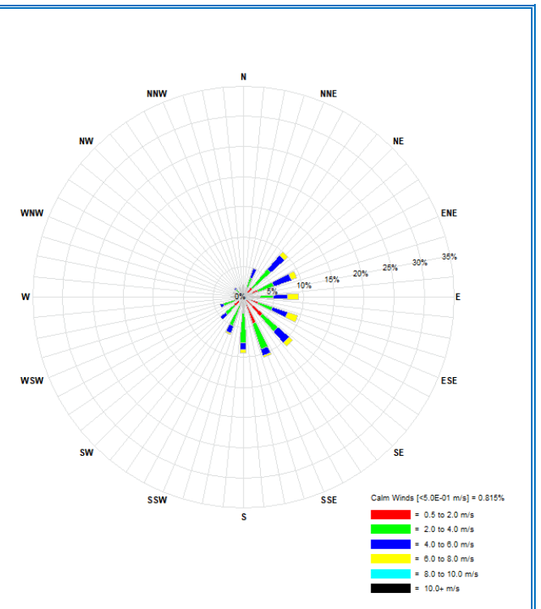
- Unstable conditions enhance turbulence and subsequent dispersion;
- Neutral stability neither enhances nor reduces turbulence; and
- Stable conditions reduce turbulence and therefore dispersion is reduced.



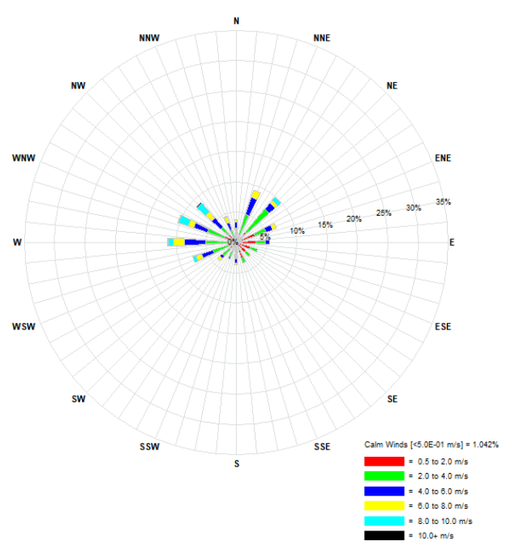
2021 **Hybridized** Annual Windrose



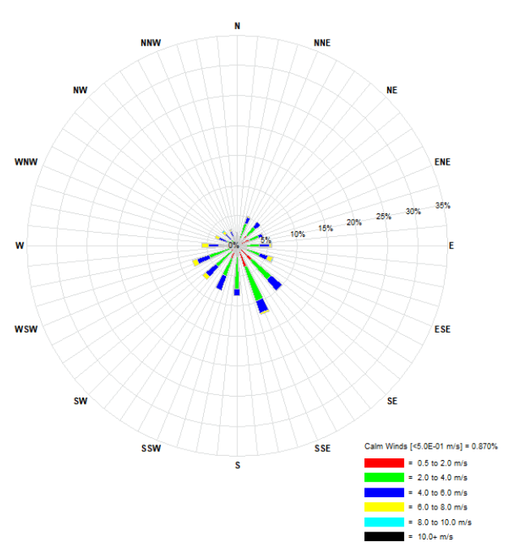
Summer



Autumn

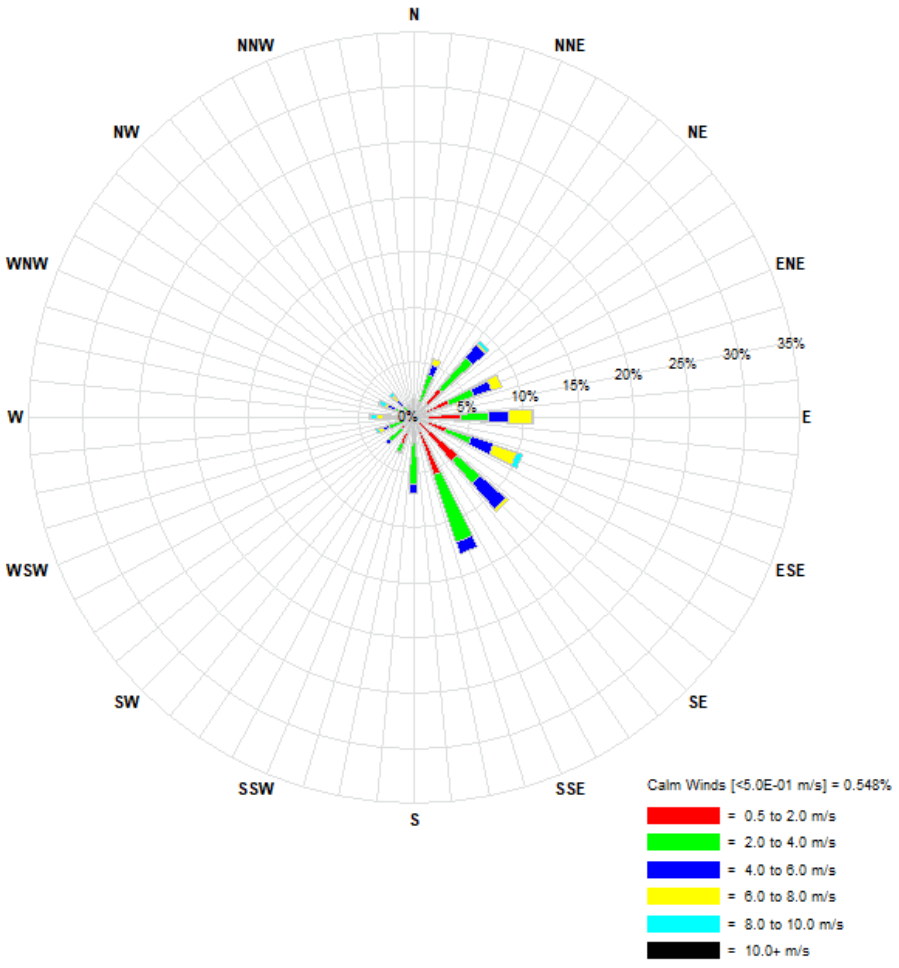


Winter

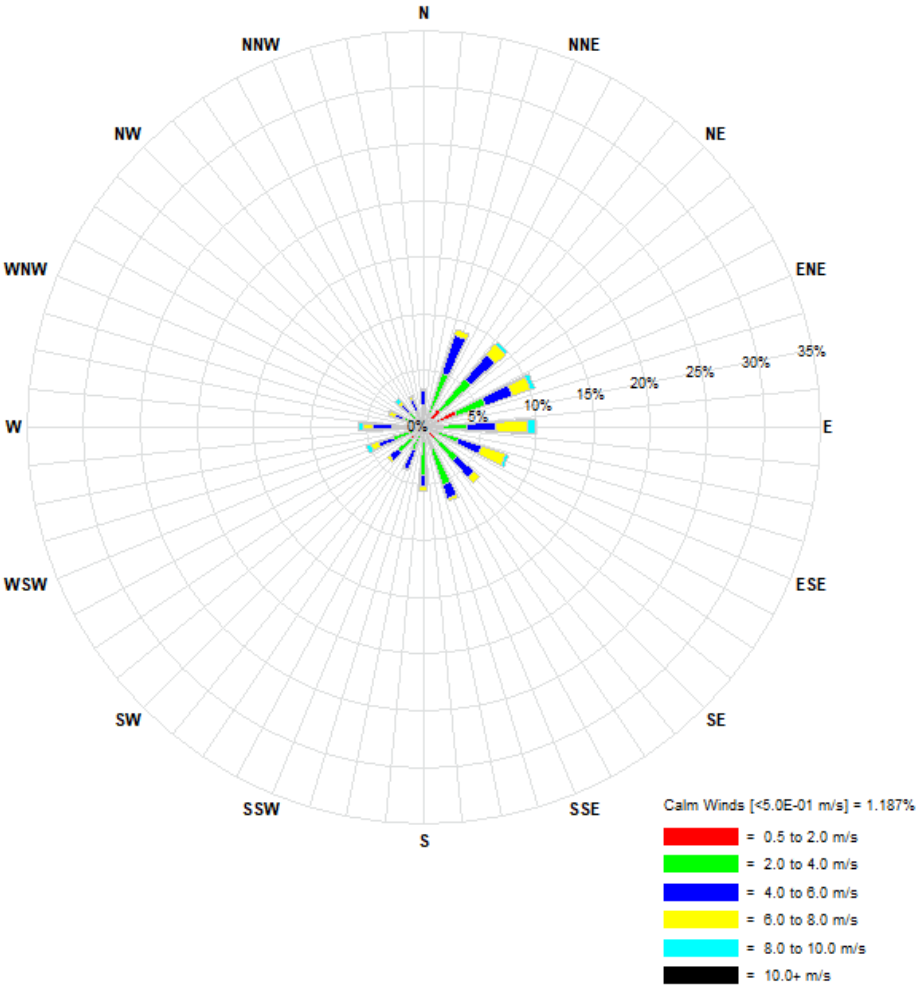


Spring

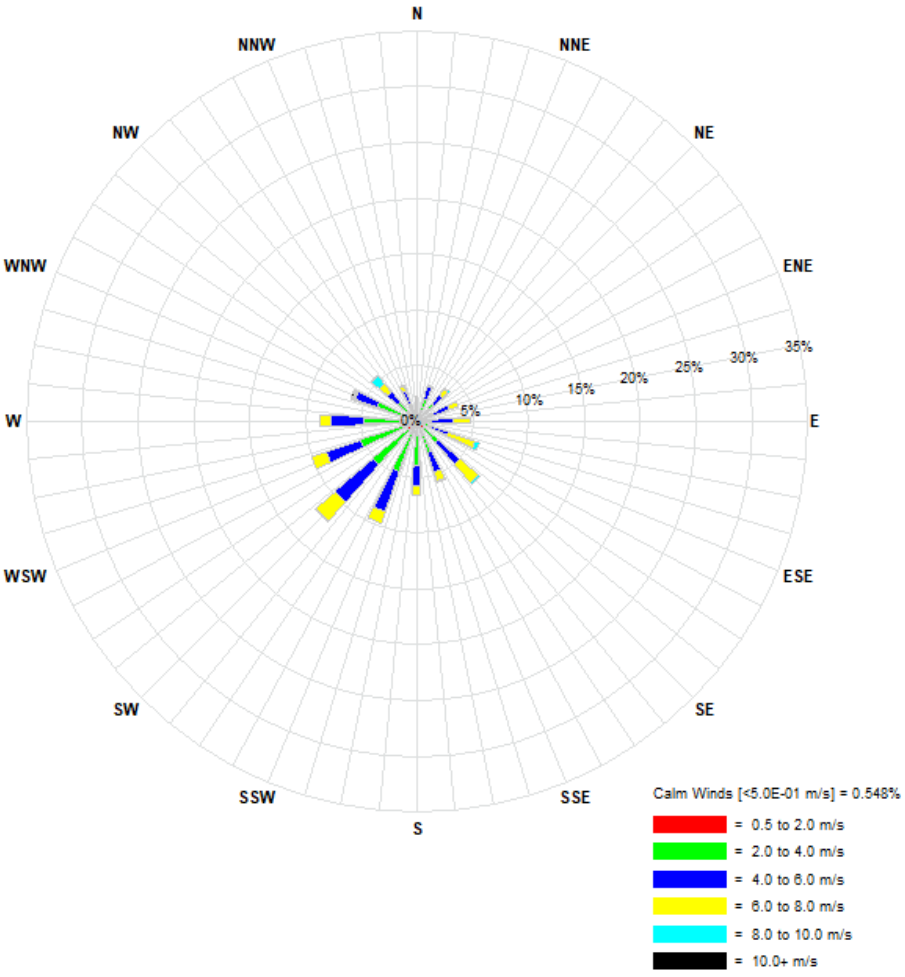
Figure 2-1: Annual and Seasonal Windroses for Hybrid derived Site-representative 2021 Meteorology (modelled)



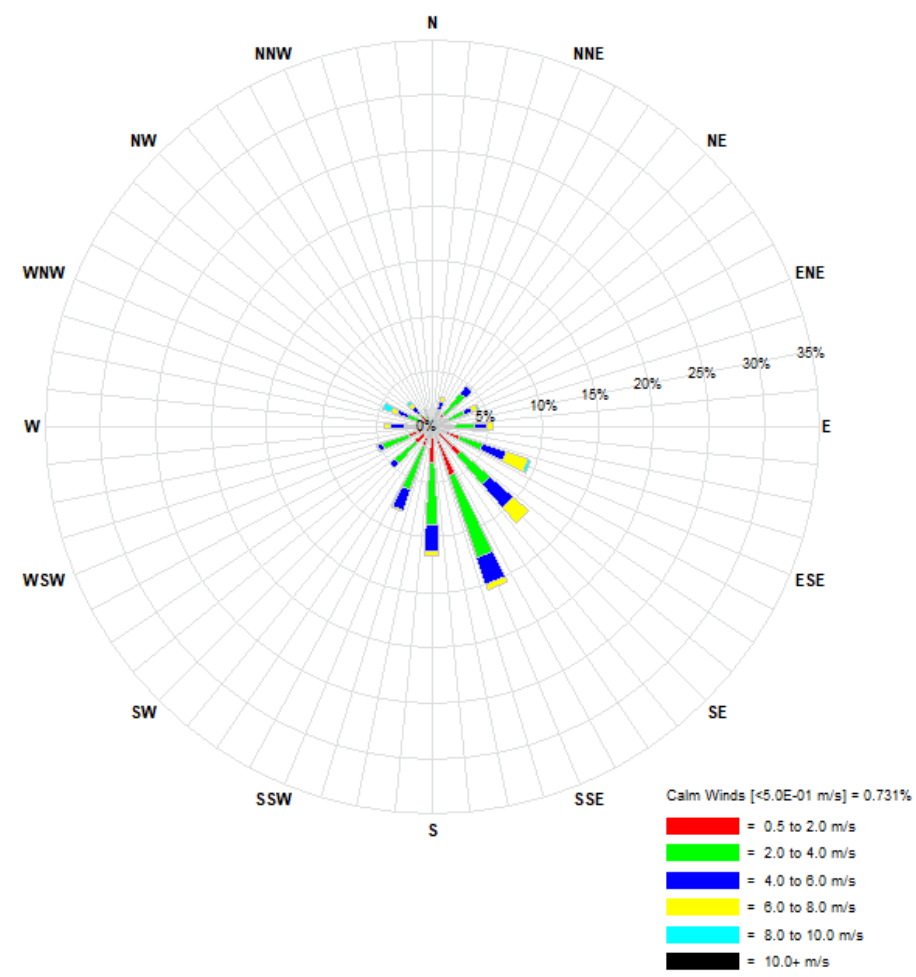
0100hrs – 0600hrs



0700hrs – 1200hrs



1300hrs – 1800hrs



1900hrs – 0000hrs

Figure 2-2: Time of Day Windroses for Hybrid derived Site-representative 2021 Meteorology (modelled)

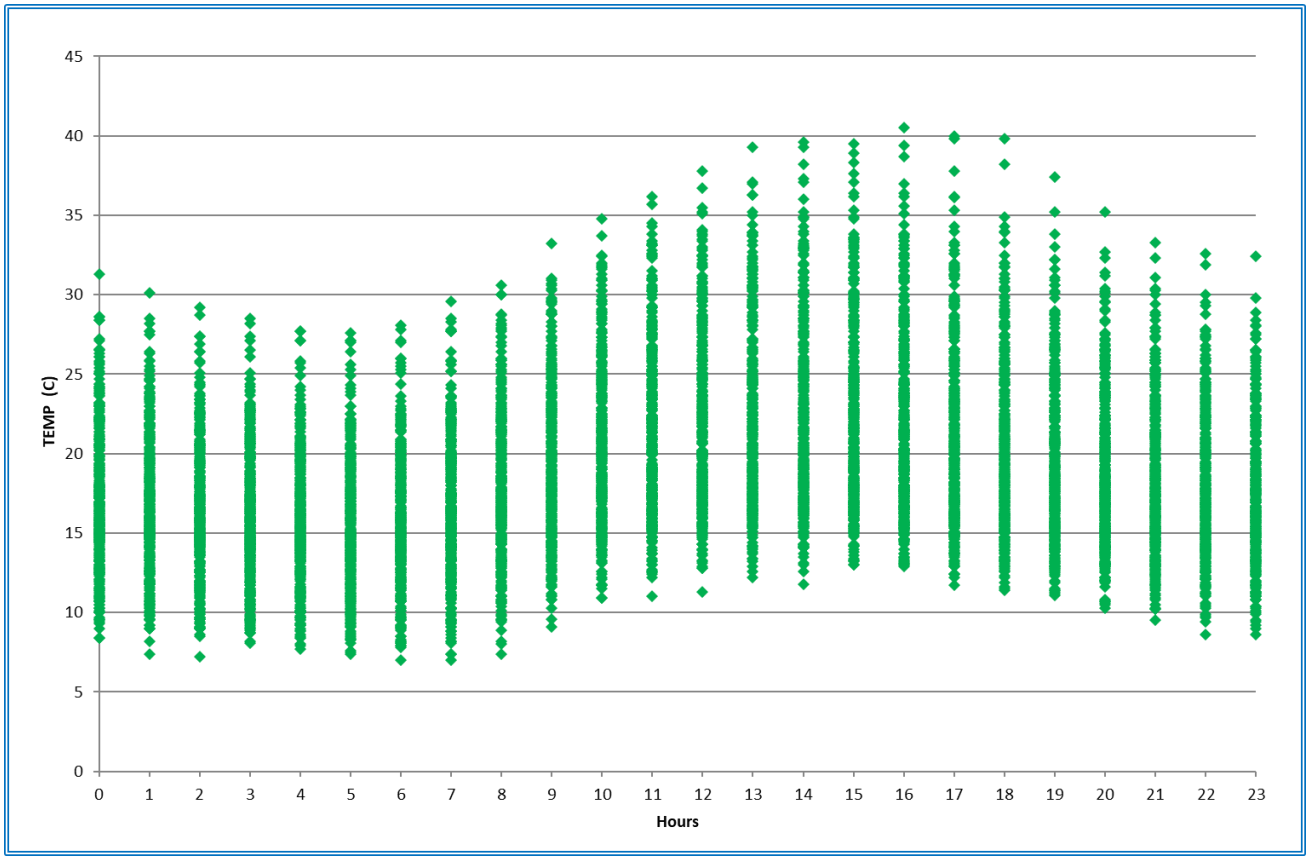


Figure 2-3: Annual X-Y scatter plot diurnal temperatures for 2021 (modelled)

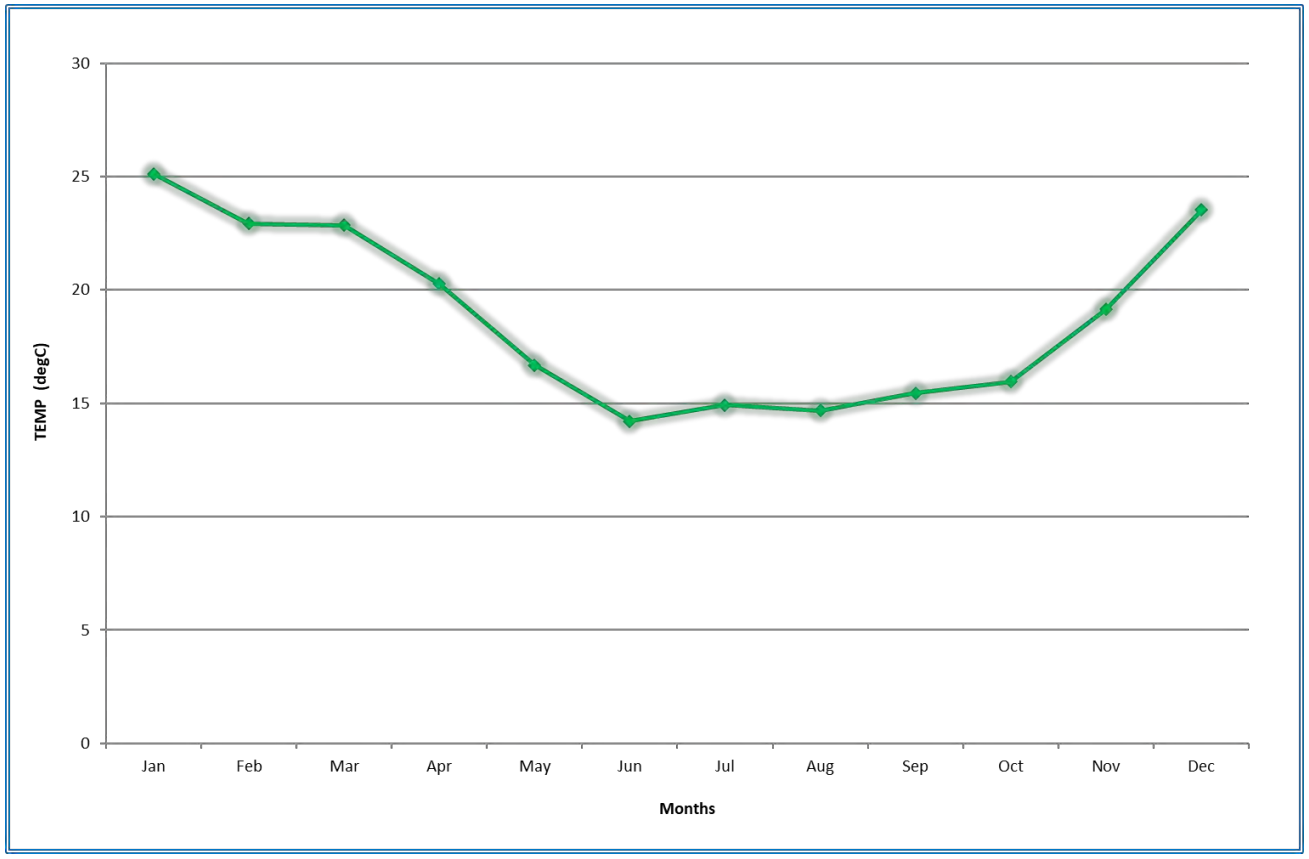


Figure 2-4: Average Monthly temperatures for 2021 (modelled)

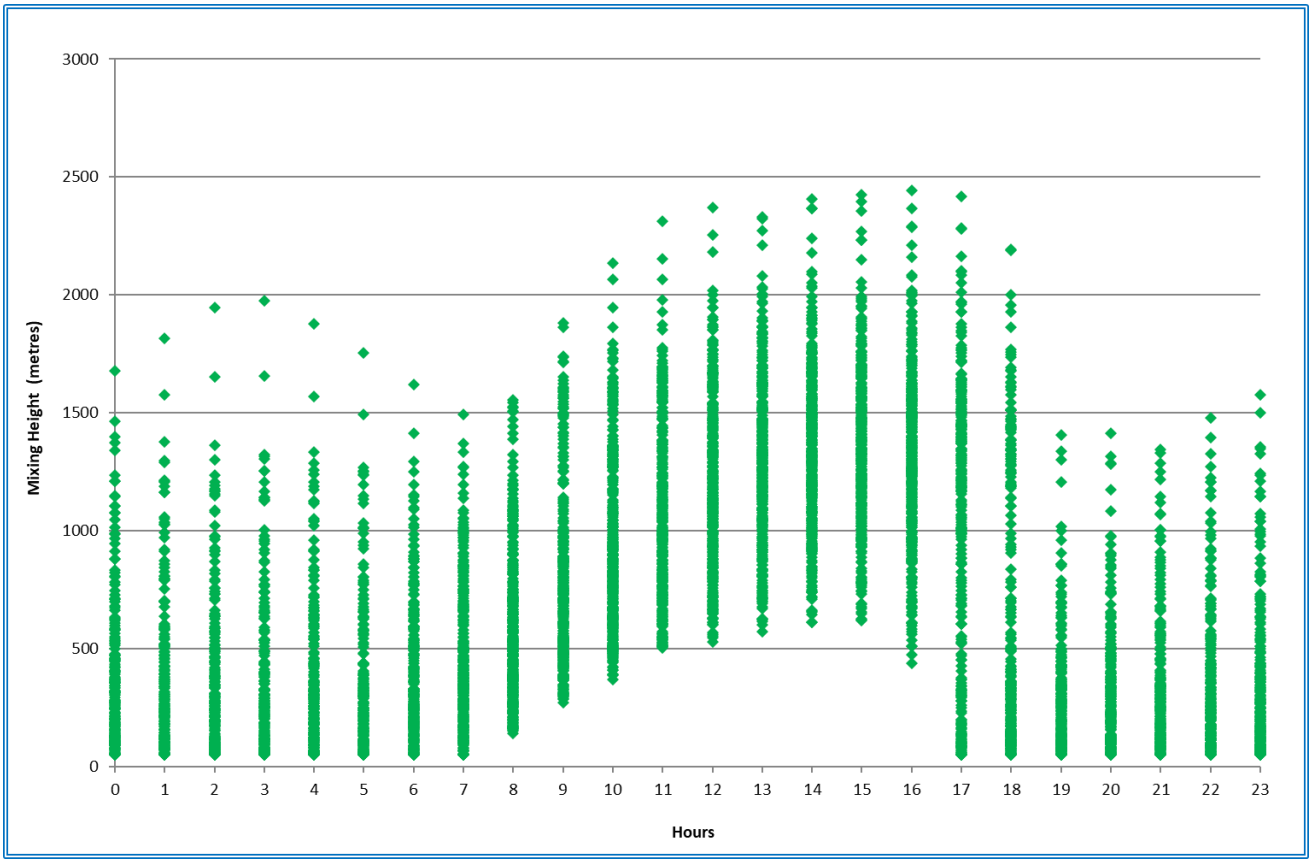


Figure 2-5: Annual X-Y scatter plot diurnal mixing height for Locality (modelled)

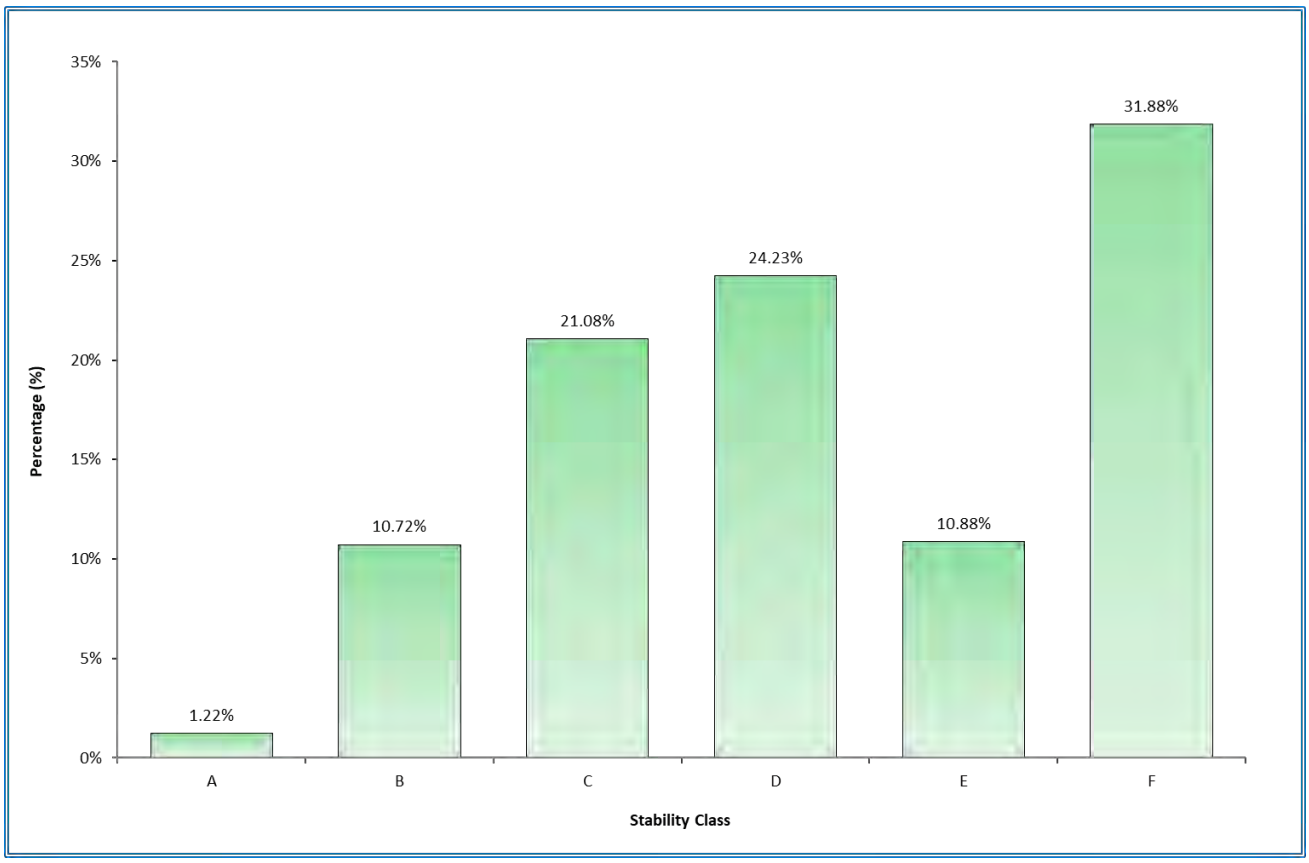


Figure 2-6: Annual stability class frequency for Locality (modelled)

Carbon Recycling Facility

Community Engagement Report

Prepared for C-Wise

6 December 2023

Project Number: TW21124

DOCUMENT CONTROL					
Version	**Description**	**Date**	**Author**	**Reviewer**	**Approver**
0.1	Internal Review	23/11/2023	BH	MH/RC	
1.0	Draft Released for Client Comment	24/11/2023	BH	MH	MH
1.1	Updates for Finalisation	6/12/2023	MH	RC	MH
2.0	First Approved Release	6/12/2023	MH	RC	MH

Approval for Release		
Name	**Position**	**File Reference**
Matthew Hobley	Waste Engineer	TW21124 - C-Wise Community Engagement Report_2.0
Signature		

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Appendices

APPENDIX A Community Engagement Letter

APPENDIX B Presentation

APPENDIX C Feedback Form

1 Introduction

C-Wise Holdings Pty Ltd (C-Wise) is currently seeking approval to develop a new Carbon Recycling Facility (the Facility) for the acceptance and processing of a range of solid and liquid organic wastes to produce compost and similar products (the Project). The Project will be located at 320 Gull Road, Keralup, a portion of Lot 9500 on Deposited Plan 414516 (the Site).

Operation of the Facility will support the diversion of organic waste from landfill, including the implementation of Food Organics and Garden Organics kerbside collections in the Perth and Peel regions, as outlined in the Waste Avoidance and Resource Recovery Strategy 2030 (Waste Authority, 2020) (Waste Strategy 2030).

Due to the activities of the Project, it will be classified as a Prescribed Premises under Part V of the *Environmental Protection Act 1986* (EP Act) and therefore requires approval from the Department of Water and Environmental Regulation (DWER) prior to construction and operation. As part of these approval processes, C-Wise has conducted a Community Engagement Program over a six-week period from October to December 2023. This report outlines the community engagement activities undertaken and summarises the feedback obtained, as well as C-Wise's and its Project Consultancy Team's responses.

2 Summary of Engagement

C-Wise recognises the importance of engagement with the surrounding community for this Project and has been proactive in consulting the community regarding the proposed Carbon Recycling Facility. Several community engagement activities have been undertaken to ensure that the local community has the opportunity to obtain information on the Project and provide feedback.

The community engagement process involved the following key activities:

1. A letter drop to surrounding premises to inform them of the informative documentation, online feedback form and community open day;
2. Materials were prepared to inform the community, and were made available via an online Project Website;
3. An online questionnaire was provided on the Project Website to gather feedback from the community and provide a method for asking queries and providing feedback; and
4. A Community Open Day was held to allow the community and key stakeholders such as the DWER to attend and engage with C-Wise and Talis staff in person.

Key documentation that was prepared to support the engagement process included:

- Community Engagement Letter;
- Project Website and Online Questionnaire;
- Presentation; and
- Feedback Form.

Residents and businesses from the area were invited to participate in various Project feedback activities. These aimed to provide an opportunity to obtain feedback on the Project to enhance C-Wise's decision-making process. Details of these activities are discussed in the following subsections.

2.1 Community Engagement Letter

C-Wise prepared a Community Engagement Letter for the Project and undertook a letter drop to all residents and businesses within approximately 2.5km of the Facility, or further where a road intersected with the 2.5km radius. The letter drop occurred in the week starting 30 October 2023. A total of 41 letters were prepared, with 28 of the letters successfully delivered. Thirteen letters could not be delivered due to the lack of a mailbox at the property, however most of these were located outside of the target 2.5km radius.

A copy of the Engagement Letter can be found in Appendix A.

The Community Engagement Letter provided information on the following key aspects of the Project:

- Proposed Facility;
- Potential environmental impacts and management;
- Specialist studies that have been prepared:
    - Environmental Assessment and Management Plan prepared by Talis Consultants;
    - Stormwater and Leachate Management Plan prepared by Talis Consultants;
    - Odour Impact Assessment prepared by Environmental and Air Quality Consulting;

    - Hydrogeological Investigations and Design prepared by WSP;
    - Bushfire Management Plan undertaken by Bushfire Prone Planning; and
    - Ecological Surveys undertaken by Focused Vision Consulting & Coterra Environment.
- Approvals Pathway:
    - Department of Water and Environmental Regulation (DWER); and
    - Shire of Murray.
- Map Indicating Site Location; and
- C-Wise Site General Arrangement.

The Community Engagement Letter included various options for members of the community to provide feedback. This included contact details to receive emails and written submissions, as well as a web link to the Project Website, discussed in Section 2.2. Community members were also invited to participate in a Community Open Day, discussed in Section 2.3 below.

2.2 Project Website and Online Questionnaire

A standalone Project Website was developed to be the Project hub where all Project information would be stored and added for community access and communications. The Project Website went live on 10 November 2023 and can be found at the following link:

https://staging-cwise-stage.kinsta.cloud/east-keralup-development-project/

A link to the Project Website was provided in the Community Engagement Letter, as well as in the Feedback Form presented during the Community Open Day.

The website provided the following information:

- Project Overview;
- C-Wise Background;
- Community Consultation Details;
- New Proposed Facility;
- Online Questionnaire;
- Map Indicating Site Location;
- C-Wise Site General Arrangement;
- 3D Site Drawing;
- Letter to the Community; and
- Contact Information and Contact Form.

The Online Questionnaire was created to give all concerned parties an opportunity to respond to the Project. It went live on 10 November 2023 with the Project Website and will remain open for the duration of the Project Development to allow continued engagement from the Community. Figure 2-1 below shows the Online Questionnaire that was provided on the Project Website.

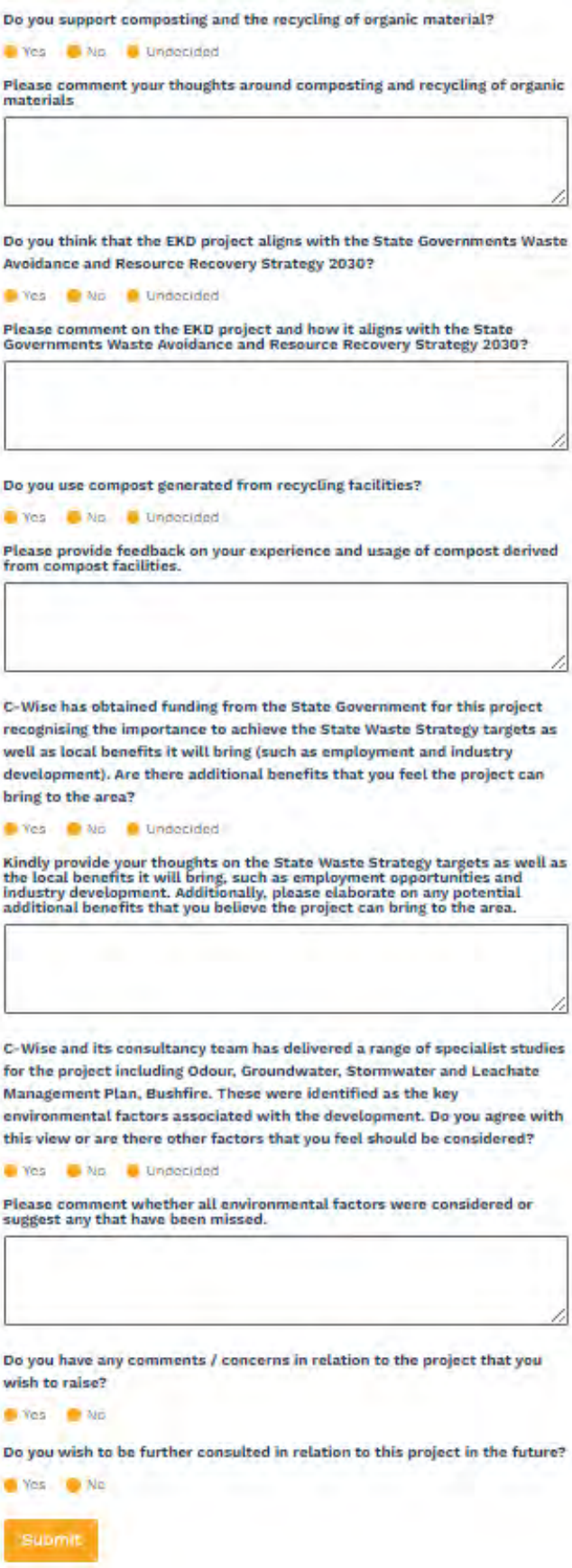


Figure 2-1: Online Questionnaire

2.3 Community Open Day

Members from the Shire of Murray community were invited to participate in a Community Open Day through the Community Engagement Letter, as well as on the Project Website. The event was held to allow the community and key stakeholders such as the DWER to engage with C-Wise and Talis staff in person.

The Community Open Day was held for four hours between 1pm and 5pm on Tuesday, 14 November 2023. The event was held at 37 Dollyup Street in Stakehill at the Food Innovation Precinct Western Australia. The session format was a question-and-answer forum that was facilitated by Talis. The participants were provided the opportunity to raise any questions or queries they may have in relation to the Project. Talis prepared a presentation to help guide discussions and provide information on the Project, and physical feedback forms, alongside QR codes for directing feedback to the Project Website, were also available. These resources are discussed further in Section 2.3.1 and Section 2.3.2 respectively.

No members of the community attended the open day, though two representatives from the DWER attended and were taken to view the Site entrance.

2.3.1 Presentation

A PowerPoint presentation was prepared by Talis to provide attendees with a more detailed description of the Project and offer an opportunity for questions and concerns to be raised.

The Presentation consisted of the following elements:

- Project Background;
- Project Funding;
- Alignment with the Waste Strategy 2030;
- Organics Recycling Guideline;
- Site Location and Design;
- Key Environmental Aspects;
- Stakeholder Engagement; and
- Approvals Pathway.

A copy of the presentation provided at the Community Open Day is included in Appendix B.

2.3.2 Feedback Form

A Feedback Form was provided to attendees at the Open Day as a way to provide questions or concerns about the Project. The Feedback Form questions were consistent with the Online Feedback Form, which was also available to attendees through a QR code which led to the Project Website. A copy of the Feedback Form can be found in Appendix C.

2.4 Feedback Received

As of the date of reporting, there has been no feedback received through the Online Questionnaire or through the email or phone number provided on the Project Website and Community Engagement Letter. The lack of community members that attended the Open Day meant that there was no in-person feedback received on the day.

Throughout the Community Engagement Program, C-Wise and Talis have received no community feedback on the Project, indicating there is no significant opposition to the Project at this stage. Having operated its existing Nambeelup Composting Facility for over 25 years, C-Wise is a recognised operator in the area and is well known within the community for being proactive in continually enhancing its composting technique and environmental management measures to achieve the best possible environmental and social outcomes. Talis believes that the lack of opposition to the Project to date is due to C-Wise's long-standing reputation and familiarity in the region and is an example of the community's general support for C-Wise's operations.

3 Conclusion

C-Wise is proposing to develop a new Carbon Recycling Facility to process a range of organic materials into a high-quality compost product. To support the development of the Project, C-Wise conducted a six-week Community Engagement Program to inform the community of the activities to be undertaken and to provide an opportunity for feedback to be received.

No feedback was received from the community on the Project during the Community Engagement Program. Following the Community Engagement Program Talis has come to the following conclusions:

- The engagement activities conducted were sufficient for the scope of the Project;
- The lack of feedback indicates that there is no major opposition to the Project at this stage;
- The lack of feedback received on the Project indicates the community's confidence that C-Wise will develop the Project in accordance with relevant standards and guidelines; and
- Risks to the environment associated with the Project will be managed appropriately.

The development of the Carbon Recycling Facility represents an opportunity for C-Wise to continue to operate from a best practice facility that incorporates extensive environmental management controls to allow for the risk of potential environmental impacts to be managed appropriately. These controls will ensure that the environment is adequately protected and that the community's expectations for the Project are met.

APPENDIX A
Community Engagement Letter

Dear Resident/Occupier,

Proposed C-Wise Carbon Recycling Facility – Community and Stakeholder Consultation Letter

C-Wise is proposing to develop a new Carbon Recycling Facility located at 320 Gull Road, Keralup, (Please refer attached). The facility will accept a range of organic materials for composting, including Food Organics and Garden Organics (FOGO) from kerbside collections in the Perth and Peel regions, as mandated by the State Government's Waste Avoidance and Resource Recovery Strategy 2030.

Recognising the importance of the proposal, C-Wise was successful in obtaining funding for the construction of the facility from both the State and Federal governments through the Food Waste for Healthy Soils Fund.

C-Wise wishes to engage the local community and stakeholders early in the project and has therefore prepared this letter to introduce the facility and provide an invitation to participate in the various consultation activities. To commence the process, C-Wise has undertaken a letter drop to all residents and businesses within approximately 2.5 km radius of the facility.

Proposed Facility

The development of the Carbon Recycling Facility will see best-practice composting infrastructure developed at the site in general alignment with the DWER's Guideline *Better Practice Organics Recycling (December 2022)*. The facility will accept FOGO waste, alongside greenwaste, forestry and liquid wastes, and will process these into a range of compost and other soil-improving products.

The whole facility will be constructed in two stages, which over time will provide C-Wise the ability to transfer all its operations across from its existing facility in Nambeelup. As illustrated in Figure 2, both Stage 1 and 2 are basically identical.

As part of Stage 1, the key elements to be constructed include:

- Carbon Storage Area
- Receival Building
- Enclosed Composting Bunkers
- Overcover aeration and maturation area
- Product screening and dispatch area
- Leachate system including sumps, tanks and evaporation ponds
- Stormwater system including swales and ponds
- Liquid waste tank farm

Stage 1 of the facility will provide sufficient annual capacity to process 100,000 of organic materials. Stage 2 will increase the facility overall capacity to 200,000 tonnes per annum.

ABN 97 962 521 954 | 139 Nambeelup Road Nambeelup WA 6207 | PO Box 2040 Mandurah WA 6210 | t 08 9581 9582 f 08 9581 9585 | e info@cwise.com.au w www.cwise.com.au

Potential Environmental Impacts and Management

C-Wise recognises that that there are a range of environmental risks associated with composting operations which require careful management. C-Wise and its team of consultants, have prepared a range of specialist studies including but not limited to:

- Environmental Assessment and Management Plan prepared by Talis Consultants
- Stormwater and Leachate Management Plan prepared by Talis Consultants
- Odour Impact Assessment prepared by Environmental and Air Quality
- Hydrogeological Investigations and Design prepared by WSP
- Bushfire Management Plan undertaken by Bushfire Prone
- Ecological Surveys undertaken by Focused Vision Consulting & Coterra Environment

As part of these works, detailed assessments have been undertaken to devise the environmental engineering and operational measures to ensure that all potential risks are controlled in accordance with regulatory and modern best practice standards.

Approvals Pathway

C-Wise will require a variety of approval for the construction and operation of the facility including:

- Department of Water and Environmental Regulation (DWER):
    - Works Approval
    - Clearing Permit
    - Licence
- Shire of Murray:
    - Development Approval Application.

Community Consultation

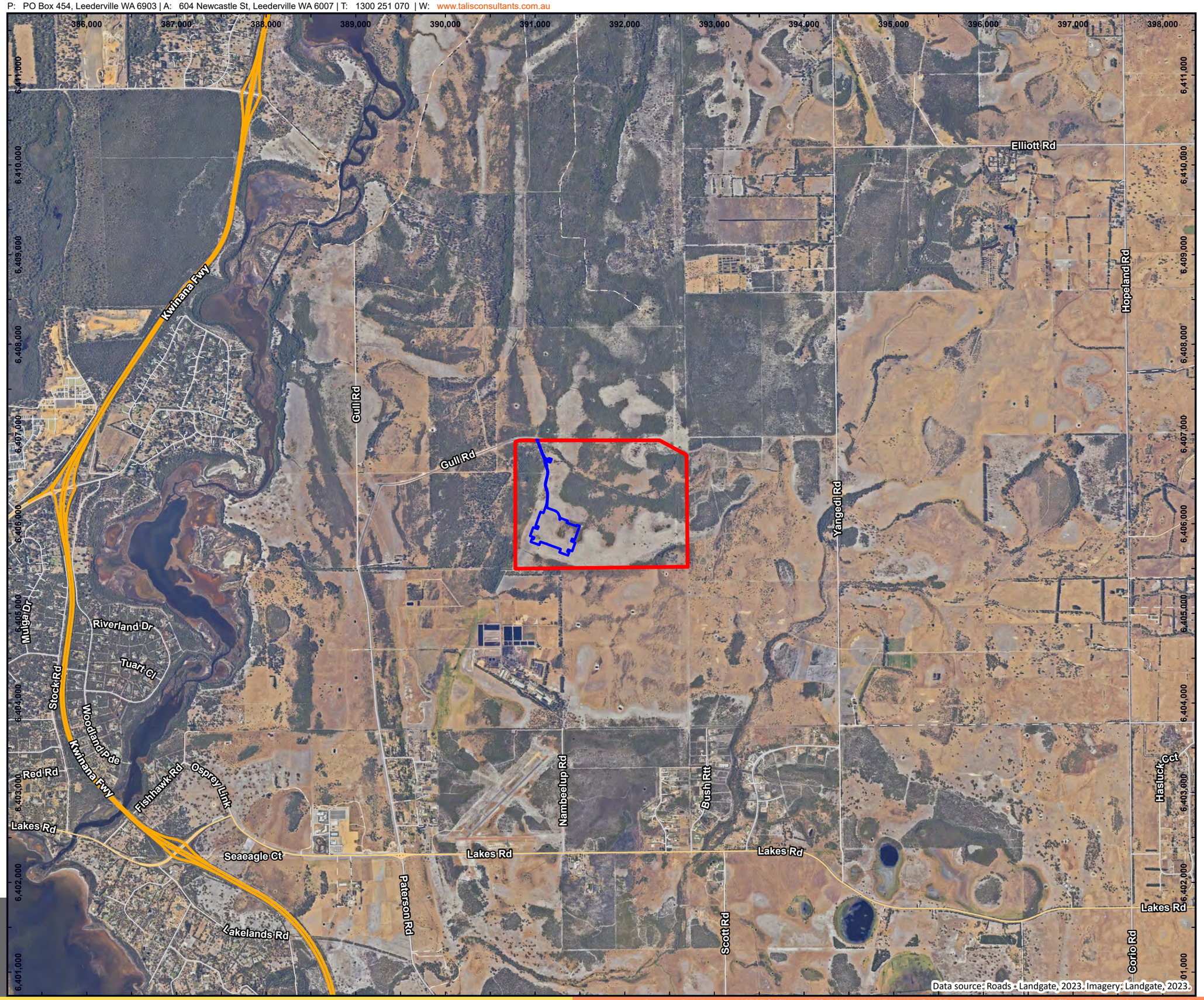
C-Wise wishes to undertake community and stakeholder consultation to provide the opportunity to have their say on the proposal. C-Wise has arranged for an open afternoon for community members and stakeholders to drop by at a convenient time to learn more about the project. C-Wise has also set up an online feedback forum. In addition, C-Wise is happy to accept emails and written submissions. Please note C-Wise is currently developing a new website that will go live on or before the 10th November at which time the link below will be operational for more information about the project.

CONSULTATION DETAILS

OPEN DAY – Food Innovation Precinct
ADDRESS - 37 Dollyup Street, Stakehill, WA 6181
Date: Tuesday 14th November 2023
Time: 1pm to 5pm
Web Link: https://staging-cwise-stage.kinsta.cloud/east-keralup-development-project/
Email and Written Submissions: info@cwise.com.au

If you have any queries, please do not hesitate to contact +61 8 9581 9582

P: PO Box 454, Leederville WA 6903 | A: 604 Newcastle St, Leederville WA 6007 | T: 1300 251 070 | W: www.talisconsultants.com.au

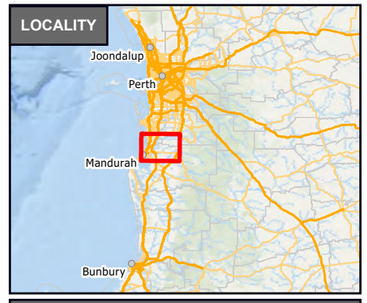


LEGEND

- Site Boundary
- Development Envelope

Western Australian Roads

- Freeway / Highway
- Main Road
- Minor Road
- Other



0 50 100 150 200 250 km

SITE LOCATION

Clearing Permit Application

C-Wise
320 Gull Road
Keralup WA 6182

N 0 500 1,000 1,500 m

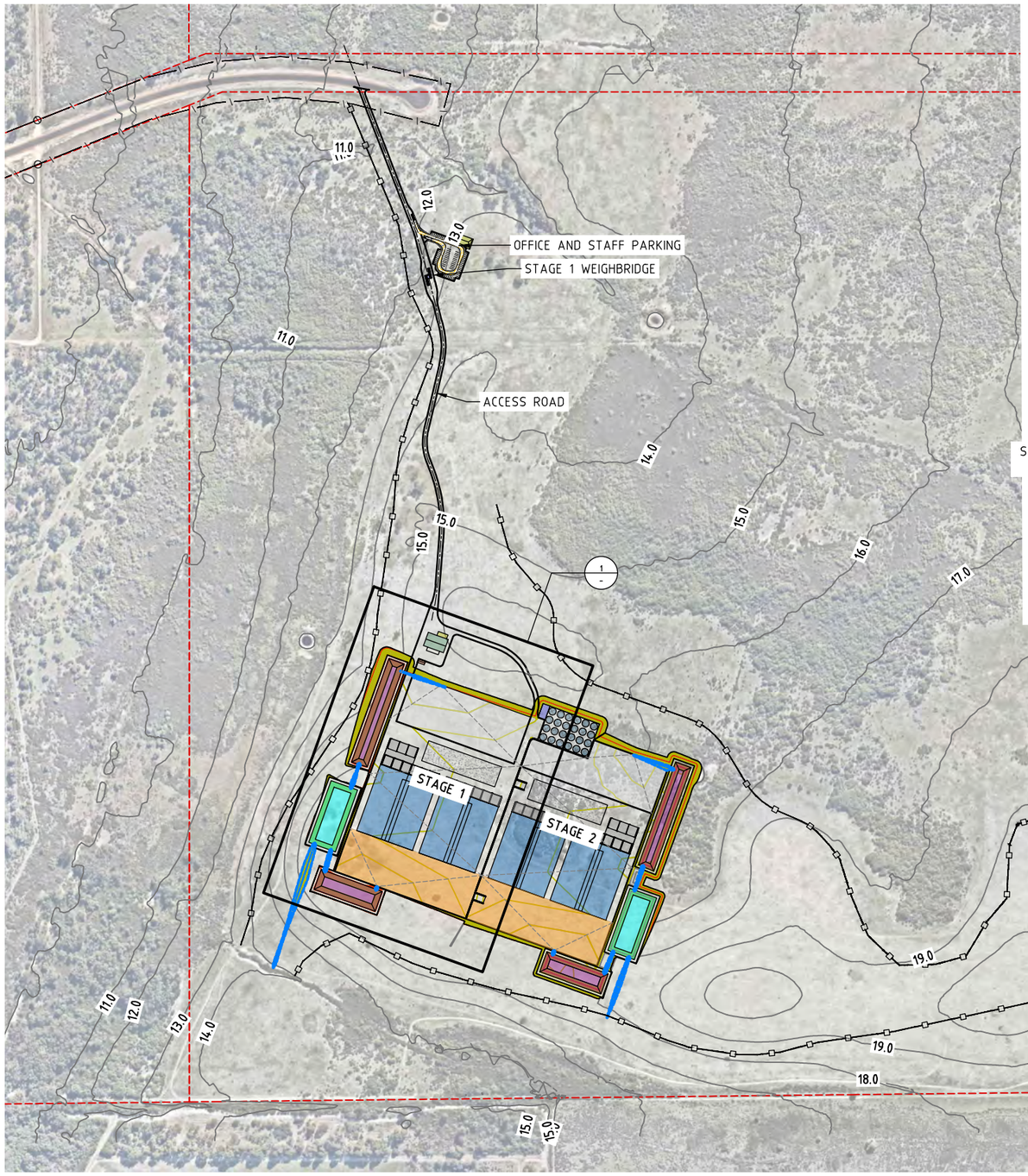
Coordinate System: GDA2020 MGA Zone 50
Scale @ A3: 1:40,000

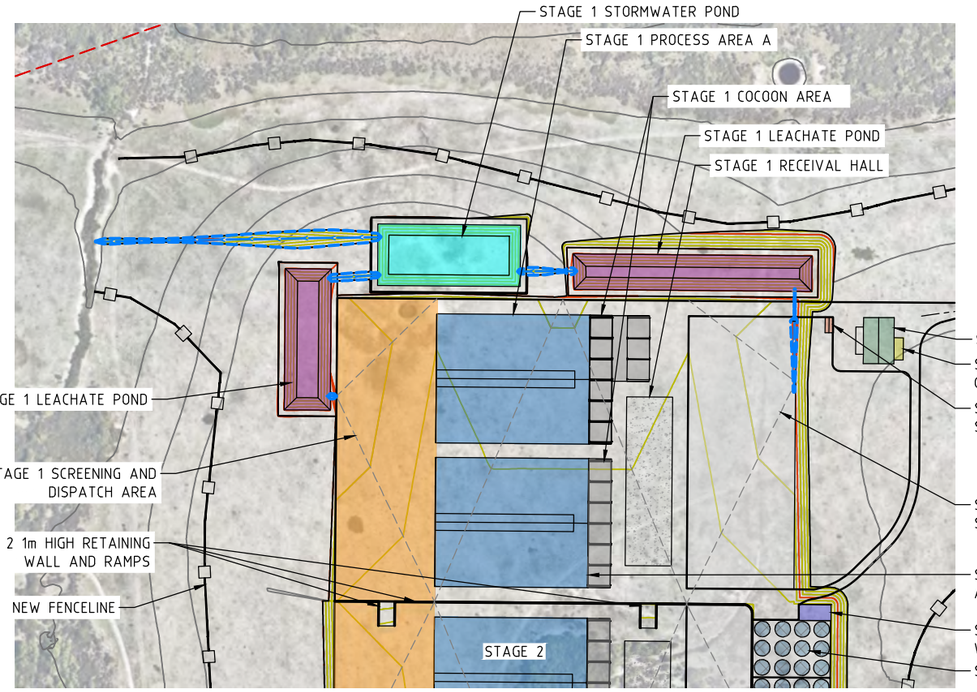
Prepared:	E Jackson	Date:	19/10/2023
Reviewed:	M Hobley	Revision:	A
Project:	TW21124		

talis consultants

Figure 01

Document Path: \\server\talis\SECTIONS\Waste\PROJECTS\TW2021\TW21124 - C-WISE Due Diligence and approvals\GIS\Maps\TW21124 - C-Wise - Clearing Permit Application\TW21124 - C-Wise - Clearing Permit Application.aprx





1 – STAGE 1 LAYOUT
SCALE: 1:4000

LEGEND:

- LEASE BOUNDARY
- ACCESS ROAD
- LEACHATE POND
- RECEPTION/OFFICES
- WORKSHOP
- STORMWATER POND
- SCREENING/DISPATCH
- LIQUID WASTE RECEIVAL
- FUEL STORE/SERVICE BAY
- TANK FARM
- RECEIVAL HALL
- COCOON AREA
- CARBON STORAGE
- OPEN DRAIN
- EXISTING FENCELINE
- NEW FENCELINE

INFORMATION ONLY
NOT FOR CONSTRUCTION

150m 0m 150m 300m
1:7500 @ A3

VERTICAL DATUM: AUSTRALIAN HEIGHT DATUM
HORIZONTAL DATUM: MGA 94 ZONE 50

talis consultants
ASSET
ENGINEERING
ENVIRONMENT
NOISE
SPATIAL
WASTE
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PERTH
604 Newcastle Street Leederville WA 6007
PO Box 454 Leederville WA 6903

Client: C-WISE Soil Carbon Solutions

NOTES

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No.	Date	Drwn.	Chk.	Amendment / Issue	App.
F	26.09.2023	YJ	AB	EARTH WORK VOLUME UPDATED	MH
E	10.07.2023	JS	AB	SITE LAYOUT UPDATED	MH
D	16.01.2023	MH	AB	SITE LAYOUT UPDATED	MH
C	15.11.2022	AB	MH	BOUNDARIES UPDATED	MH
B	03.02.2022	YJ	AB	SECTIONS AND ISOPACHYTE LAYOUT ADDED	MH
A	15.11.2021	YJ	AB	PRELIMINARY ISSUE	MH

Project: C-WISE DUE DILIGENCE AND APPROVALS

Title: GENERAL ARRANGEMENT

Scale: AS SHOWN @ A3 | Date: 02.03.2022
Drawn: YJ | Checked: AB | Approved: MH
Job No: TW21124 | Drg. No: C-100 | Rev: F
Filename: TW21124-SET.DWG

APPENDIX B
Presentation

C-Wise: Carbon Recycling Facility

Community Engagement Workshop

14 November 2023

ASSETS | ENGINEERING | ENVIRONMENT | NOISE | SPATIAL | WASTE

1

AGENDA

- Project Background
- Project Funding
- Alignment with Waste Strategy 2030
- Organics Recycling Guideline
- Site Location & Design
- Key Environmental Aspects
- Stakeholder Engagement
- Approvals Pathway

2

Who Are C-Wise?

- C-Wise recognised as WA's leading composting firm with over 25 years of operations.
- Winner of several awards, including:
  - Telstra's WA winner of the 2024 Best of Business Award for promoting sustainability;
  - Andy Gulliver (Founding Director) wins AORA Legend Award in 2016 for his contribution to the composting industry;
  - Organic Consumer Choice Awards 2014, Best Organic Input Supplier;
  - Resource and Waste Management Awards 2012, for the New Perth Bunbury Highway Soil Manufacturer for Landscaping and Construction; and
  - The Western Australian Environment Awards 2005, Overall Winner and Small Business Leading by Example.

3

Project Background

- Result of a decade-long goal of establishing a modern, better practice facility at a new location
- Proposing Carbon Recycling Facility to process 200,000 tonne per annum of organic materials
  - Stage 1: 100,000 tonnes of capacity
  - Stage 2: Additional 100,000 tonnes of capacity, relocating from the existing Site
- Important project to support the State Waste Strategy & FOGO mandate for Local Governments in Perth and Peel
- C-Wise and team of consultants in the process of finalising Environmental and Planning approval applications
- Timeline:
  - Stage 1 construction in early 2024, starts operations early 2025
  - Stage 2 construction early 2027, starts operations early 2028

4

Government Funding

- C-Wise secured $5.75M in funding from the Federal and State Government's Food Waste for Healthy Soil Soils Fund
- This represented half of all funding allocated to WA
- Funding aimed at supporting rollout of FOGO for local governments by 2025, and diverting organic waste from landfill

Department of Water and Environmental Regulation
GOVERNMENT OF WESTERN AUSTRALIA

Australian Government
Department of Climate Change, Energy, the Environment and Water

C·WISE

5

State Waste Strategy 2030

- Vision:
  - ***Western Australia will become a sustainable, low-waste, circular economy in which human health and the environment are protected from the impacts of waste.***
- Avoid, Recover, Protect initiatives and targets aim to deliver the vision
- FOGO mandate for all Perth and Peel local governments by 2025
- Aims to recover 75% of material by 2030

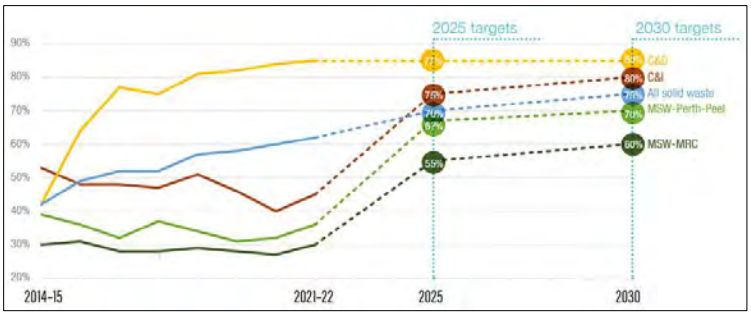
C·WISE

6

State Waste Strategy 2030

- C-Wise Carbon Recycling Project a key piece of infrastructure to deliver the State Strategy and targets

Avoid	Recover	Protect
Western Australians generate less waste.	*Western Australians recover more value and resources from waste.*	***Western Australians protect the environment by managing waste responsibly.***
2025 – 10% reduction in waste generation per capita **2030** – 20% reduction in waste generation per capita	**2025** – Increase material recovery to 70% **2030** – Increase material recovery to 75% **From 2020** – Recover energy only from residual waste	**2030** – No more than 15% of waste generated in Perth and Peel regions is landfilled **2030** – All waste is managed and/or disposed to better practice facilities



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DWER Organics Recycling Guideline

- Purpose:
  - ***To set environmental performance objectives and identify benchmark controls for the planning, design and operation of organics recycling facilities***
- Environmental Performance Objectives:
  - Feedstocks
  - Emissions to land and water
  - Odour
  - Point source emissions to air
  - Dust
  - Noise
  - Emissions of litter and debris
  - Fire prevention and management
  - Vectors; and
  - Product Quality
- Facility design prepared in general accordance with these Guidelines

8

Site Location

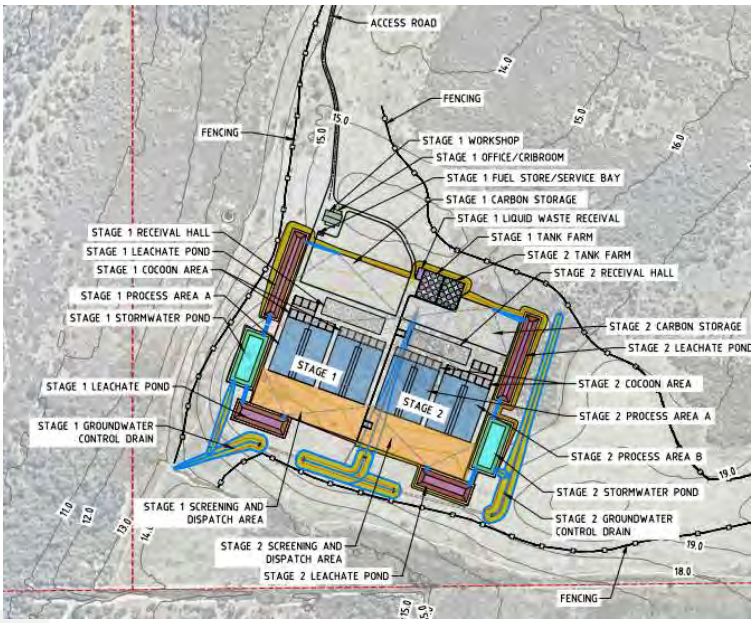
- 230 Gull Road, Keralup
- Keralup region previously planned for large scale residential development by Development WA.
- Focused changed to industrial land around 2014
- Registration of Interest released 2018 by Development WA.
- C-Wise entered into a long term (50 years) lease with Development WA in August 2021.
- Lease agreement requires Construction Contract Awarded 2025

9

Site and Design

10

Site and Design



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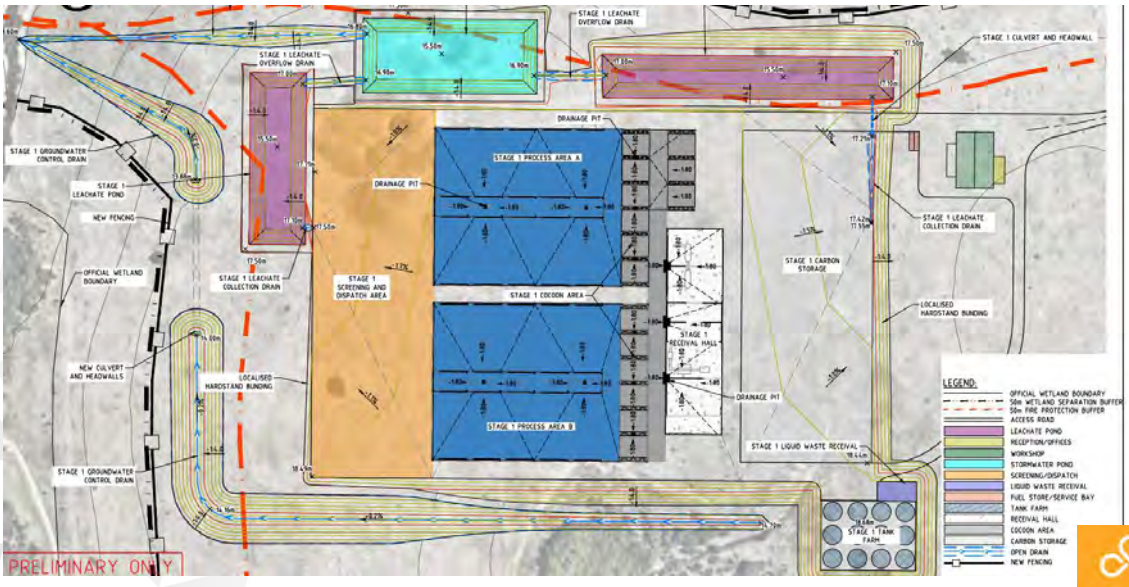
Stage 1 Design



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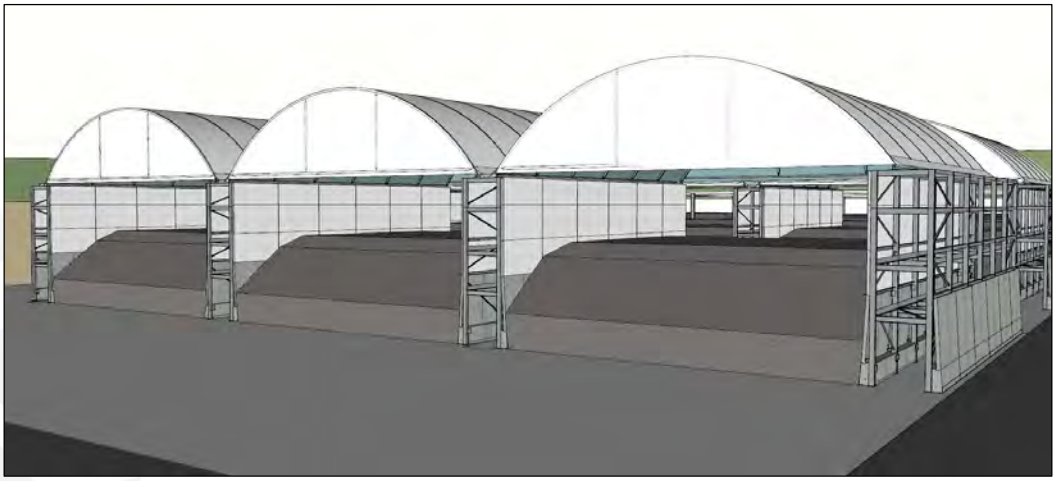
Stage 1 Design

13

Cocoon / Smart Composting System



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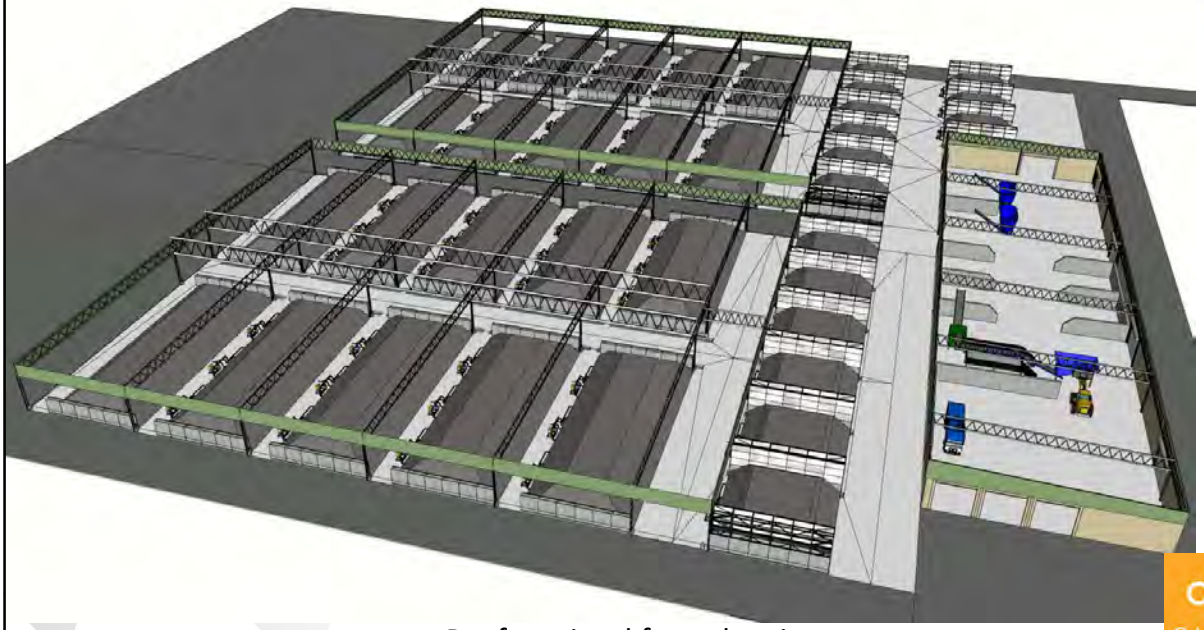
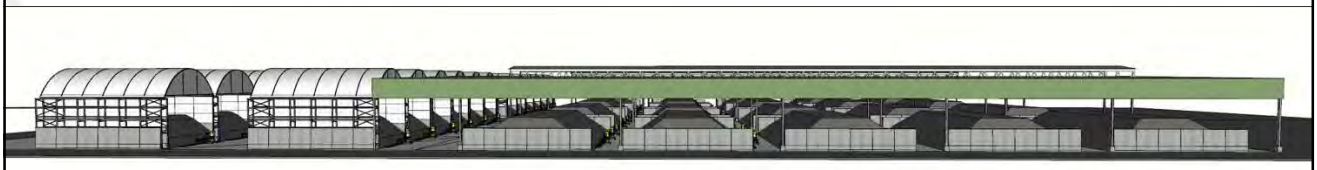
Processing Areas



Roofs omitted from drawings

15

Elevation



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Potential Environmental Aspects

KEY

- Leachate
- Surface Water
- Odour
- Vegetation & Clearing

OTHER

- Weeds
- Fire
- Fire Wash Water
- Noise
- Dust
- Vermin and Feral Animals
- Acid Sulfate Soils
- Litter
- Security
- Traffic

17

Leachate & Surface Water

- **Elimination – overarching management strategy**
- All clean stormwater directed away from processing areas
- Roof areas all taken directly to stormwater ponds
- Design to cater 1-in-20 storm event as per the Organics Recycling Guidelines
- High Risk Leachate
  - Generated within Receival Hall, Cocoon Area and Processing Area
  - Receival Hall roofed with internal sumps
  - Cocoon system with tension fabric roofs with all areas graded to internal sumps
  - Processing Area full roofed and some side walls. Floor graded to drain to internal sumps.
  - All high risk leachate pumped out to liquid waste tanks and recycled through the composting process
  - Designed above of the 1-in-100 storm event - well beyond the Organics Recycling Guidelines (1-in-20)

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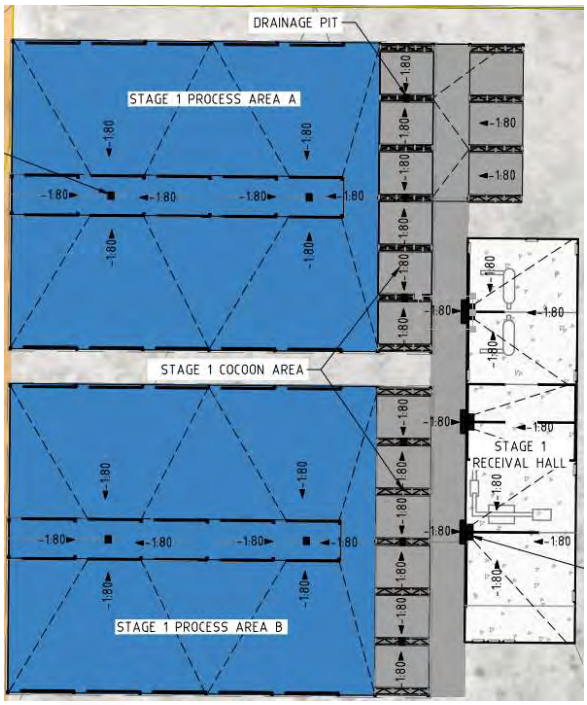
High Risk Leachate Design



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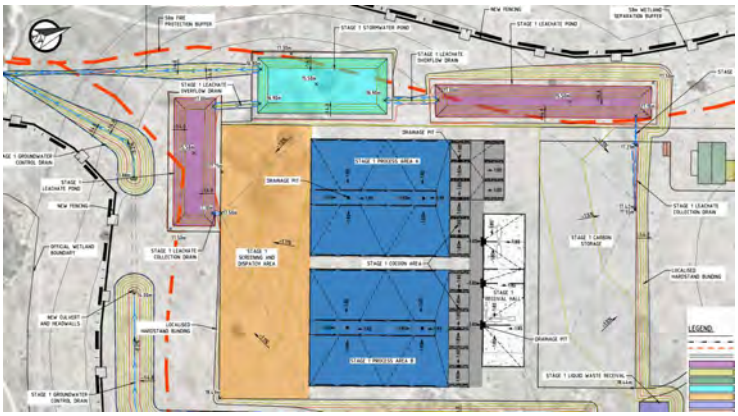
Low Risk Leachate & Surface Water

- Low risk leachate generated from Carbon Storage Area and Products Dispatch & Screening Area
- Graded hardstand areas and perimeter swales leading to lined stormwater ponds
- Leachate Ponds lined with GCL and HDPE (relevant to Class III landfill standard)
- Designed to 1-in-100 storm event – well beyond the 1-in-20 Organics Recycling Guidelines
- Higher events, low risk leachate then transfers to the HDPE-lined stormwater system for further dilution prior to controlled discharge.
- Monitoring points up and downgradient of ponds (and the Facility)



20

Groundwater Controls

- Extensive data on groundwater across the area – including Development WA investigations and published data
- Phase 1 Works:
  - Groundwater investigations at the Site
  - Prepared long term groundwater levels estimates (based on climatic and bores data)
  - Determined groundwater control level across the Facility (14m and & 15m AHD) to take off the seasonal highs
- Phase 2 Works:
  - Detailed modelling and design works for the groundwater control system
- Ensure a minimum separation distance of 1.5m from base of leachate/surface water ponds and controlled groundwater level

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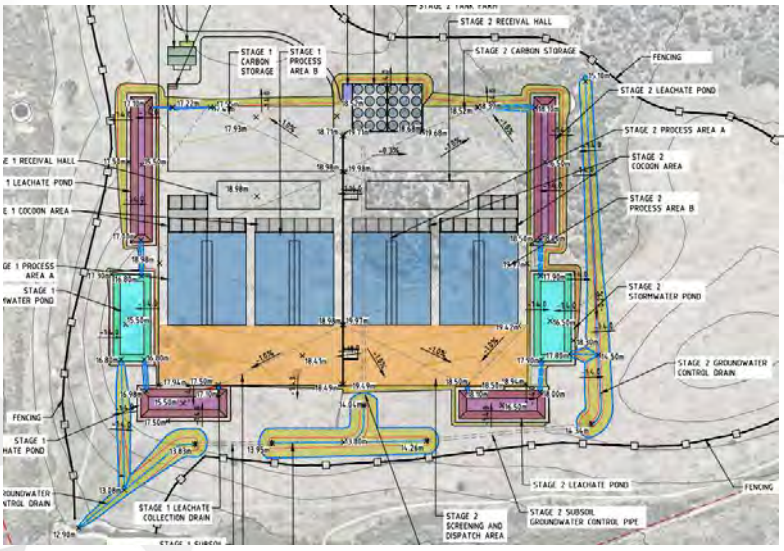
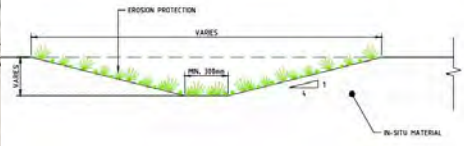
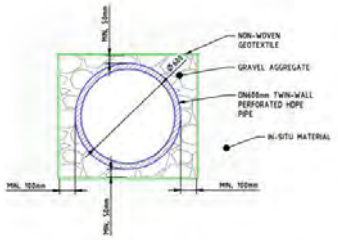
Groundwater Controls







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Clearing Permit

- Siting and Design to eliminate/minimise clearing of native vegetation/wetlands
- Or if clearing was required, degraded condition vegetation only
- 50m buffers surrounding all wetlands (bar minor area in north-eastern corner)
- Fence to be established along buffer to minimise future impacts
- Bushfire Asset Protection Zone 50m – means in excess of 100m wetland buffer in most areas

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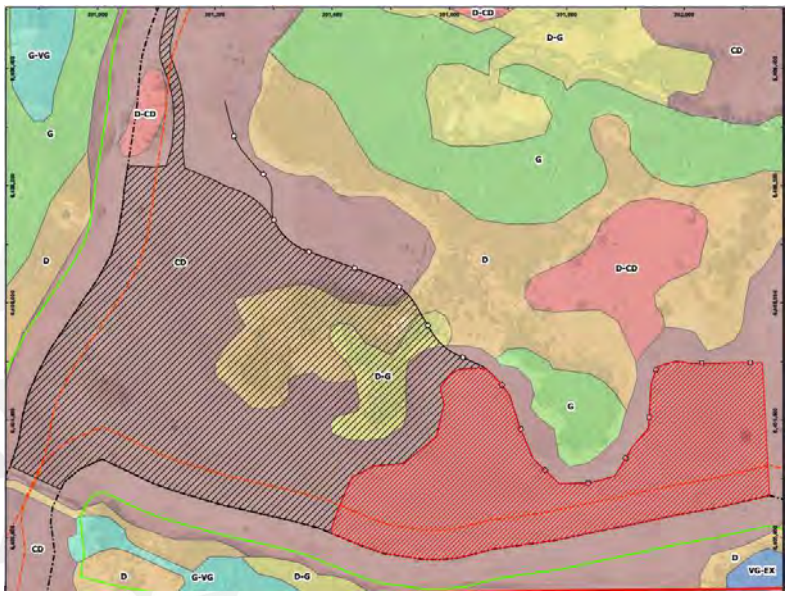
Clearing Permit

24

Clearing Permit



- Site Boundary
- Clearing Area
- Excavation Area
- Wetland Boundary
- Wetland 100m Fire Buffer
- Wetland 50m Buffer
- Fenceline

Vegetation Condition

- (VG-EX) Very Good to Excellent
- (G-VG) Good to Very Good
- (G) Good
- (D-G) Degraded to Good
- (D) Degraded
- (D-CD) Degraded to Completely Degraded
- (CD) Completely Degraded

25

Clearing Statistics

- 96% of clearing to be between areas of Completely Degraded and Degraded condition
- 4% of clearing in areas of Degraded to Good condition

Vegetation Condition	Proportion of Site		Proportion of Clearing Area	
	ha	%	ha	%
Completely Degraded	123.14	45.71	39.28	86.31
Completely Degraded to Degraded	17.85	6.62	-	-
Degraded	35.95	13.34	4.23	9.30
Degraded to Good	27.31	10.14	2.00	4.39
Good	51.89	19.26	-	-
Good to Very Good	7.74	2.87	-	-
Very Good to Excellent	5.56	2.06	-	-

26

Odour

- Odour recognised as a key environmental factor for similar facilities
- John Hurley of Environment and Air Quality (EAQ) been involved in the project to date and currently undertaking Odour Impact Assessment
- Nearest residential dwellings – 2.5km south-east & 3.2km west
- Key focus on main potential odour sources:
  - Receival hall enclosed with ventilation system for air exchange
  - Cocoons – enclosed force aeration system with air extraction passed through to MAF system in the maturation process
  - MAF – 3+ maturation processes to support optimum composting conditions
  - High risk leachate and liquid waste – fully enclosed tank farm
- Odour impact assessment will include suitable conservatism in the modelling works and provide design and operational guidance.

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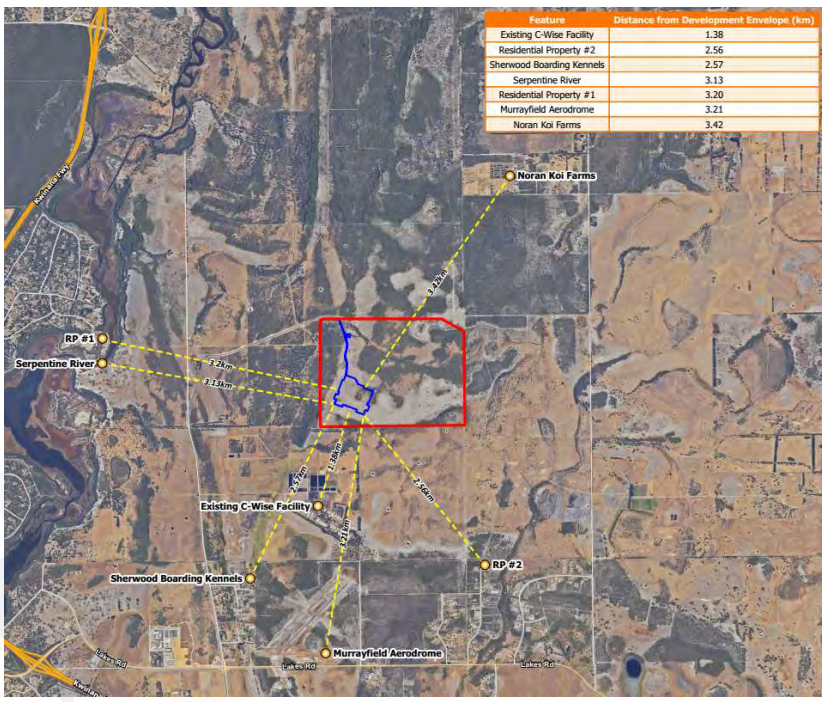
Odour



Feature	Distance from Development Envelope (km)
Existing C-Wise Facility	1.38
Residential Property #2	2.56
Sherwood Boarding Kennels	2.57
Serpentine River	3.13
Residential Property #1	3.20
Murrayfield Aerodrome	3.21
Noran Koi Farms	3.42

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Other Environmental Factors

Aspect	Management Measures
Weeds	Implementation of the Weed Management Plan Buffers to surrounding environment
Fire	Bushfire Management Plan Bushfire Emergency Plan Bushfire Risk Management Plan
Fire Wash Water	Managed through leachate management system
Noise	Enclosed & roofed receival & processing activities Operations limited to daylight hours
Dust	Hardstands, covered loads, speed limit controls

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Other Environmental Factors

Aspect	Management Measures
Vermin and Feral Animals	Clean floor policy implemented in the Receival Building
Acid Sulfate Soils	Siting and compliance with DWER's Treatment and Management of Soil and Water in Acid Sulfate Soil Landscapes
Litter	Covered loads, enclosed Receival Building, clean floor policy, regular collections
Security	Signage and fencing, locked buildings
Traffic	Traffic Impact Assessment

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Stakeholder Engagement

- Engagement with a variety of Key Stakeholders
  - Department of Water and Environmental Regulation
  - Department of Biodiversity, Conservation and Attractions
  - Shire of Murray
- Members of the Community
- Standalone Community Consultation report:
  - Consultation undertakings
  - Feedback obtained and responses from C-Wise and Consultants

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Approvals Underway

- Native Vegetation Clearing Permit – submitted in November
- Works Approval
  - Documentation about to be finalised – to be submitted this week
  - Time Limited Operations (180 days)
- Development Approval
  - Planning consultancy working on finalising the application – to be submitted in early December
  - Joint Development Assessment Panel pathway with statutory 90-day assessment timeframe
- Aim to secure all approvals by March 2024

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Approval Documentation

DOCUMENTS	CONSULTANT
Environmental Assessment and Management Plan	**Talis**
Conceptual Designs	**Talis**
Surface Water and Leachate Management Plan	**Talis**
Detailed Pond Designs	**Talis**
Ponds Technical Specification	**Talis**
Ponds CQA Plan	**Talis**
Traffic Impact Statement	**Talis**
Community Engagement	**Talis**
Odour Impact Assessment	**Environment & Air Quality**
Bushfire Management Plan	**Bushfire Prone Planning**
Bushfire Emergency Plan	
Bushfire Risk Management Plan	
Groundwater Levels Study	**WSP**
Groundwater Control Design Report	**WSP**
Planning Application	**Altus Planning**

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APPENDIX C
Feedback Form

C-Wise EKD Carbon Recycling Facility: Community Feedback Form

C-Wise wishes to engage the local community and stakeholders early in the project and has therefore prepared this form as an invitation to participate in the various consultation activities.

If you would like the opportunity to provide some feedback, please take a moment to complete the Survey below. The survey will only take a minute and provides an opportunity to share your own thoughts and queries. Your input is valuable to us.

Community Feedback	
Name:	
Email:	
Do you support composting and the recycling of organic materials?	
Do you think that the EKD project aligns with the Stage Government's Waste Avoidance and Resource Recovery Strategy 2030?	
Do you use compost generated from recycling facilities?	
C-Wise has obtained funding from the State Government for this project recognising the importance to achieve the State Waste Strategy targets as well as local benefits it will bring (such as employment and industry development). Are there additional benefits that you feel the project can bring to the area?	
C-Wise and its consultancy team has delivered a range of specialist studies for the project including Odour, Groundwater, Stormwater and Leachate, and Bushfire. These were identified as the key environmental factors associated with the development. Do you agree with this view, or are there other factors that you feel should be considered?	
Do you have any additional comments or concerns relating to the project that you wish to raise?	
Do you wish to be further consulted in relation to this project in the future?	

C-Wise EKD Carbon Recycling Facility: Online Feedback Form

C-Wise wishes to engage the local community and stakeholders early in the project and has therefore prepared on online website as an invitation to participate in the various consultation activities.

If you would like the opportunity to provide some feedback, please take a moment to complete the Survey via the QR Code below. The survey will only take a minute and provides an opportunity to share your own thoughts and queries. Your input is valuable to us.

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Carbon Recycling Facility

Surface Water and Leachate Management Plan

Prepared for C-WISE

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Project Number: TW21124

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Appendices

APPENDIX A Drawings

APPENDIX B Surface Water & Leachate Modelling

1 Introduction

Talis Consultants Pty Ltd (Talis) was commissioned by C-Wise Holdings Pty Ltd (C-Wise) to prepare a Surface Water and Leachate Management Plan (SWLMP) for its new Carbon Recycling Facility (the Facility) that summarises the assessments and strategy for managing surface water and leachate at the Facility.

1.1 Background

C-Wise is proposing to develop a new Carbon Recycling Facility to accept a range of organic materials for composting as well as accepting materials for resale to market (the Project).

The Project will support the adoption of a three-bin kerbside collection system by providing increased capacity and services to process organic waste for the surrounding regions. It will be delivered in a two-stage approach, with the initial processing capacity doubling as C-Wise's existing site in Nambeelup is decommissioned and operations are moved to the new site. C-Wise is seeking approval for both Stage 1 and Stage 2 of the Project at this stage to reduce overall timeframes for approval and future administrative burden.

The Facility will be located at 320 Gull Road, Keralup, WA on a portion of Lot 9500 on Deposited Plan 414516 (the Site). Due to the Site's proximity to conservation and resource enhancement category wetlands, C-Wise recognises that it is critical to demonstrate that potential impacts to surface water and groundwater have been considered and that appropriate management measures are in place to minimise the risk of any significant environmental impacts.

1.2 Objectives

This Surface Water and Leachate Management Plan (SWLMP) summarises the design and staged development of the better practice and operationally flexible leachate and surface water management systems for the Site. The SWLMP has been developed in general accordance with the Department of Water and Environmental Regulation's (DWER's) *Guideline: Better Practice Organics Recycling* (the Organics Recycling Guideline), which provide environmental performance objectives and benchmark controls for the planning, design and operations of organics recycling facilities regulated under Part V of the *Environmental Protection Act 1986* (EP Act).

The SWLMP shall address the following minimum overall infrastructure design standards for surface water and leachate management at the Site:

- Separate uncontaminated stormwater run-off from the area defined by the leachate containment system by using, for example, surface-grade changes, bunds, interceptor drains, piping and other drainage systems;
- Design the leachate containment system based on quantitative assessment of the potential leachate and stormwater runoff generated from a one in 20 (5 per cent) annual exceedance probability (AEP) 24-hour storm event; and
- Design and construct drainage infrastructure to convey the runoff from the leachate containment system that would result from a one in 20 (5 per cent) AEP 24-hour rainfall event.

The SWLMP will also outline where the design or operation of the facility supports the Environmental Performance Objectives (EPOs) or Benchmark Controls described in the Organics Recycling Guidelines.

1.3 Scope of Report

In order to meet the objectives discussed in Section 1.2, the SWLMP contains the following elements:

- Site Information;
- Surface Water Strategy:
  - Surface water management requirements;
  - Surface water generation modelling;
  - Surface water infrastructure requirements; and
  - Operational management and monitoring strategy.
- Leachate Management Strategy:
  - Leachate management requirements;
  - Leachate generation modelling;
  - Leachate infrastructure requirements; and
  - Operational management and monitoring strategy.
- Appendices:
  - Drawings; and
  - Surface Water & Leachate Modelling.

2 Site Information

The following sections provides general information of the Site, including current layout, licencing, and environmental attributes.

2.1 Site Layout

The Project will be located on 269.4ha of land at 320 Gull Road, Keralup, within a portion of Lot 9500 on Deposited Plan 414516 in Certificate of Title Volume 2991 Folio 741, of which the Development Footprint encompasses approximately 17.2ha. Access to the Site will be from the northwestern boundary, directly on to Gull Road.

The proposed layout of the Carbon Recycling Facility is shown in Drawing C-100, provided in Appendix A. The Facility will consist of the following key elements:

- Access Road;
- Weighbridge;
- Administration Office;
- Carbon storage area;
- Liquid waste tanks and receival area;
- Receival building;
- Cocoons (fully enclosed);
- Mobile Aerated Floor (MAF) System (under cover);
- Final maturation area (under cover);
- Screening and dispatch area
- Leachate Ponds;
- Stormwater ponds;
- Wetland fencing and firebreaks;
- Fuel store and service area; and
- Workshop, crib room and office.

The majority of infrastructure is roofed to minimise high-risk leachate generation resulting from stormwater contact with materials. The Facility will be delivered in two stages, with Stage 2 of the Project having an identical processing setup to Stage 1, located directly to the east. As such, the same infrastructure and controls will be present in both facilities, although minor layout changes will exist.

2.2 Works Approval

Certain industrial premises with the potential to cause emissions and discharges to air, land or water are classified as 'Prescribed Premises' and trigger regulations and associated approvals under Part V of the EP Act. Those activities that are considered to be Prescribed Premises, and their associated production or design thresholds, are listed in Schedule 1 of the *Environmental Protection Regulations 1987*. The DWER is responsible for the regulation of Prescribed Premises under Part V of the EP Act, approval under which is granted in the form of Works Approvals for construction and Licences for operation.

This SWLMP has been developed to support C-Wise's application for a Works Approval to construct the Facility, as it is anticipated that it will be considered a Prescribed Premises. The Prescribed Premises categories relevant to the Project are outlined in Table 2-1.

Table 2-1: Summary of Prescribed Premises Categories

Category No.	Name	Description	Production or Design Capacity
61	Liquid waste facility	Premises on which liquid waste produced on other premises (other than sewerage waste) is stored, reprocessed, treated or irrigated	100 tonnes or more per year
67A	Compost manufacturing and soil blending	Premises on which organic material (excluding silage) or waste is stored pending processing, mixing, drying or composting to produce commercial quantities of compost or blended soils	1,000 tonnes or more per year

C-Wise is proposing to accept 200,000 tonnes per annum of materials under Category 67A, and 60,000 tonnes per annum of liquid wastes under Category 61 at the Facility.

2.3 Environmental Attributes

The following section outlines the key environmental attributes of the Site, including climate, topography, geology, groundwater, and surface water.

2.3.1 Climate

The local and regional climate data sources will be utilised for the design of the Site's surface water and leachate management systems, including rainfall and pan evaporation.

The Site is located within a warm temperate climactic zone that experiences dry and hot summers and cool wet winters. According to the Bureau of Meteorology (BOM), the closest weather station with long-term data is Mandurah (Station 009977), approximately 15km southwest of the Site. However, since there is limited quality controlled BOM data available for rainfall and pan evaporation, this data was sourced from SILO, a database of Australian climate data from 1889 to the present day that is hosted by the Queensland Department of Environment and Science. It provides daily meteorological datasets for a range of climate variables in ready-to-use formats suitable for biophysical modelling, research, and climate applications. The datasets are constructed from observational data obtained from BOM, using mathematical interpolation techniques to infill gaps in time series and construct spatial grids. The spatial grid selected (Latitude: -32.50, Longitude: 115.85) is for Keralup, WA and encompasses the majority of the Site.

2.3.1.1 *Rainfall*

Being in a temperate zone, rainfall is seasonal with higher rainfall generally in the months of May to September. Table 2-2 presents a summary of rainfall records, from 1971 to 2022.

Table 2-2: Rainfall Overview in Millimetres (1971-2022)

Aspect	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average	14.4	14.2	18.6	41.9	111	145	154	121	83.9	43.3	29.2	10.8	788
50th Percentile	44.1	10.7	0.0	60.0	76.7	195	47.1	108	109	26.0	59.5	63.6	799
90th Percentile	0.2	2.7	22.4	43.5	245	222	65.1	127	115	78.6	20.4	13.4	955
Highest	2.2	10.7	0.1	69.2	245	138	303	147	31.7	82.8	16.4	0.0	1,046

The mean annual rainfall for the Site is calculated as 788 millimetres (mm) with the highest recorded annual rainfall at 1,046mm, which occurred in 1974. The 50th percentile rainfall year occurred in 2012 and was equal to 799mm of rain. The 90th percentile rainfall year occurred in 2005, and recorded 955mm of rain.

Short Duration Design Rainfall

Rainfall Intensity Frequency Duration (IFD) data for the Site was obtained using the BOM Computerised Design IFD Rainfall System (CDIRS) and the Australian Rainfall and Runoff 2016 database (ARR2016). CDIRS produces a complete set of IFD curves and associated weather data based on user-defined coordinates (http://www.bom.gov.au/water/designRainfalls/revised-ifd/?year=2016).

Table 2-3 summarises the Annual Exceedance Probability (AEP) of storms with 1 to 72-hour durations. The equivalent Average Recurrence Intervals (ARIs) for each storm event is also outlined. These values can be used to estimate precipitation rates at the Site for a range of events.

Table 2-3: Summary of Annual Exceedance Probabilities for Site (ARR2016)

Storm Duration	1 in 1 yr	1 in 10 yr	1 in 20 yr	1 in 50 yr	1 in 100 yr
	63%	10%	5%	2%	1%
	Rainfall Depth (mm)				
1 hour	19	29	33	38	42
2 hour	24	38	42	49	54
3 hour	28	44	49	57	63
6 hour	35	57	65	76	86
12 hour	44	73	84	101	115
24 hour	54	91	106	127	145
48 hour	65	109	126	149	168
72 hour	73	119	137	159	178

A 1-in-20-year, 24-hour storm event has a rainfall depth of 106mm, and a 1-in-100-year AEP, 24-hour storm event has a rainfall dept of 145mm. According to SILO, the highest daily rainfall rate from 1970-2022 was 124mm in January 1982, which is approximately equivalent to a 1-in-50-year, 24-hour storm event.

2.3.1.2 *Pan Evaporation*

The approximate average daily pan evaporation rates for the Site are based on the calculated monthly rates from SILO. Table 2-4 outlines the pan evaporation data during an average, maximum, 50th and 90th percentile rainfall year, from 1971 to 2022.

Table 2-4: Pan Evaporation Data for the Site in Millimetres (mm)

Rainfall Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average	265	222	188	114	76.8	57.7	60.5	73.0	94.1	138	186	243	1,719
50th Percentile	285	216	216	109	68.1	56.0	54.1	69.9	98.3	148	177	234	1,732
90th Percentile	267	203	173	101	76.0	51.4	56.7	69.3	86.6	111	178	189	1,563
Highest	318	240	208	108	77.2	58.8	70.6	75.9	98.5	125	174	256	1,810

The total annual pan evaporation in the assessed rainfall years ranges from 1,563mm to 1,810mm and monthly from 51.4mm to 318mm. The total average annual pan evaporation for the Site is calculated as 1,719mm. This potential evaporation rate for the Site is greater than the highest recorded rainfall year, indicating that evaporation can be a useful tool for managing stormwater and leachate generated at the Site.

2.3.2 Topography

The topography at the Site ranges from 10m Australian Height Datum (AHD) to the northeast to 18mAHD to the southeast. The topography within the proposed location of the Facility ranges from 18mAHD to 20mAHD, with a drop to 12mAHD on the south-western corner of the proposed development footprint. The Site topography is shown in Drawing C-100, provided in Appendix A.

2.3.3 Geology

Surface geology at the Site is classified as predominantly 'Qag', or alluvial sand and clay with shallow marine and estuarine lenses and local basal conglomerate.

A contamination investigation undertaken by Western Environmental in February 2021 indicated that soils within 0.5m of the surface at the Site predominantly consist of sand, well sorted, dark to light grey (tending lighter with depth), dry, homogenous, with trace organic material at surface (grass roots) and depth (minor grass root fibres) (Western Environmental, 2021).

2.3.4 Hydrology

To protect water sources, surface water proclaimed areas have been allocated under the *Rights in Water and Irrigation Act 1914* (RIWI Act). Surface water areas are proclaimed for the purpose of controlling the taking of water from watercourses and wetlands in order to systematically manage their use. The Site is located in a Surface Water Proclaimed Area, specifically the Serpentine River System.

Portions of two conservation category wetlands are located in the southern and western sections of the Site. Surrounding the Site boundary in all directions are a number of small wetlands. To the west of the Site, there is the Serpentine River which ultimately discharges into the Peel Inlet and Harvey Estuary.

2.3.5 Hydrogeology

Under the RIWI Act, proclaimed groundwater areas in WA are areas in which licences are required to construct or alter a well and to take groundwater. The Site is located within Murray Groundwater Area.

Regional groundwater flows in a westerly direction towards the Serpentine River (Coterra Environment, 2021). A Groundwater Level Study was undertaken by WSP Australia Pty Ltd (WSP) to determine the 50-year Design Groundwater Levels (DGWL) at the Site and to inform any containment pond design proposed for the Project. The DGWL was determined using historic groundwater levels, hydrogeological features and key parameters such as climate, surface water, drains, groundwater abstraction and land use. WSP developed two sets of DGWL contours as follows:

- Average Annual Maximum Groundwater Level (AAMGL), 50% Annual Exceedance Probability (AEP):
  - The AAMGL ranges from reduced level (RL) 9mAHD at the north-western Site boundary to RL 19mAHD at the eastern boundary;
  - The AAMGL within the Stage 1 Development Footprint ranges from RL 13mAHD to RL 14.5mAHD; and
  - The AAMGL within the Stage 2 Development Footprint ranges from RL 14.5mAHD to RL 16mAHD.
- 50 Year DGWL, 2% AEP:
  - The 50 Year DGWL ranges from RL 9.5mAHD at the north-western boundary Site to RL 19.5mAHD at the eastern boundary;
  - The 50 Year DGWL within the Stage 1 Development Footprint ranges from RL 13.9mAHD to RL 15.2mAHD; and
  - The 50 Year DGWL within the Stage 2 Development Footprint ranges from RL 15.1mAHD to RL 16.5mAHD.

FSG Geotechnics was engaged by C-Wise to undertake the design of a controlled groundwater level drainage system across the Facility to ensure a minimum separation distance of 1.5m is maintained between the base of each pond and the estimated 50 Year Design Groundwater Level at the Site. The groundwater drainage system modelled by FSG Geotechnics will be staged with the development of the Facility. Stage 1 will initially comprise an open swale along its eastern and southern site edges, which will control groundwater levels beneath the three ponds to no higher than 14mAHD. At the development of Stage 2, the eastern swale between Stage 1 and Stage 2 will be converted into a sub-soil drain pipe, and Stage 2 will have its own swale installed along the Stage 2 eastern and southern boundaries to control the groundwater level beneath the Stage 2 ponds to no more than 15mAHD.

The investigation found that the groundwater designs for the Facility are able to control groundwater to the required depth underneath all leachate and surface water ponds. The controls within Stage 1 are designed to only remove the seasonal peak groundwater level, with any flows and associated discharge only likely to occur during the wet winter months. The final design of the Stage 2 groundwater control will be refined prior to construction, once additional groundwater data has been gathered across the Site as part of the operation of Stage 1 of the Facility. The set groundwater control level under each stage has been used to design the minimum separation distance for each proposed pond, which is discussed further in Sections 3 and 4.

3 Surface Water Management Strategy

Environmental risks associated with leachate and surface water within the overall Site boundary will be managed through the establishment of a better practice and operationally flexible surface water management system (SWMS). To appropriately manage these risks, the SWMS needs to achieve two key objectives, including minimising leachate generation and proactively managing surface water. These objectives, and the design features incorporated to achieve these, are shown in Table 3-1.

Table 3-1: Objectives and Associated Design Features of the Surface Water Management System

Objective	Design Feature
Minimise Leachate Generation	Implement a best practice surface water management system in general accordance with the Organics Recycling Guideline
	Ensure that the processing areas are covered to eliminate leachate generation through precipitation
	Construct the processing areas such that stormwater run-off inflow is mitigated
	Develop a drainage system across the Site's operational areas that includes strategically located discharge points away from the processing and storage areas
Proactively Manage Surface Water	Develop hardstands that are graded to ensure the capture of all stormwater run-off within the Site's operational areas
	Ensure the surface water management system is appropriately sized to manage a 1-in-20-year Annual Exceedance Probability (AEP), 24-hour duration storm event
	Consideration of the environmentally sensitive areas around the Site (i.e., wetlands)
	Establish controlled discharge points for surface water

The proposed SWMS to meet the objectives outlined in Table 3-1 is discussed in the following sub-sections.

3.1 Key Infrastructure

3.1.1 Hardstands, Surfacing and Bunding

Surface water at the Site will be generated by runoff from roofed areas and from concrete or bitumen sealed hardstands which are kept hydraulically separate from sealed hardstands containing leachate-generating materials.

The capture and conveyance of surface water from these areas will be established at the detailed design stage for the Site. However, it is anticipated that a combination of overland flow and drainage pipes will divert captured surface water to a designed surface water pond.

3.1.2 Surface Water Ponds

Two surface water ponds will be constructed at the Site to effectively retain surface water during small rainfall events and provide attenuation during larger events. These two surface water attenuation ponds will be located around the perimeter of the operational areas (both Stage 1 and Stage 2). Each pond will be constructed in the Site's low points and will consist of a 300mm compacted subgrade layer using onsite soil material and a high-density polyethylene (HDPE) geomembrane. Each pond will feature a passive spillway, which will allow for a controlled release of surface water offsite. The base of each pond will have a minimum groundwater separation distance of 1.5m from the controlled groundwater level, as outlined in Section 2.3.5.

3.2 Surface Water Modelling

In accordance with the Organics Recycling Guideline, the SWMS has been designed to contain and control surface water runoff from a 1-in-20-year AEP, 24-hour storm event, at a minimum.

The Site's proposed surface water management infrastructure consists of hardstands and surface water attenuation ponds as discussed in Section 3.1. To determine the appropriate design for this infrastructure, modelling was undertaken utilising a Microsoft Excel surface water pond sizing algorithm based on local climate data including rainfall depth and intensity.

3.2.1 Catchment Areas

To assist with the modelling, non-leachate generating areas in each stage of the Site were identified, with a total area of approximately 31,500m^2 for potentially generating clean stormwater run-off.

3.3 Surface Water Infrastructure Design

The following sections describe the modelling results and the finalised design characteristics of the key infrastructure proposed for the Site's SWMS.

3.3.1 Surface Water Runoff Generation

As discussed in Section 3.2.1, an area of approximately 31,550m^2, consisting of roofing and sealed hardstands, is capable of generating runoff in each stage at the Site. In accordance with the Organics Recycling Guideline, the runoff coefficient for these areas was assumed to be 1.0, to model a worst-case scenario where all rainfall within this area generates runoff that requires management via a surface water pond.

Therefore, in the 1-in-20-year, 24-hour design storm event of 106mm, approximately 3,345m^3 of surface water will require attenuation in each stage of development.

3.3.2 Surface Water Ponds

Once the required runoff had been calculated, it was used to size the two surface water ponds proposed for the Site. Table 3-2 outlines the key design criteria for each proposed surface water pond.

Table 3-2: Summary of Surface Water Pond Design Criteria

Pond	Approx. Dimensions [LxWxh] (m)	Side Slopes (V:H)	Surface Area (m^2)	Operational Pond Capacity* (m^3)	Required Capacity (m^3)	Storm Check Pass?
Stage 1	93x40x1.8	1:4	3,720	3,367	3,345	PASS
Stage 2	93x40x1.8	1:4	3,720	3,367	3,345	PASS

**Operational Pond Capacity assumes a 500mm freeboard for the ponds to account for the proposed passive spillway.*

All ponds are capable of handling a 1-in-20-year, 24-hour storm event, and can safely overtop during larger storm events without backing up or causing failure at other points of the SWMS.

As discussed in Section 3.1.2, each pond will be lined with a HDPE geomembrane and will be excavated to a depth of 1.8m with the cut faces at a gradient of 1:4 (V:H). The geomembrane will be secured in a 0.6m deep anchor trench around the perimeter of each pond. The ponds will have a 4m wide track around the perimeter to allow for full access by a light vehicle. The base of each pond will have a minimum separation distance of 1.5m from the controlled groundwater level discussed in Section 2.3.5.

Though not anticipated to occur except during rainfall events exceeding a 1-in-100-year, 24-hour rainfall event, each surface water pond has been designed to accept leachate from the two leachate ponds that will also be constructed for each stage of the Project. Therefore, each surface water pond also contains two HDPE-lined inlet swales from these leachate ponds, which are discussed in further detail in Section 4.1.5.

3.4 Management and Monitoring Strategy

Regular monitoring and maintenance of the SWMS should be undertaken on a regular basis to ensure the system meets the Environmental Performance Objectives within the Organics Recycling Guideline.

C-Wise currently has a Dam Management Procedure for their existing Site, which will be adapted to cover the surface water ponds at the new Facility. Table 3-3 outlines the minimum monitoring and maintenance schedule adapted from the Dam Management Procedure.

Table 3-3: Monitoring and Maintenance Schedule for the SWMS

Activity	Frequency
Integrity of each surface water attenuation pond	Quarterly
Integrity of all overflow points and inlets	Quarterly
Water levels within each surface water attenuation pond	Weekly
Surface water quality monitoring from each pond (pH, Conductivity, Total Dissolved Salts, Oxidation Reduction Potential, Temperature, Dissolved Oxygen)	Weekly
Surface water quality monitoring from each pond (Chemical Oxygen Demand)	Monthly

Activity	Frequency
Surface water quality monitoring from each pond (Biological Oxygen Demand)	Quarterly
Occurrence of overflow events	Whenever an overflow occurs

The surface water monitoring regime will be defined within the Site Licence and will be undertaken in accordance with it. The proposed surface water monitoring points for the Site are presented in Drawing C-110 in Appendix A.

4 Leachate Management Strategy

The Organics Recycling Guideline defines leachate as liquid that has percolated through and/or been generated by the decomposition of waste material, including water that has interacted with feedstocks, materials undergoing processing (i.e., mechanical, pasteurisation or composting) or products. Leachate emissions from compositing facilities have the potential to contain nutrients, metals, salts and other soluble or suspended components and decomposition products of the waste.

The Organics Recycling Guideline states that the design and construction of the leachate management system must consider the higher-risk leachate generated from the composting process, including liquids generated during the decomposition of waste or from the addition of liquids to the composting process (i.e., water, re-use leachate and liquid waste feedstocks), as well as lower-risk leachate generated from rainwater/stormwater entering the leachate containment system.

The following sections discuss the key infrastructure that will manage the leachate generated at the Site and how it was designed through modelling the estimated volume of leachate that will be produced.

4.1 Key Infrastructure

4.1.1 Covered Infrastructure

C-Wise has pursued a strategy of elimination regarding leachate generation at the Site wherever possible and has roofed high-risk leachate generating areas to prevent generation via rainfall. Of particular note is the receival building, and all stages of the composting process will occur under a roof in both Stages 1 and 2 of the Site.

The roofs will be constructed from impermeable materials and surface water generated from these roofs will be captured and managed via the SWMS outlined in Section 3.

4.1.2 Hardstands, Surfacing and Bunding

All of the Site's operational areas will feature hardstands comprised of compacted limestone or impermeable bitumen, or concrete slab. These hardstands provide a lower permeability surface to mitigate rainfall percolation in the Site's operational areas. The following subsections outline the characteristics of each hardstand type.

4.1.2.1 *Concrete, Asphalt and Bitumen*

Concrete hardstands will be used beneath roofed Process Areas in the receival building, and the space between the receival building and the cocoons. These areas will generate high-risk leachate from Food Organics and Garden Organics (FOGO) products and liquid wastes used in the process and will feature falls at a 1:80 (V:H) slope towards drainage pits, located centrally within each area. These pits will then be pumped to the tank farm, discussed further in Section 4.1.3.

Bitumen or asphalt will be used in open-air areas of each stage, including the screening and dispatch area. The hardstand at the screening and dispatch area will store completed compost products which generate a low-risk leachate as defined within the Organics Recycling Guideline. This hardstand area will drain at a 1:100 (V:H) fall toward a low-risk leachate evaporation pond, detailed further in Section 4.1.4. Bunding will be installed at the edge of the hardstand to assist in directing leachate toward the pond.

The concrete and bitumen/asphalt hardstands will meet the requirement of the Organics Recycling Guideline, including the following criteria:

- Constructed to an adequate thickness to achieve a sealed impermeable;
- Designed by a person who has appropriate accreditation, competency and experience in the design of impermeable hardstands; and
- Construction will be subject to suitable construction quality assurance regime determined by the designer of the hardstand.

4.1.2.2 *Crushed Limestone*

A crushed limestone hardstand will be used for the carbon storage areas within Stage 1 and 2. These hardstands will be used to store green waste, natural fibrous organics, and forestry residues, and will generate a low-risk leachate as defined within the Organics Recycling Guideline.

The limestone material will be applied in a minimum 300mm thick layer, which has been shown to achieve an effective permeability of $2.8x10^{-8}$m/s. This hardstand will be designed by a suitably qualified person and undergo a construction quality assurance regime determined by the designer of the hardstand, inclusive of geotechnical testing in accordance with *AS1289 – Methods of testing soils for engineering purposes*.

This hardstand area will drain at a 1:100 (V:H) fall toward a low-risk leachate evaporation pond, detailed further in Section 4.1.4. Any leachate generated in this area will free flow across the surface of the hardstand, which will be maintained to ensure ponding of leachate on the surface does not occur. Bunding will be installed at the edge of the hardstand to assist in directing leachate toward the pond.

4.1.3 High-Risk Leachate Storage Tanks

While the composting process activities will be undertaken under cover, leachate from the process will still be produced and must be managed appropriately.

All sealed surfaces within the processing areas, the receival buildings, and the hardstands in-between the two, will direct any leachate generated to a series of collection pits. These pits will capture the leachate, which will then be pumped to a designated above-ground tank farm for each stage, located on the northern edge of the Facility.

Though the overall tank farm will be used for managing both leachate and liquid wastes accepted at the Site, each of the tank farms includes a dedicated tank system for the management of high-risk leachate. Each tank has a design capacity of $340m^3$, and the tank farm for each stage is comprised of 12 tanks, with a minimum of $702m^3$ of storage (i.e. three tanks) within each tank farm dedicated to high-risk leachate.

The tanks within the farm for each stage will be arranged in banks of three, with the tank farm bunded to a capacity of 110% that of volume of a single bank within the bund. The tanks will also be equipped with monitoring equipment (e.g. high-level alarms) to ensure that they do not overfill.

Both liquid waste and high-risk leachate will be extracted from the tank farms for use in the early stages of the composting process. Tank storage of high-risk leachate contributes to the overall strategy of elimination of high-risk leachate, with no additional leachate generation caused by rainfall on the surface of a pond or similar storage device.

4.1.4 Leachate Evaporation Ponds

Each stage of the Project will include two leachate evaporation ponds which will accept the low-risk leachate produced from precipitation falling onto the uncovered operational areas of the Site. Each Stage will feature a Carbon Storage Pond (CS), and a Screening & Dispatch Pond (S&D).

To prevent leachate stored in the evaporation ponds from percolating into the groundwater system, the ponds will be lined in general accordance with the Organics Recycling Guideline (from bottom to top):

- 300mm thick Compacted Subgrade Layer;
- Geosynthetic Clay Liner (GCL); and
- 2mm thick HDPE Geomembrane.

The proposed leachate ponds have been designed to manage a 'worst case', peak leachate generation scenario, which considers:

- Five consecutive 90th percentile rainfall years; and
- A 1-in-100 year, 24-hour storm event check.

The storm check was applied to assess the impact of a 1-in-100-year, 24-hour storm event on the pond and hardstand system to ensure that leachate generated during that event can be accommodated by the pond during a wet, 90th rainfall year.

Details on the generation modelling are discussed in Section 4.2.

4.1.5 Leachate Conveyance System

Leachate drains in the form of open trapezoidal channels, which will be used to effectively transport any leachate from the hardstand areas to the leachate evaporation ponds. These channels will also allow for the safe overtopping of leachate into the surface water pond for each stage during storm events larger than a 1-in-100, 24-hour storm event. These swales will be lined with a 2mm HDPE geomembrane to minimise any leachate percolation into the ground.

4.2 Leachate Generation Modelling

To ensure the leachate pond system has the appropriate capacity, the potential volume of leachate that will be generated by Site activities must be modelled. The modelling for the Site aims to determine the 'worst case' scenario for leachate generation, which is later used as an input for the required Water Balance Assessment. Leachate generated from Site activities is dependent on the surface area of the operational areas and rainfall into those areas. The following sections outline the approach to determining leachate generation at the Site.

4.2.1 High-Risk Leachate Generation

High-risk leachate will be generated from three areas at the Site: the receival building, the process areas (including the cocoon, MAF and settling Areas), and the concrete hardstand in-between the two.

As the receival building and process areas are roofed, leachate generation in these areas is driven by the composting process rather than rainfall. This level of generation is not anticipated to be significant and will be reused within the composting process via the tank farm.

Generation of leachate from the bitumen hardstand is not roofed and will be rainfall driven. Therefore, rainfall runoff from the hardstand was calculated during both a 50th and 90th percentile rainfall year, with an assumed hardstand runoff coefficient of 1.0 in line with the Organics Recycling Guideline. Table 4-1 provides a summary of high-risk leachate generation at the Site during both 50th and 90th percentile rainfall years.

Table 4-1: Summary of High-Risk Leachate Generation for Each Stage (m^3)

Aspect	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
50th Percentile	102	25	0	139	178	450	109	249	253	60	138	147	1,850
90th Percentile	0	6	52	101	568	514	151	293	266	182	47	31	2,211

The Site is anticipated to generate 1,850m^3 of high-risk leachate during a 50th percentile rainfall year, and 2,211m^3 of high-risk leachate during a 90th percentile rainfall year in each stage. The highest rates of leachate generation occur particularly during the winter months when significant rainfall events are more likely to arise.

4.2.2 Low-Risk Leachate Generation

Low-risk leachate will be generated from the carbon storage area and the screening and dispatch area at the Site. These areas are outdoors, and generation of low-risk leachate will be rainfall driven. Therefore, rainfall runoff from these hardstands was calculated during both a 50th and 90th percentile rainfall year, with an assumed hardstand runoff coefficient of 1.0 in line with the Organics Recycling Guideline. Table 4-2 provides a summary of low-risk leachate generation at the Site during both 50th and 90th percentile rainfall years.

Table 4-2: Summary of Low-Risk Leachate Generation for Each Stage (m^3)

Aspect	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
50th Percentile	1,159	281	0	1,577	2,016	5,115	1,238	2,825	2,875	683	1,564	1,672	21,006
90th Percentile	5	71	589	1,143	6,450	5,838	1,711	3,325	3,017	2,066	536	352	25,104

The Site is anticipated to generate 21,006m^3 of low-risk leachate during a 50th percentile rainfall year, and 25,104m^3 of low-risk leachate during a 90th percentile rainfall year in each stage.

4.2.3 Leachate Usage Modelling

The composting process at the Site requires water inputs, which will be met by using a combination of liquid waste, leachate reuse and licenced groundwater abstraction, used preferentially in that order. As the process is occurring under roofs, for every tonne of incoming material to be composted, one tonne of liquid is required to be added to the process. Therefore, as each stage has a 100,000 tonne per annum of incoming solid material to be composted, and 30,000 tonnes of liquid waste input, an additional 70,000 tonnes of water will be required for the process, of which leachate will be preferentially used over surface and groundwater. The monthly abstraction of leachate from the ponds was determined for each stage from the annual total assuming an average daily requirement of 192m^3 and has been presented in Table 4-3.

Table 4-3: Summary of Leachate Abstraction from Each Stage (m^3)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
5,945	5,370	5,945	5,753	5,945	5,753	5,945	5,945	5,753	5,945	5,753	5,945	70,000

4.3 Leachate Management Infrastructure Design

4.3.1 Pond Water Balance Assessment

A Water Balance Assessment was utilised to determine the appropriate size of the proposed leachate evaporation ponds and to assess their subsequent performance. It was developed in general accordance with the Organics Recycling Guideline to ensure the system is suitably sized to manage the leachate. Using a Microsoft Excel algorithm, the assessment presented a simplified input and output system based on the following:

- Inputs:
  - Leachate; and
  - Monthly rainfall.
- Outputs:
  - Evaporation; and
  - Process Requirements.

4.3.1.1 *System Inputs*

The leachate generation volumes presented in Table 4-1 and Table 4-2 were utilised as part of the Water Balance Assessment for the ponds in addition to the monthly rainfall for the 90th percentile rainfall year. This represents a highly conservative measure, in which five-consecutive wet rainfall years occur in a row. As detailed in Section 2.3.1.1, the 90th percentile rainfall scenario equates to an annual rainfall of 955mm.

4.3.1.2 *System Outputs*

To quantify the amount of leachate evaporated each year, the following parameters were assumed:

- The freeboard was set at 500mm to determine the operational volume of each pond;
- The actual evaporation rate was assumed to be 70% of the potential pan evaporation rate;
- Leachate is recirculated into the processing areas for reuse/product conditioning at a 1:1 solids to liquids ratio;
- No rainfall within an evaporation pond's catchment area was lost to run-off; and
- For the purpose of the calculations, the evaporation area was set at half the pond depth for each evaporation pond.

The volumes within the evaporation ponds for a given month included the initial leachate inputs transferred from the Site's operational areas, the remaining leachate from the previous month (if any), any further leachate inputs for the month, and the rainfall within the pond's catchment area based on the rainfall scenario.

Details on the evaporation outputs are provided in Appendix B.

4.3.1.3 *Results*

As shown in Drawing C-101, four leachate evaporation ponds are proposed across Stages 1 and 2 of the Project, a Carbon Storage Pond (CS) and a Screening & Dispatch Pond (S&D) in each stage.

Each pond will be lined with a GCL overlain with a HDPE geomembrane and would be excavated to a depth of 2m with the cut faces at a gradient of 1:4 (V:H). The geomembrane will be secured in a 0.6m deep anchor trench around the perimeter of each pond. The ponds will have a 4m wide track around the perimeter to allow for full access by a light vehicle. The base of each pond will have a minimum separation distance of 1.5m from the controlled groundwater level discussed in Section 2.3.5.

Typical construction details for the leachate evaporation pond system can be seen in Drawing C-301 provided in Appendix A. The design characteristics of the evaporation ponds are provided in Table 4-4.

Table 4-4: Leachate Evaporation Pond Design Characteristics

Location	Pond	Catchment Area (m^2)	Evaporation Area* (m^2)	Operational Volume** (m^3)	Total Volume (m^3)
Stage 1	CS 1	3,565	2,205	2,846	4,453
	S&D 1	2,760	1,848	2,478	3,739
Stage 2	CS 2	3,565	2,205	2,846	4,453
	S&D 2	2,760	1,848	2,478	3,739

**Maximum Evaporation Area is considered to be at 1,000mm freeboard from pond crest.*
*** Operational Volume is considered to be at 500mm freeboard from pond crest.*

The ponds are designed to be empty at least once per year prior to maximum levels being reached, which may be achieved either by evaporation or transferring leachate between ponds. This will allow inspection and maintenance of the pond lining system to ensure long-term integrity of the system.

The results of the modelling are provided in Appendix B.

4.3.1.4 *Storm Event Check*

The Organics Recycling Guideline states that a leachate pond must have a freeboard that can accept rainfall directly on the pond from a 24-hour rainfall event with a 1-in-20-year average recurrence interval without overflowing. The design for the Site goes above this requirement, with a 1-in-100-year, 24-hour storm event being used to assess the overall capacity of the ponds. The results of the storm event check are summarised in Table 4-5.

Table 4-5: Storm Event Check

Location	Pond	Catchment Size (m^2)	Runoff Coefficient	1-in-100-Year, 24-Hr Rainfall Event (mm)	Required Storage (m^3)	Storm Check Pass?
Stage 1	CS 1	16,094	1.0	145	2,334	PASS
	S&D 1	16,515			2,395	PASS
Stage 2	CS 2	16,094			2,334	PASS
	S&D 2	16,515			2,395	PASS

The storm event check model verified that the pond system has adequate capacity to cater for leachate generated during a 1-in-100-year, 24-hour storm event while remaining beneath the pond's operational capacity, in accordance with the Organics Recycling Guideline.

4.3.2 High-Risk Leachate Storage Tanks

Due to the high-risk nature of leachate to be stored in the proposed tank farms, a highly conservative approach has been used to assess the required storage volume. Similarly to the leachate ponds, a 1-in-100-year, 24-hour storm event was assessed to determine the minimum storage requirement of the high-risk leachate storage. However, as the only method of drawdown from the tank farm is reuse within the composting process, an additional check was also undertaken to ensure that the tanks are capable of storing the leachate generated during the wettest recorded month between 1921 and 2022. Table 4-6 provides a summary of the high-risk leachate tank design criteria and assessments.

Table 4-6: High-Risk Leachate Tank Design Summary

Aspect	Value
High-Risk Leachate Catchment (m^2)	2,315
Catchment Runoff Coefficient	1.0
1-in-100-year, 24-hour rainfall event (mm)	145
Design Storm Event Leachate Generation (m^3)	336
Maximum monthly rainfall from 1971-2022 (mm)	303
Leachate Generation from Rainfall (m^3)	702
Maximum Monthly Leachate Generation (m^3)	**702**

Therefore, using the standard tank farm tank size of 340m^3, three tanks will be required to meet the minimum storage requirement of 702m^3 for each stage. Should smaller tanks be nominated, or a different tank farm configuration be developed during the Site's detailed design, the minimum storage of 702m^3 will be maintained.

4.4 Management and Monitoring Strategy

The leachate management system (LMS) will be regularly inspected, maintained, and repaired when necessary. Leachate monitoring will be undertaken on a regular basis to ensure the leachate management system (i.e., ponds, drain, pipes, etc.) is operating effectively. C-Wise currently has a Dam Management Procedure for their existing Site, which will be adapted to cover the leachate ponds at the new Facility.

Table 4-7 shows the recommended monitoring and maintenance schedule to preserve the integrity of the leachate management system and to determine leachate quality.

Table 4-7: Monitoring and Maintenance Schedule for the LMS

Activity	Frequency
Integrity of each leachate pond	Quarterly
Integrity of all overflow points and inlets	Quarterly
Water levels within each leachate pond	Weekly
Leachate quality monitoring from each pond (pH, Conductivity, Total Dissolved Salts, Oxidation Reduction Potential, Temperature, Dissolved Oxygen)	Weekly
Leachate quality monitoring from each pond (Chemical Oxygen Demand)	Monthly
Leachate quality monitoring from each pond (Biological Oxygen Demand)	Quarterly
Occurrence of overflow events	Whenever an overflow occurs
Groundwater quality monitoring	Quarterly

The groundwater and leachate monitoring regime will be defined within the Site Licence and will be undertaken in accordance with it. The proposed monitoring points for the Site are presented in Drawing C-110 in Appendix A.

APPENDIX A
Drawings

Drawing C-100: General Arrangement

Drawing C-101: Site Plan Layout

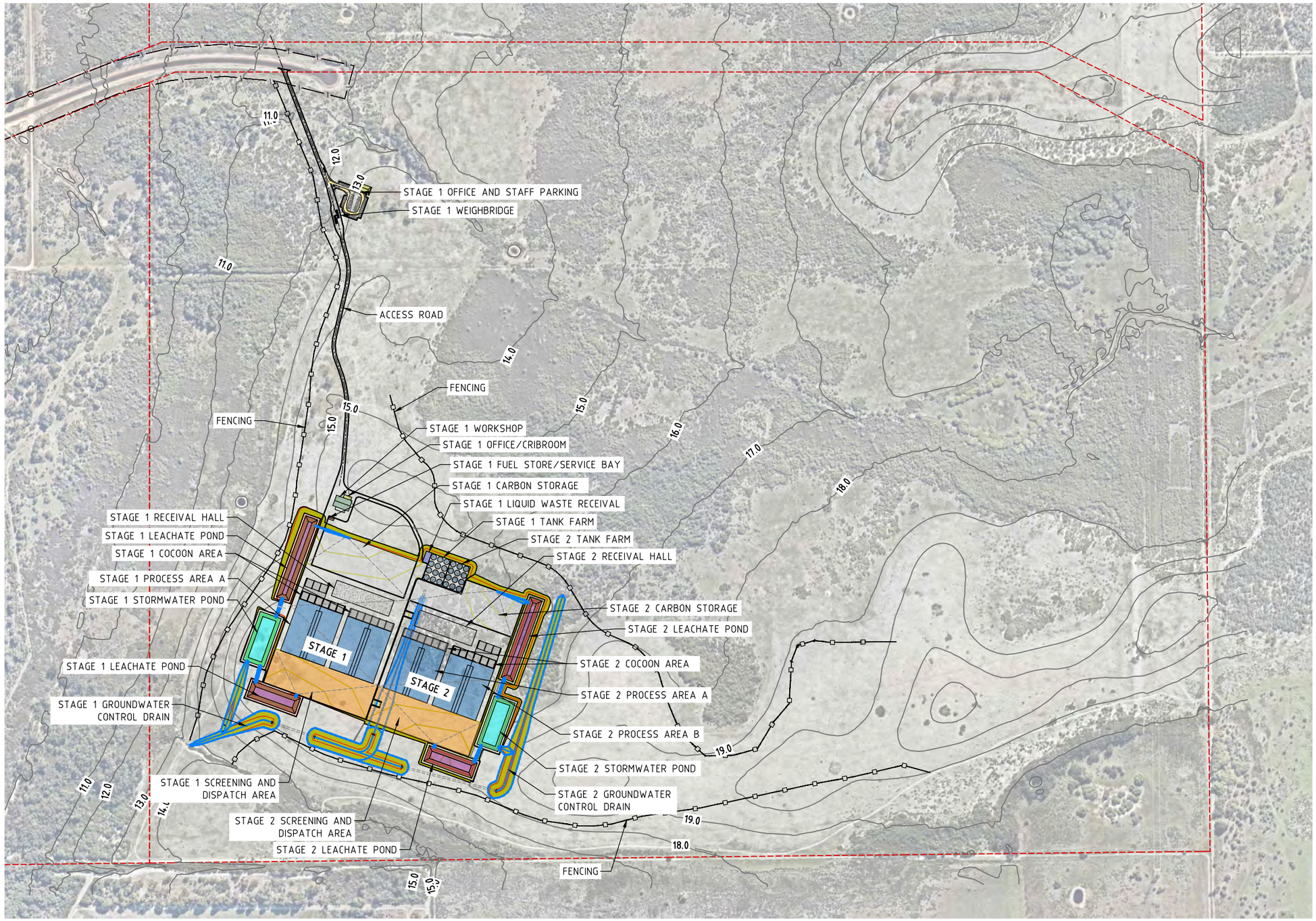
Drawing C-106: Surface Water and Leachate Management Layout – Stage 1

Drawing C-107: Surface Water and Leachate Management Layout – Stage 2

Drawing C-110: Environmental Monitoring Point Layout

Drawing C-300: Ponds and Containment Infrastructure

Drawing C-301: Channels and Conveyance Infrastructure



LEGEND:

- LEASE BOUNDARY
- ACCESS ROAD
- LEACHATE POND
- RECEPTION/OFFICES
- WORKSHOP
- STORMWATER POND
- SCREENING/DISPATCH
- LIQUID WASTE RECEIVAL
- FUEL STORE/SERVICE BAY
- TANK FARM
- RECEIVAL HALL
- COCOON AREA
- CARBON STORAGE
- OPEN DRAIN
- EXISTING FENCING
- FENCING

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150m 0m 150m 300m

1:7500 @ A3

VERTICAL DATUM: AUSTRALIAN HEIGHT DATUM
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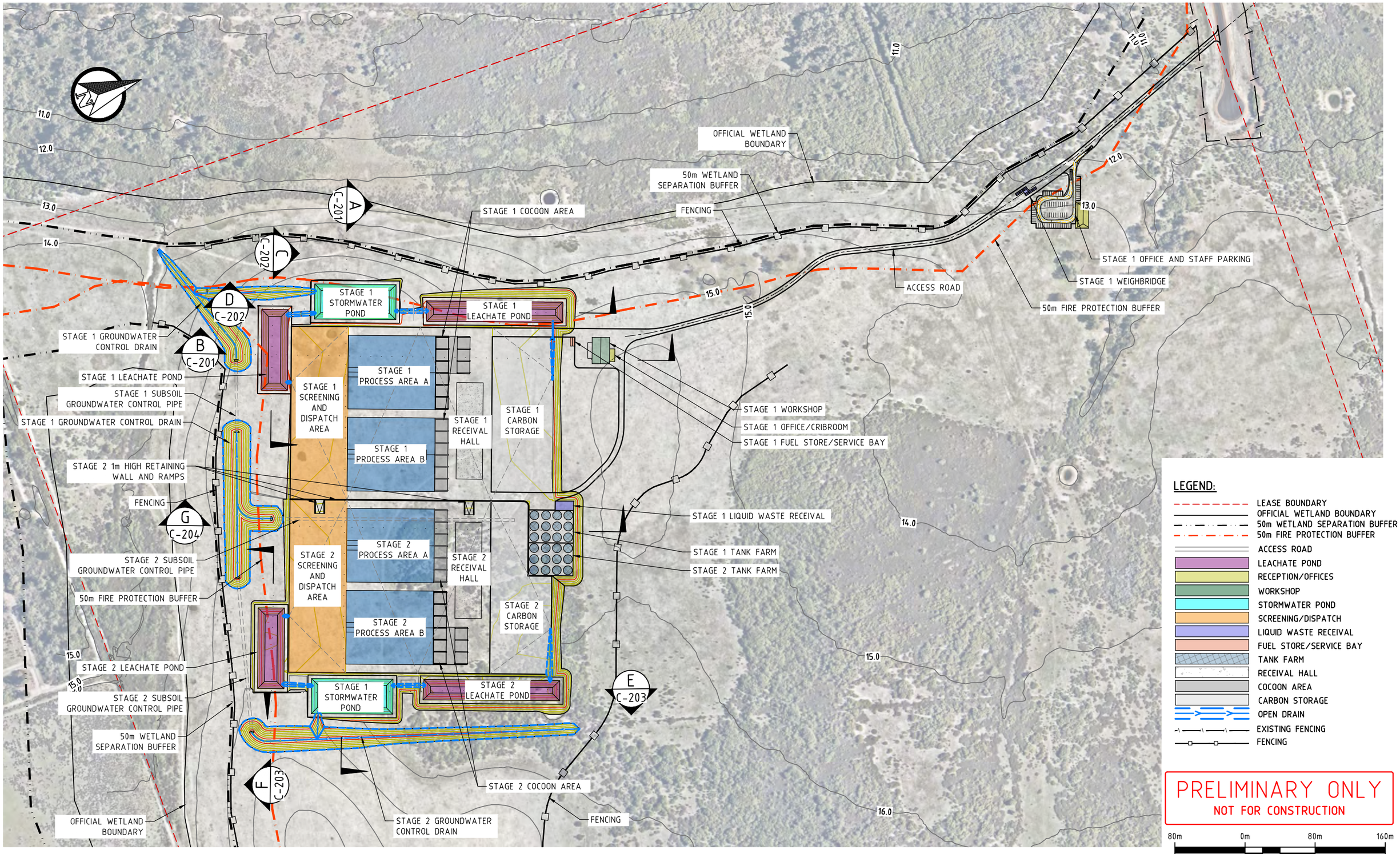
No.	Date	Drwn.	Chk.	Amendment / Issue	App.
F	26.09.2023	YJ	AB	EARTH WORK VOLUME UPDATED	MH
E	10.07.2023	JS	AB	SITE LAYOUT UPDATED	MH
D	16.01.2023	MH	AB	SITE LAYOUT UPDATED	MH
C	15.11.2022	AB	MH	BOUNDARIES UPDATED	MH
B	03.02.2022	YJ	AB	SECTIONS AND ISOPACHYTE LAYOUT ADDED	MH
A	15.11.2021	YJ	AB	PRELIMINARY ISSUE	MH

Project: C-WISE DUE DILIGENCE AND APPROVALS

Title: GENERAL ARRANGEMENT

Scale: 1:7500 @ A3 | Date: 02.03.2022
Drawn: YJ | Checked: AB | Approved: MH
Job No: TW21124 | Drg. No: C-100 | Rev: F
Filename: TW21124-SET.DWG



LEGEND:

- LEASE BOUNDARY
- OFFICIAL WETLAND BOUNDARY
- 50m WETLAND SEPARATION BUFFER
- 50m FIRE PROTECTION BUFFER
- ACCESS ROAD
- LEACHATE POND
- RECEPTION/OFFICES
- WORKSHOP
- STORMWATER POND
- SCREENING/DISPATCH
- LIQUID WASTE RECEIVAL
- FUEL STORE/SERVICE BAY
- TANK FARM
- RECEIVAL HALL
- COCOON AREA
- CARBON STORAGE
- OPEN DRAIN
- EXISTING FENCING
- FENCING

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80m 0m 80m 160m

1:4000 @ A3

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E	26.09.2023	YJ	AB	EARTH WORK VOLUME UPDATED	MH
D	16.01.2023	MH	AB	SITE LAYOUT UPDATED	MH
C	15.11.2022	AB	MH	BOUNDARIES UPDATED	MH
B	02.03.2022	YJ	AB	SECTIONS AND ISOPACHYTE LAYOUT ADDED	MH
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Project: C-WISE DUE DILIGENCE AND APPROVALS

Title: SITE PLAN LAYOUT

Scale: 1:4000 @ A3 | Date: 02.03.2022
Drawn: YJ | Checked: AB | Approved: MH
Job No: TW21124 | Drg. No: C-101 | Rev: E
Filename: TW21124-SET.DWG

12.90m
STAGE 1 STORMWATER OVERFLOW DRAIN
50m FIRE PROTECTION BUFFER
STAGE 1 STORMWATER POND
FENCING
STAGE 1 LEACHATE POND
50m WETLAND SEPARATION BUFFER
STAGE 1 LEACHATE OVERFLOW DRAIN
STAGE 1 CULVERT AND HEADWALL
STAGE 1 LEACHATE OVERFLOW DRAIN
DRAINAGE PIT
STAGE 1 GROUNDWATER CONTROL DRAIN
STAGE 1 PROCESS AREA A
STAGE 1 LEACHATE POND
DRAINAGE PIT
FENCING
STAGE 1 SUBSOIL GROUNDWATER CONTROL PIPE
STAGE 1 LEACHATE COLLECTION DRAIN
STAGE 1 SCREENING AND DISPATCH AREA
STAGE 1 COCOON AREA
OFFICIAL WETLAND BOUNDARY
STAGE 1 CARBON STORAGE
STAGE 1 LEACHATE COLLECTION DRAIN
LOCALISED HARDSTAND BUNDING
STAGE 1 RECEIVAL HALL
NEW CULVERT AND HEADWALLS
LOCALISED HARDSTAND BUNDING
DRAINAGE PIT
STAGE 1 PROCESS AREA B
STAGE 1 LIQUID WASTE RECEIVAL
STAGE 1 GROUNDWATER CONTROL DRAIN
STAGE 1 TANK FARM

LEGEND:
- OFFICIAL WETLAND BOUNDARY
- 50m WETLAND SEPARATION BUFFER
- 50m FIRE PROTECTION BUFFER
- ACCESS ROAD
- LEACHATE POND
- RECEPTION/OFFICES
- WORKSHOP
- STORMWATER POND
- SCREENING/DISPATCH
- LIQUID WASTE RECEIVAL
- FUEL STORE/SERVICE BAY
- TANK FARM
- RECEIVAL HALL
- COCOON AREA
- CARBON STORAGE
- OPEN DRAIN
- FENCING

30m 0m 30m 60m

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Title: SURFACE WATER & LEACHATE MANAGEMENT LAYOUT - STAGE 1

Scale: 1:1500 @ A3		Date: 02.03.2022	
Drawn: YJ	Checked: AB	Approved: MH	
Job No: TW21124	Drg. No: C-106	Rev: A	
Filename: TW21124-SET.DWG			

STAGE 1

STAGE 2 SUBSOIL GROUNDWATER CONTROL PIPE

STAGE 2 1m HIGH RETAINING WALL AND RAMPS

STAGE 2 CULVERT AND HEADWALL

DRAINAGE PIT

STAGE 2 PROCESS AREA A

STAGE 1 LIQUID WASTE RECEIVAL

STAGE 1 TANK FARM

STAGE 2 TANK FARM

STAGE 2 GROUNDWATER CONTROL DRAIN

LOCALISED HARDSTAND BUNDING

STAGE 2 SCREENING AND DISPATCH AREA

STAGE 2 CULVERT AND HEADWALLS

FENCING

STAGE 2 COCOON AREA

STAGE 2 RECEIVAL HALL

OFFICIAL WETLAND BOUNDARY

STAGE 2 CARBON STORAGE

STAGE 2 LEACHATE COLLECTION DRAIN

STAGE 2 PROCESS AREA B

STAGE 2 LEACHATE POND

STAGE 2 LEACHATE OVERFLOW DRAIN

STAGE 2 STORMWATER OVERFLOW DRAIN

STAGE 2 SUBSOIL GROUNDWATER CONTROL PIPE

STAGE 2 STORMWATER POND

STAGE 2 GROUNDWATER CONTROL DRAIN

LEGEND:

- OFFICIAL WETLAND BOUNDARY
- 50m WETLAND SEPARATION BUFFER
- 50m FIRE PROTECTION BUFFER
- ACCESS ROAD
- LEACHATE POND
- RECEPTION/OFFICES
- WORKSHOP
- STORMWATER POND
- SCREENING/DISPATCH
- LIQUID WASTE RECEIVAL
- FUEL STORE/SERVICE BAY
- TANK FARM
- RECEIVAL HALL
- COCOON AREA
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- OPEN DRAIN
- FENCING

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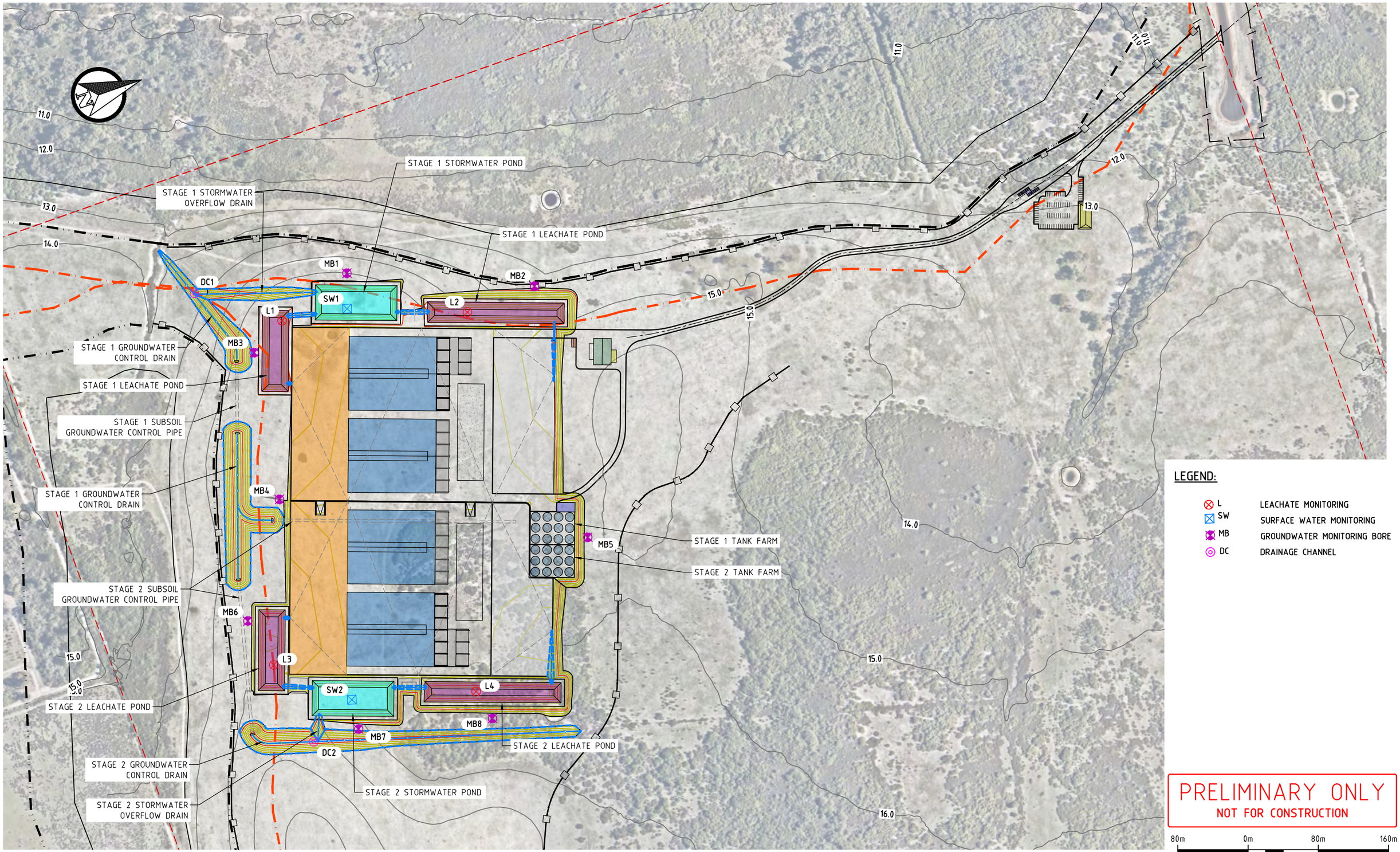
Project: C-WISE DUE DILIGENCE AND APPROVALS

Title: SURFACE WATER & LEACHATE MANAGEMENT LAYOUT - STAGE 2

Scale: 1:1500 @ A3		Date: 02.03.2022
Drawn: YJ	Checked: AB	Approved: MH
Job No: TW21124	Drg. No: C-107	Rev: A
Filename: TW21124-SET.DWG		



LEGEND:

L	LEACHATE MONITORING
SW	SURFACE WATER MONITORING
MB	GROUNDWATER MONITORING BORE
DC	DRAINAGE CHANNEL

PRELIMINARY ONLY
NOT FOR CONSTRUCTION

80m 0m 80m 160m

1:4000 @ A3

VERTICAL DATUM: AUSTRALIAN HEIGHT DATUM
HORIZONTAL DATUM: MGA 94 ZONE 50

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Client: C-WISE Soil Carbon Solutions

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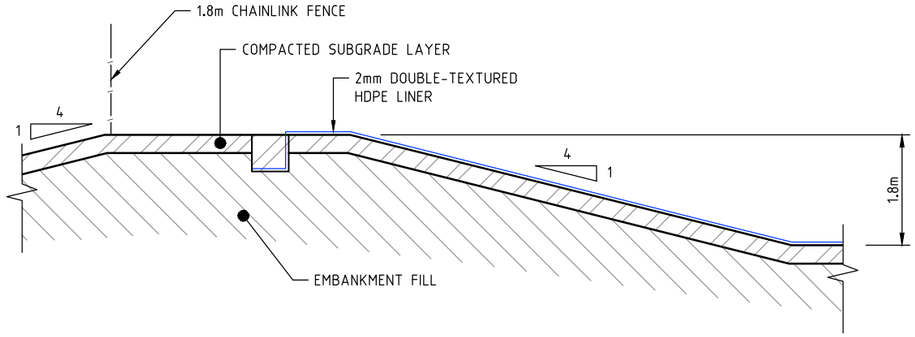
No.	Date	Drwn.	Chk.	Amendment / Issue	App.
A	24.10.2023	VS	AB	MONITORING POINT LAYOUT ADDED	MH

Project: C-WISE DUE DILIGENCE AND APPROVALS

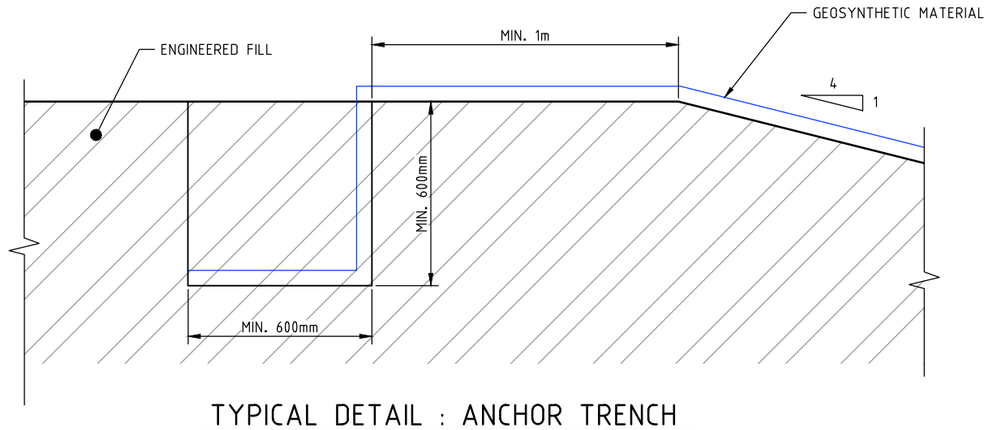
Title: ENVIRONMENTAL MONITORING POINT LAYOUT

Scale: 1:4000 @ A3		Date: 02.03.2022	
Drawn: YJ	Checked: AB	Approved: MH	
Job No: TW21124	Drg. No: C-110	Rev: A	
Filename: TW21124-SET.DWG			



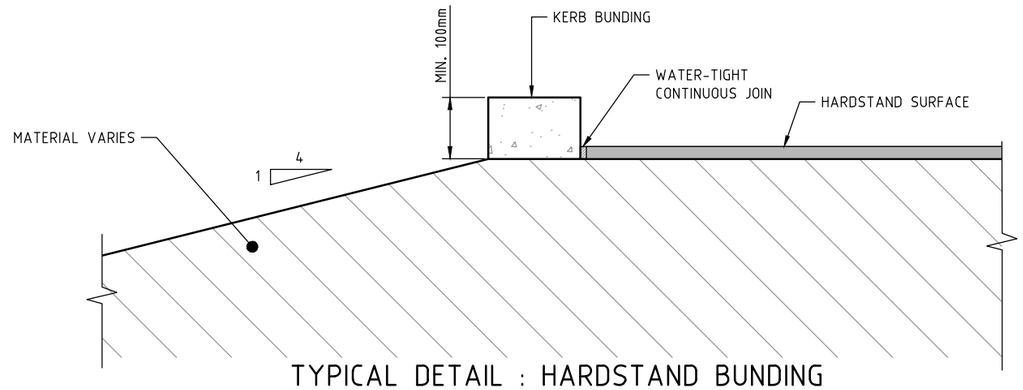
TYPICAL DETAIL : SURFACE WATER POND

SCALE: 1:100



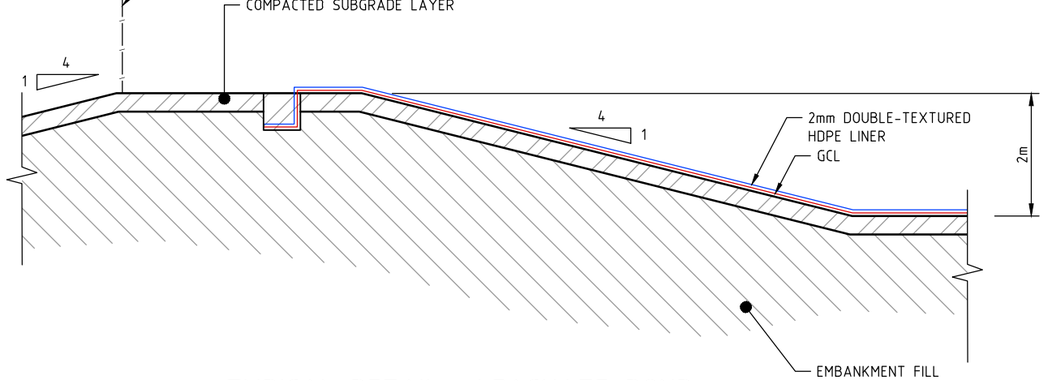
TYPICAL DETAIL : ANCHOR TRENCH

SCALE: 1:20



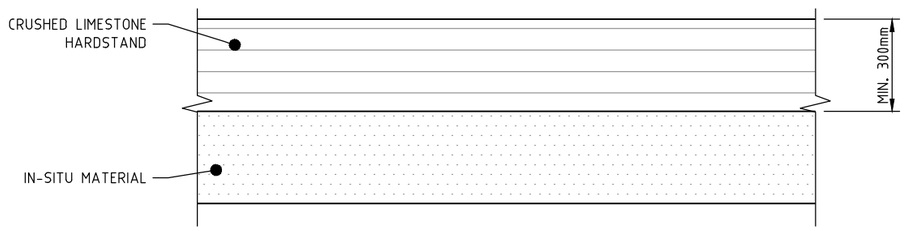
TYPICAL DETAIL : HARDSTAND BUNDING

SCALE: N.T.S



TYPICAL DETAIL : LEACHATE POND

SCALE: 1:100



TYPICAL DETAIL : CRUSHED LIMESTONE HARDSTAND

SCALE: N.T.S

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VERTICAL DATUM: AUSTRALIAN HEIGHT DATUM
HORIZONTAL DATUM: MGA 94 ZONE 50

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Client: C-WISE Soil Carbon Solutions

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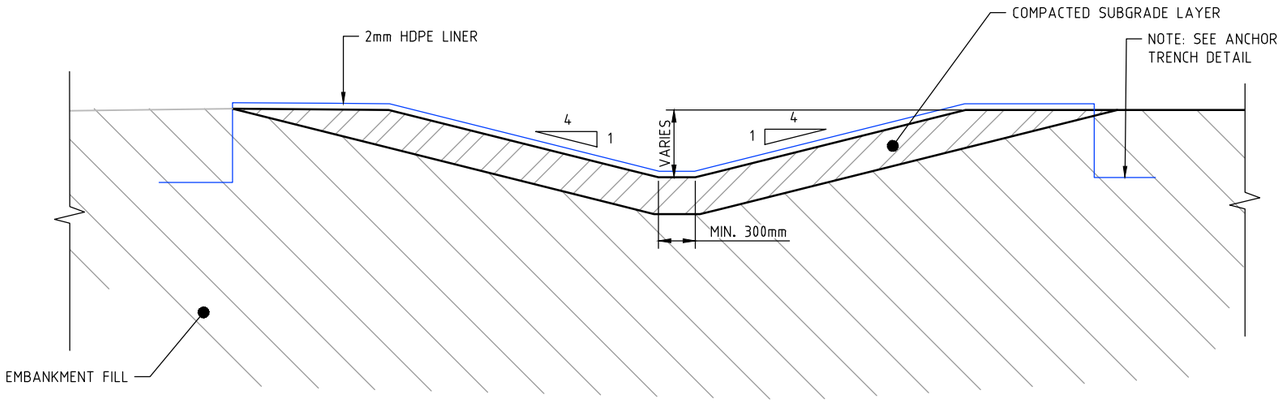
No.	Date	Drwn.	Chk.	Amendment / Issue	App.
A	24.10.2023	YJ	AB	TYPICAL DETAIL DRAWING ADDED	MH

Project: C-WISE DUE DILIGENCE AND APPROVALS

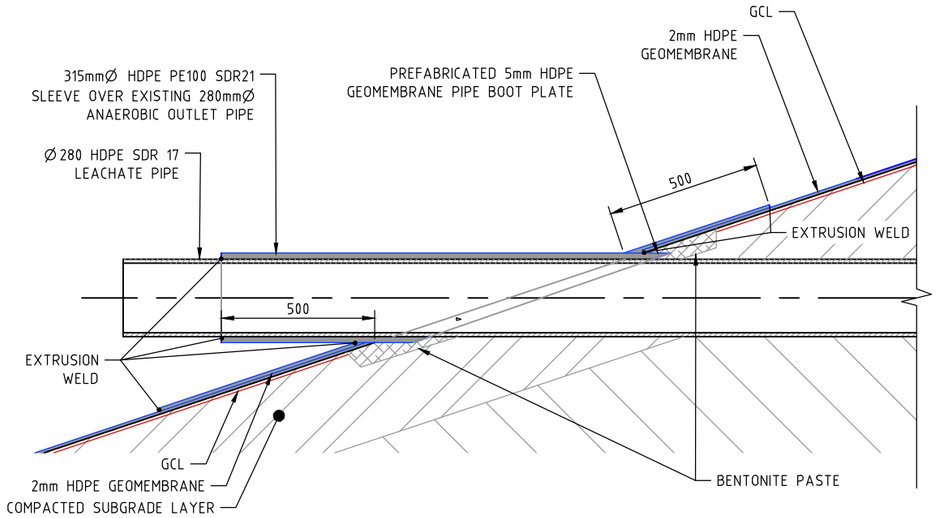
Title: PONDS AND CONTAINMENT INFRASTRUCTURE

Scale: AS SHOWN @ A3	Date: 02.03.2022	
Drawn: YJ	Checked: AB	Approved: MH
Job No: TW21124	Drg. No: C-300	Rev: A
Filename: TW21124-SET.DWG		



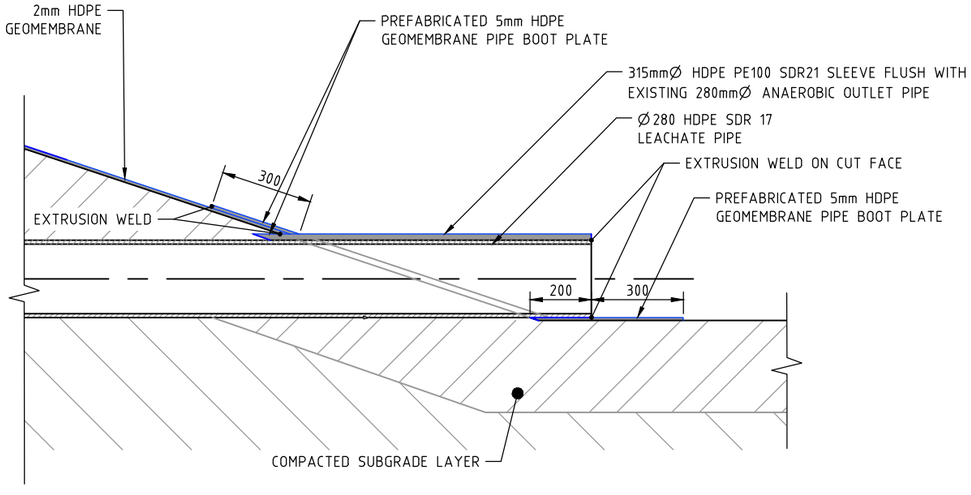
TYPICAL DETAIL : LINED CHANNEL

SCALE: 1:50



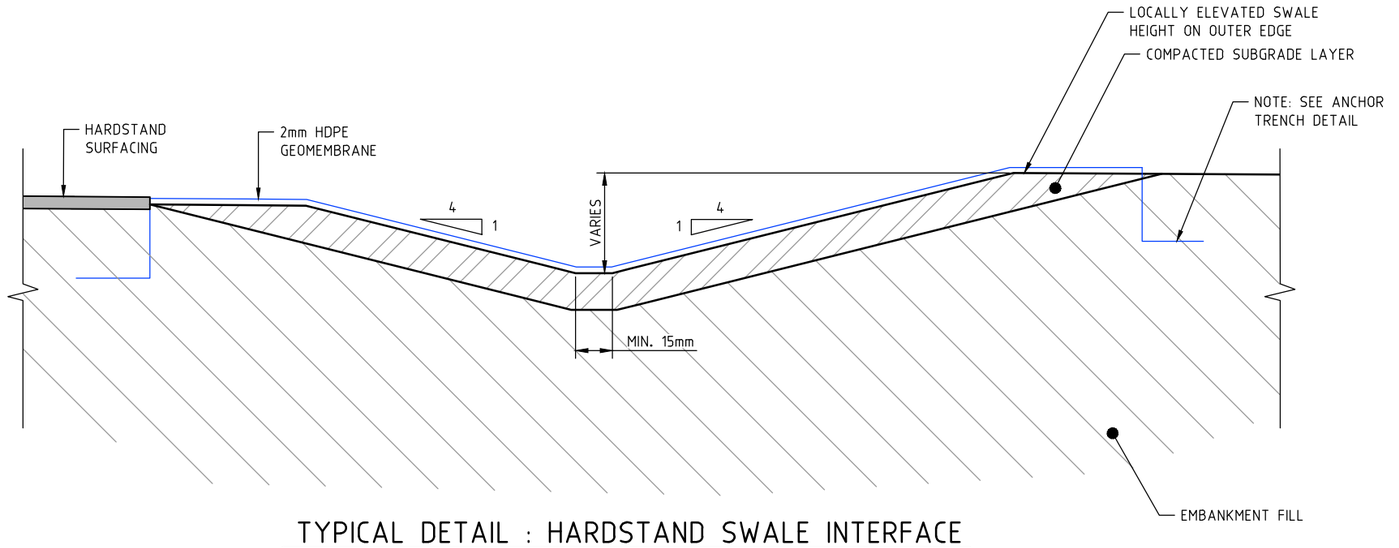
TYPICAL DETAIL : HDPE LEACHATE CULVERT OUTLET

SCALE: N.T.S



TYPICAL DETAIL : HDPE LEACHATE CULVERT INLET

SCALE: N.T.S



TYPICAL DETAIL : HARDSTAND SWALE INTERFACE

SCALE: 1:50

PRELIMINARY ONLY
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VERTICAL DATUM: AUSTRALIAN HEIGHT DATUM
HORIZONTAL DATUM: MGA 94 ZONE 50

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Client: C-WISE Soil Carbon Solutions

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No.	Date	Drwn.	Chk.	Amendment / Issue	App.
A	24.10.2023	YJ	AB	TYPICAL DETAIL DRAWING ADDED	MH

Project: C-WISE DUE DILIGENCE AND APPROVALS

Title: CHANNELS AND CONVEYANCE INFRASTRUCTURE

Scale: AS SHOWN @ A3	Date: 02.03.2022	
Drawn: YJ	Checked: AB	Approved: MH
Job No: TW21124	Drg. No: C-301	Rev: A
Filename: TW21124-SET.DWG		

APPENDIX B
Surface Water & Leachate Modelling

Table 1.1: Site Details

Site Location:	C-Wise
Latitutde:	-32.479255
Longitude:	115.846847

Table 1.2: SILO Rainfall Data (mm)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total Annual	Percentile
1971	5	7	74	5	126	130	148	99	167	87	15	3	865	68%
1972	0	0	4	30	60	123	172	169	63	43	15	2	680	21%
1973	8	2	0	79	135	186	218	132	180	40	23	0	1,002	92%
1974	**2**	**11**	**0**	**69**	**245**	**138**	**303**	**147**	**32**	**83**	**16**	**0**	**1,046**	**98%**
1975	0	1	18	21	111	153	190	98	90	49	18	1	749	40%
1976	48	21	0	79	103	90	105	127	63	43	60	9	748	38%
1977	6	4	5	0	118	96	86	132	26	71	12	0	556	8%
1978	2	19	10	8	161	195	181	39	115	71	13	11	824	57%
1979	2	7	22	56	77	138	125	94	67	31	48	5	673	19%
1980	0	31	3	90	126	169	189	137	63	52	15	53	927	87%
1981	0	16	11	33	171	161	189	132	72	52	48	6	890	79%
1982	181	5	25	0	65	145	189	99	110	40	7	8	873	72%
1983	0	50	4	21	54	272	125	175	120	9	33	13	876	74%
1984	1	3	16	74	282	161	92	142	90	37	113	19	1,030	94%
1985	0	4	18	90	77	145	181	175	72	37	36	11	843	60%
1986	1	78	18	8	161	145	181	152	52	34	27	1	858	66%
1987	2	0	16	118	54	161	164	94	63	26	33	29	760	42%
1988	1	1	13	74	152	186	155	108	110	46	45	3	892	83%
1989	25	37	7	60	190	90	190	90	76	115	9	6	894	85%
1990	22	11	46	106	83	84	172	103	85	52	18	6	788	47%
1991	6	31	3	56	161	222	190	127	104	37	64	34	1,034	96%
1992	0	78	42	21	111	242	118	163	72	19	56	13	934	89%
1993	2	21	33	13	96	96	164	82	126	31	30	1	695	25%
1994	2	3	4	5	135	204	118	112	55	17	10	0	665	15%
1995	1	0	6	16	152	116	248	94	94	92	33	17	868	70%
1996	3	0	10	26	65	222	199	137	120	43	45	15	884	75%
1997	1	9	42	33	111	161	125	142	85	29	9	0	746	34%
1998	2	0	95	23	65	169	87	158	120	43	48	12	821	55%
1999	10	0	11	23	111	204	147	98	120	79	2	4	809	53%
2000	87	0	33	36	54	169	269	152	55	7	20	1	885	77%
2001	0	5	3	5	118	73	105	112	115	29	27	11	603	11%
2002	11	0	3	56	65	169	164	108	63	46	30	4	718	28%
2003	5	19	57	106	96	153	172	112	99	37	33	1	890	81%
2004	0	3	0	13	119	138	140	163	52	52	23	4	706	26%
2005	**0**	**3**	**22**	**44**	**245**	**222**	**65**	**127**	**115**	**79**	**20**	**13**	**955**	**91%**
2006	48	2	10	30	54	22	118	163	41	31	23	1	543	6%
2007	17	7	8	69	77	109	181	127	120	63	3	13	794	49%
2008	0	37	5	137	111	169	181	26	63	49	68	11	856	64%
2009	11	11	8	2	65	195	140	127	115	9	48	1	731	32%
2010	0	1	39	40	77	79	118	62	24	17	11	7	474	2%
2011	37	0	0	30	83	177	140	117	110	31	52	68	843	62%
2012	**44**	**11**	**0**	**60**	**77**	**195**	**47**	**108**	**109**	**26**	**60**	**64**	**799**	**51%**
2013	10	4	46	13	135	40	140	158	155	34	13	1	747	36%
2014	0	0	20	21	171	109	140	98	59	26	25	0	669	17%
2015	0	11	22	60	65	84	105	112	38	17	16	11	542	4%
2016	40	1	20	51	111	116	86	137	72	34	15	9	692	23%
2017	3	115	25	0	96	68	181	147	76	34	4	34	782	45%
2018	93	6	5	9	83	161	164	163	26	52	7	2	772	43%
2019	6	0	14	36	26	169	118	108	38	37	12	2	565	9%
2020	3	7	33	9	83	116	111	74	85	21	72	1	616	13%
2021	1	46	28	65	104	96	237	86	67	92	6	3	831	58%
2022	0	1	8	51	104	123	155	147	59	26	33	17	724	30%
Average	14	14	19	42	111	145	154	121	84	43	29	11	788	

Table 1.3: SILO Pan Evaporation Data (mm)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total Annual
1971	205	192	172	98	69	56	55	71	91	118	145	229	1,502
1972	265	254	196	119	93	55	69	72	87	146	223	282	1,862
1973	299	229	203	108	78	56	53	67	96	126	200	255	1,769
1974	**318**	**240**	**208**	**108**	**77**	**59**	**71**	**76**	**99**	**125**	**174**	**256**	**1,810**
1975	262	260	203	105	81	71	74	77	100	126	166	259	1,783
1976	254	235	196	117	82	56	70	79	89	142	174	225	1,718
1977	258	224	181	134	73	65	67	81	93	133	185	246	1,738
1978	260	224	208	133	90	59	65	72	92	161	209	241	1,812
1979	252	208	185	109	84	50	62	67	90	142	161	250	1,659
1980	284	217	183	93	75	59	61	77	89	126	154	212	1,630
1981	283	217	198	105	99	64	68	85	95	133	160	224	1,730
1982	226	224	182	117	71	64	71	71	92	156	186	218	1,678
1983	282	169	210	112	71	60	58	78	90	141	186	214	1,672
1984	273	243	160	123	69	55	56	68	100	133	166	193	1,639
1985	242	239	191	115	80	52	54	68	93	139	177	208	1,657
1986	276	166	149	105	61	51	51	58	79	119	177	230	1,522
1987	239	234	174	103	61	52	51	68	102	135	175	217	1,608
1988	243	264	203	122	71	61	61	72	91	117	192	235	1,731
1989	239	193	205	111	74	51	49	75	83	117	194	220	1,609
1990	229	199	160	104	64	53	67	73	95	119	174	223	1,560
1991	274	210	176	120	79	53	58	75	84	130	156	221	1,635
1992	271	187	153	114	65	66	58	69	87	134	171	233	1,608
1993	258	221	173	99	76	55	62	73	94	122	162	258	1,651
1994	263	210	199	132	89	54	60	80	106	153	206	279	1,830
1995	292	256	217	126	85	62	61	75	87	145	181	235	1,821
1996	283	270	201	131	92	65	74	73	99	138	176	233	1,834
1997	284	205	177	105	72	53	61	71	84	151	173	253	1,688
1998	269	225	187	108	81	64	47	70	94	146	185	235	1,711
1999	255	236	175	137	66	61	62	73	85	132	208	258	1,749
2000	228	231	185	125	76	62	65	71	91	151	191	258	1,732
2001	244	211	203	124	73	50	56	70	86	139	200	230	1,684
2002	257	237	193	109	75	58	60	72	96	129	196	256	1,739
2003	272	206	196	104	82	55	56	71	91	138	195	238	1,704
2004	265	216	194	117	78	61	57	70	98	135	182	249	1,722
2005	**267**	**203**	**173**	**101**	**76**	**51**	**57**	**69**	**87**	**111**	**178**	**189**	**1,563**
2006	217	204	194	102	76	59	58	74	97	159	186	257	1,681
2007	237	197	195	102	66	64	68	63	88	135	213	225	1,653
2008	273	236	192	99	64	58	53	80	91	139	161	219	1,665
2009	250	215	179	136	94	56	58	67	91	148	179	259	1,731
2010	288	215	190	100	74	48	52	70	114	162	214	252	1,779
2011	256	256	232	140	85	62	55	77	96	139	183	231	1,812
2012	**285**	**216**	**216**	**109**	**68**	**56**	**54**	**70**	**98**	**148**	**177**	**234**	**1,732**
2013	255	237	165	104	70	53	57	72	92	142	214	265	1,724
2014	284	252	195	117	63	53	59	81	98	149	180	256	1,785
2015	291	212	183	110	79	60	55	75	112	156	216	270	1,817
2016	258	243	187	96	71	54	61	69	88	137	214	253	1,733
2017	277	195	166	120	77	62	66	74	103	150	229	254	1,774
2018	268	209	191	111	97	51	72	73	95	134	195	252	1,746
2019	267	230	192	118	80	67	54	89	112	148	225	287	1,869
2020	274	217	177	115	84	65	62	75	102	177	168	285	1,801
2021	329	205	176	128	74	55	71	76	111	134	204	289	1,850
2022	316	258	197	126	86	61	69	78	96	137	186	268	1,876
Average	265	222	188	114	77	58	60	73	94	138	186	243	1,719

Table 1.4: Rainfall AEP

AEP		Rainfall (mm)											
Duration		**63.2%**	**50.0%**	**20.0%**	**10.0%**	**5.0%**	**2.0%**	**1.0%**	**0.5%**	**0.2%**	**0.1%**	**0.05%**	**4.0%**
Hours	**BoM**	**1:1**	**1:2**	**1:5**	**1:10**	**1:20**	**1:50**	**1:100**	**1:200**	**1:500**	**1:1000**	**1:2000**	**1:25**
0.02	**1 min**	1.9	2.09	2.68	3.09	3.5	4.05	4.47	5.12	6.06	6.87	7.77	3.68
0.03	**2 min**	3.34	3.63	4.54	5.14	5.72	6.45	6.99	7.92	9.24	10.4	11.6	5.96
0.05	**3 min**	4.46	4.87	6.12	6.97	7.79	8.84	9.63	10.9	12.8	14.4	16.2	8.14
0.07	**4 min**	5.38	5.88	7.46	8.53	9.58	11	12	13.7	16.1	18.2	20.4	10.05
0.08	**5 min**	6.15	6.74	8.61	9.88	11.1	12.8	14.1	16.1	19	21.5	24.2	11.67
0.17	**10 min**	8.87	9.76	12.6	14.6	16.6	19.3	21.3	24.5	29.1	33	37.4	17.50
0.25	**15 min**	10.7	11.8	15.2	17.6	20	23.2	25.7	29.6	35.1	39.8	45.1	21.07
0.33	**20 min**	12.1	13.3	17.1	19.8	22.5	26.1	28.9	33.1	39.3	44.5	50.4	23.70
0.42	**25 min**	13.2	14.5	18.7	21.6	24.4	28.3	31.3	35.8	42.4	48.1	54.4	25.70
0.50	**30 min**	14.2	15.6	20	23.1	26.1	30.1	33.3	38.1	45.1	51.1	57.7	27.43
0.75	**45 min**	16.6	18.2	23.2	26.6	30	34.5	38	43.5	51.3	58	65.5	31.50
1.00	**1 hour**	18.5	20.2	25.6	29.4	33.1	38	41.8	47.8	56.3	63.6	71.8	34.73
1.50	**1.5 hour**	21.5	23.4	29.6	33.8	38.1	43.8	48.2	55	64.9	73.3	82.6	40.00
2.00	**2 hour**	23.8	26	32.8	37.5	42.2	48.6	53.7	61.3	72.4	81.8	92.4	44.33
3.00	**3 hour**	27.6	30	37.9	43.5	49.2	57	63.2	72.4	85.7	97.1	110	51.80
4.50	**4.5 hour**	31.8	34.6	44	50.7	57.7	67.4	75.3	86.6	103	117	132	60.93
6.00	**6 hour**	35.1	38.3	48.8	56.6	64.6	76.1	85.6	98.5	117	133	152	68.43
9.00	**9 hour**	40.1	43.8	56.4	65.8	75.7	90.1	102	118	140	160	182	80.50
12.00	**12 hour**	43.9	48.1	62.2	72.9	84.3	101	115	132	158	180	205	89.87
18.00	**18 hour**	49.6	54.3	70.8	83.4	97	117	133	153	182	207	235	103.67
24.00	**24 hour**	53.8	59	77.1	90.9	106	127	145	166	197	223	252	113.00
30.00	**30 hour**	57.2	62.7	81.9	96.7	113	135	154	176	206	233	260	120.33
36.00	**36 hour**	60.1	65.9	86	101	118	141	160	181	212	237	264	125.67
48.00	**48 hour**	65	71.2	92.5	109	126	149	168	188	217	241	266	133.67
72.00	**72 hour**	73.3	80	103	119	137	159	178	196	222	244	266	144.33
96.00	**96 hour**	80.7	88	112	129	146	168	185	204	229	249	270	153.33
120.00	**120 hour**	88.1	95.9	121	138	155	177	194	213	238	257	277	162.33
144.00	**144 hour**	95.8	104	130	148	165	188	206	224	249	268	289	172.67
168.00	**168 hour**	104	113	140	158	175	200	219	237	263	283	302	183.33

Table 1.5: Pan Evaporation Data (mm)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total Annual
90th %-ile Daily	8.6	6.5	5.6	3.3	2.5	1.7	1.8	2.2	2.8	3.6	5.7	6.1	1,563
90th Percentile	267.2	202.9	173.4	100.9	76.0	51.4	56.7	69.3	86.6	111.1	178.0	189.1	
50th %-ile Daily	9.2	7.0	7.0	3.5	2.2	1.8	1.7	2.3	3.2	4.8	5.7	7.6	1,732
50th Percentile	284.7	216.0	216.4	109.3	68.1	56.0	54.1	69.9	98.3	147.6	177.3	234.1	
Maximum Daily	10.3	7.7	6.7	3.5	2.5	1.9	2.3	2.4	3.2	4.0	5.6	8.3	1,810
Maximum	318.4	239.5	208.2	107.9	77.2	58.8	70.6	75.9	98.5	124.5	174.0	256.4	
Average Daily	8.6	7.2	6.1	3.7	2.5	1.9	2.0	2.4	3.0	4.5	6.0	7.8	1,719
Average	265.3	222.1	188.3	113.9	76.8	57.7	60.5	73.0	94.1	138.4	186.2	242.6	
# Days	31	28	31	30	31	30	31	31	30	31	30	31	365

Table 1.6: Rainfall Year Summary (mm)

Scenario	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average	14.4	14.2	18.6	41.9	111.1	145.2	154.3	120.9	83.9	43.3	29.2	10.8	787.8
50th Percentile	44.1	10.7	0.0	60.0	76.7	194.6	47.1	107.5	109.4	26.0	59.5	63.6	799.2
90th Percentile	0.2	2.7	22.4	43.5	245.4	222.1	65.1	126.5	114.8	78.6	20.4	13.4	955.1
Maximum	2.2	10.7	0.1	69.2	245.4	137.5	303.2	147.1	31.7	82.8	16.4	0.0	1,046.3

Table 2.1: Total Leachate Generation (m3)

Generation Scenario	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Average	-5,567	-4,996	-5,456	-4,653	-3,025	-1,936	-1,890	-2,768	-3,548	-4,808	-4,986	-5,662	-49,295
50th Percentile	-4,786	-5,089	-5,945	-4,176	-3,929	-639	-4,707	-3,120	-2,878	-5,262	-4,190	-4,274	-48,994
90th Percentile	-5,940	-5,299	-5,356	-4,610	505	84	-4,234	-2,620	-2,736	-3,879	-5,217	-5,593	-44,896
Maximum	-5,887	-5,089	-5,943	-3,935	505	-2,139	2,024	-2,079	-4,920	-3,769	-5,322	-5,945	-42,499

Table 2.2: Individual Leachate Generation (m3)

Generation Scenario	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
High Risk Leachate													
Average Rainfall	33	33	43	97	257	336	357	280	194	100	68	25	1,824
50th Percentile Rainfall	102	25	0	139	178	450	109	249	253	60	138	147	1,850
90th Percentile Rainfall	0	6	52	101	568	514	151	293	266	182	47	31	2,211
Maximum Rainfall	5	25	0	160	568	318	702	341	73	192	38	0	2,422
Low Risk Leachate													
Average Rainfall	180	178	233	525	1,392	1,820	1,933	1,514	1,051	542	366	135	9,870
50th Percentile Rainfall	553	134	0	752	961	2,438	590	1,347	1,371	326	745	797	10,013
90th Percentile Rainfall	3	34	281	545	3,075	2,783	816	1,585	1,438	985	256	168	11,966
Maximum Rainfall	28	134	1	867	3,075	1,723	3,799	1,843	397	1,037	205	0	13,109
Leachate Reuse													
Average Rainfall	-5,945	-5,370	-5,945	-5,753	-5,945	-5,753	-5,945	-5,945	-5,753	-5,945	-5,753	-5,945	-70,000
50th Percentile Rainfall	-5,945	-5,370	-5,945	-5,753	-5,945	-5,753	-5,945	-5,945	-5,753	-5,945	-5,753	-5,945	-70,000
90th Percentile Rainfall	-5,945	-5,370	-5,945	-5,753	-5,945	-5,753	-5,945	-5,945	-5,753	-5,945	-5,753	-5,945	-70,000
Maximum Rainfall	-5,945	-5,370	-5,945	-5,753	-5,945	-5,753	-5,945	-5,945	-5,753	-5,945	-5,753	-5,945	-70,000
Finished Product Leachate													
Average Rainfall	198	196	256	576	1,528	1,998	2,122	1,663	1,154	595	402	148	10,835
50th Percentile Rainfall	607	147	0	825	1,055	2,677	648	1,479	1,505	358	818	875	10,993
90th Percentile Rainfall	3	37	308	598	3,375	3,055	895	1,740	1,579	1,081	281	184	13,137
Maximum Rainfall	30	147	1	952	3,375	1,891	4,170	2,023	436	1,139	226	0	14,392

Table 2.3: Key Leachate Generation Parameters

Aspect	Value
High Risk Leachate Area (m^2)	2,315
Low Risk Leachate Area (m^2)	12,529
Finished Product Leachate Area (m^2)	13,755
Surface Water Catchment (m^2)	31,553
Runoff Coefficient	1

Table 2.4: Leachate Generation Inclusion

Aspect	Value
High Risk Leachate	NO
Low Risk Leachate	YES
Leachate Reuse	YES
Finished Product Leachate	YES

Table 2.5 Leachate Reuse Rates

Input	Value
Annual Greenwaste Input (t)	100,000
Annual Liquid Waste Input (t)	30,000
Water Use (greenwaste:water)	
Average Rainfall	1.0
50th Percentile Rainfall	1.0
90th Percentile Rainfall	1.0
Maximum Rainfall	1.0

*1:1 for all as compost is undercover and will have no rainfall input

Table 3.1: Pond Design Characteristics

Aspect	Pond 1	Pond 2	Pond 3
W (m)	23	30	40
L (m)	155	92	93
h (m)	2	2	1.8
Side Slope (1:V)	4	4	4
Freeboard (m)	0.5	0.5	0.5
Evaporation Depth (m)	1	1	0.9
Base Width (m)	7	14	25.6
Base Length (m)	139	76	78.6
Operational Width (m)	19	26	36
Operational Length (m)	151	88	89
Evaporation Width (m)	15	22	32.8
Evaporation Length (m)	147	84	85.8
Pond Catchment Area (m^2)	3,565	2,760	3,720
Pond Evaporation Area (m^2)	2,205	1,848	2,814
Operational Capacity (m^3)	2,846	2,478	3,367
Total Capacity (m^3)	4,453	3,739	5,097

Table 3.2: Surface Water Check

Aspect	Value
Storm Event Duration	24 hour
Storm Event AEP	1:20
Storm Event Rainfall (mm)	106
Required Stormwater Capacity (m^3)	3,345
Storage Check?	**PASS**

Table 3.3: High Risk Leachate

Aspect	Value
Storm Event Duration	24 hour
Storm Event AEP	1:100
Storm Event Rainfall (mm)	145
Required Stormwater Capacity (m^3)	336
Maximum Monthly Storage (m^3)	702
Required # of 340m^3 Tanks	**3**
Required Pumping Capacity (L/s)	3.9

NOTES:

- Volume of Pond: $V=(h/6)*((LxW)+((W+W_b)*(LxL_b))+(L_b*W_b))$
- Passing Minimum Storage Requirement means Operational Capacity is not exceeded during minimum storm event
- Passing Maximum Storage Requirement means Total Capacity is not exceeded during maximum storm event
- Maximum storage check can be failed provided there is an allowable discharge point
- Pond 1 is for the Low Risk Leachate Catchment
- Pond 2 is for the Dispatch Leachate Catchment
- Pond 3 is for the Surface Water Catchment

Table 4.1: Water Balance Inputs

Aspect	Value
Runoff Coefficient	1
Evaporation Coefficient	0.7

Table 4.2: Rainfall Scenario Inputs

Year	Rainfall
1	90th Percentile
2	90th Percentile
3	90th Percentile
4	90th Percentile
5	90th Percentile

Table 4.3: Leachate Inputs

Pond	% of Leachate in Pond
Pond 1	48%
Pond 2	52%

Table 4.4: Storm Check Inputs

Aspect	Value
Storm Event Duration	24 hour
Storm Event AEP	1:100
Storm Event Rainfall (mm)	145

Table 4.5: Water Balance

Year	Month	Pond 1	Pond 2
1	Jan	0	0
1	Feb	0	0
1	Mar	0	0
1	Apr	0	0
1	May	998	843
1	Jun	1,751	1,434
1	Jul	0	0
1	Aug	0	0
1	Sep	0	0
1	Oct	0	0
1	Nov	0	0
1	Dec	0	0
2	Jan	0	0
2	Feb	0	0
2	Mar	0	0
2	Apr	0	0
2	May	998	843
2	Jun	1,751	1,434
2	Jul	0	0
2	Aug	0	0
2	Sep	0	0
2	Oct	0	0
2	Nov	0	0
2	Dec	0	0
3	Jan	0	0
3	Feb	0	0
3	Mar	0	0
3	Apr	0	0
3	May	998	843
3	Jun	1,751	1,434
3	Jul	0	0
3	Aug	0	0
3	Sep	0	0
3	Oct	0	0
3	Nov	0	0
3	Dec	0	0
4	Jan	0	0
4	Feb	0	0
4	Mar	0	0
4	Apr	0	0
4	May	998	843
4	Jun	1,751	1,434
4	Jul	0	0
4	Aug	0	0
4	Sep	0	0
4	Oct	0	0
4	Nov	0	0
4	Dec	0	0
5	Jan	0	0
5	Feb	0	0
5	Mar	0	0
5	Apr	0	0
5	May	998	843
5	Jun	1,751	1,434
5	Jul	0	0
5	Aug	0	0
5	Sep	0	0
5	Oct	0	0
5	Nov	0	0
5	Dec	0	0

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FOGO Facillity Keralup

Bushfire Risk Report

Assessments of Risk Levels and Risk Management

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Shire of Murray

19 December 2023

Job Reference No: 220666

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Limitations: The protection measures contained in this Bushfire Risk – Assessment and Management Report, are considered to be minimum requirements and they do not guarantee that buildings or infrastructure will not be damaged in a bushfire, persons injured, or fatalities occur either on the subject site or off the site while evacuating. This is substantially due to the unpredictable nature and behaviour of fire and fire weather conditions. Additionally, the correct implementation of the recommended protection measures will depend upon, among other things, the ongoing actions of the landowners and/or operators over which Bushfire Prone Planning has no control.

All surveys, forecasts, projections and recommendations made in this report associated with the proposed development are made in good faith based on information available to Bushfire Prone Planning at the time. All maps included herein are indicative in nature and are not to be used for accurate calculations.

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1 REPORT USE GUIDANCE - FOR MANAGERS & DECISION MAKERS

LOCATION OF KEY INFORMATION	
The applied risk assessment process as pre-requisite reading to assist with understanding the assessments and the presentation of the results.	Section 2 and Appendices 1 & 2
The assessed bushfire risk levels and the relative contribution of each primary factor contributing to that risk.	Section 3
The BAL contour map illustrating the Bushfire Attack Levels (BAL's) impacting the site.	Section 5.2.3
The mandatory bushfire risk management actions to be addressed (current and future).	Sections 4.2
The recommended additional bushfire protection measures and their implementation priority rating.	Section 4.2.1.
Identified additional issues and advice provided for consideration by management.	Section 4.2.2

SECTION 5 - THE ASSESSMENT OF BUSHFIRE RISK

For the Food Organic Garden Organic Facility (FOGO), the risk assessment derives defined levels of risk associated with a bushfire event within the immediate and broader surrounding landscape, to the identified elements at risk (i.e., relevant classes of persons and property).

The adopted assessment approach applies a methodology that considers bushfire risk to be determined as a consequence of the interaction of three factors:

1. The bushfire hazard (which presents varying threats and threat levels);
2. The levels of exposure of each element at risk to those threats; and
3. The levels of vulnerability of each element at risk to those threats.

The assessment considers both the current level of risk (inherent), and the potential level of risk (residual) should proactive management be able to implement the recommended additional bushfire protection measures.

The assessment is largely qualitative in nature but incorporates quantitative processes and information when relevant and available. This results in the derivation of 'indicative' bushfire risk levels.

The assessment is conducted by a bushfire planning consultant with practical bushfire event management experience and relevant accreditation. An important objective is to present understandable and practical protection measures that are able to be justifiably applied by management.

SECTION 6 - THE ASSESSMENT OF BUSHFIRE RISK MANAGEMENT

Assessments are conducted that consider how well two defined pathways for implementing both the required and any additionally recommended bushfire protection measures, are being applied. Guidance for best practice application of these measures is provided. The two pathways are:

1. The application of 'informative' risk management mechanisms which include:
    a. The organised application and maintenance of all applicable bushfire protection measures through a range of operational documents, as relevant to a site and its use; and
    b. The development and application of advice to inform management's planning of future modifications and/or development of a site and its use. This is necessary where bushfire risk mitigation measures are necessary inputs to design and construction.
2. The application of 'regulatory' risk management mechanisms that are to be complied with. These include operating and construction regulations and standards, and relevant planning authority guidelines/standards.

*****

2 INTRODUCTION

2.1 THE ASSESSED ASSET AND ITS USE

The proposed Food Organics and Garden Organics (FOGO) facility will be developed to maximise material recovery. The facility will include a combination of covered and open-air construction including concrete bunkers. Some components of the proposed development are;

- Receival Hall.
- Shedding and screening.
- Mixing and preparation.
- Composting.
- Final product storing and dispatch area.
- Workshop.
- Office.

CONDUCTING THE ASSESSMENT

In July of 2022 Bushfire Prone Planning were commissioned by Talis Consulting (on behalf of C-Wise) to undertake a Bushfire Risk Report for the proposed FOGO Facility located at Lot 9500 320 Gull Road Keralup. A site visit was conducted in September 2022 to assess the vegetation and slope to determine BAL requirements and the surrounding landscape up to 2 kilometres.

2.2 ESTABLISHING THE REPORT OBJECTIVES

The applied risk assessment process (refer to s2.3 and Appendix 1), and the methodology used to inform the management of risk (refer to s2.4), provide a flexible platform for producing the required evaluations and reporting.

It can account for all types of development and use and be constructed to deliver the required management and decision making information.

Consequently, to ensure the required information outcomes are met, the specific objectives for the subject site need to be identified to guide the report development.

These objectives are established in the checklist on the following page.

CHECKLIST ESTABLISHING THE REPORT OBJECTIVES TO BE MET FOR THE SUBJECT SITE					
AVAILABLE OBJECTIVES			THE OBJECTIVES TO BE MET	THE OBJECTIVES TO BE MET ARE ESTABLISHED BY	
				The Owner and/or Operator of Subject Site in Discussion with the Bushfire Consultant	The 'Planning' Bushfire Management Plan Being Concurrently Produced
RISK ASSESSMENT					
Hazard	Identify all bushfire hazards with potential to impact the subject site.		✓		✓
Risk Levels	Assess inherent bushfire risk levels, for each identified element at risk, by accounting for existing and/or planned implementation of bushfire protection measures, along with all other interacting factors.		✓		✓
	Assess residual bushfire risk levels, for each identified element at risk, by additionally accounting for implementation of recommended bushfire protection measures, along with all other interacting factors.		✓		✓
RISK MANAGEMENT					
Compliance	Assess current compliance and/or future compliance capability against the 'mandatory' bushfire risk management mechanisms. Note for operating standards, assessment is restricted to the requirements that have direct relevance to a bushfire event. These can include: • Separation from bushfire prone vegetation (APZ/firebreaks); • Access/egress for firefighting services/site occupants, including firebreaks; and • Firefighting water supply & delivery for structure and surrounds fire, not the bushfire.	Planning Guidelines/Standards - for development & uses on bushfire prone land	✓		✓
		Operating Standards / Regulations			
		Construction Standards - for buildings in bushfire areas			
Recommendations	Recommend additional bushfire protection measures to be implemented and their priority.				✓
	Identify the relevant planning and/or site operations documents in which the recommended bushfire protection measures should be included.				✓
Advice	Provide specific advice to inform planning for design and construction.				
	Provide general advice that identifies issues for management to consider.				

OBJECTIVE VARIATIONS TO BE APPLIED:

An onsite shelter will be provided. For further details refer to the Bushfire Management Plan (BMP)

State any specific objectives/outcomes required by the client – N/A

WETLAND BUFFER
STORMWATER POND
RECEIVAL HALL
LEACHATE POND
ACCESS ROAD
OFFICE AND STAFF PARKING
WEIGHBRIDGE
WORKSHOP
OFFICE/CRIBROOM
FUEL STORE/SERVICE BAY
CARBON STORAGE
LEACHATE POND
1m HIGH RETAINING WALL
LIQUID WASTE RECEIVAL
TANK FARM
FUTURE DEVELOPMENT
STAGE 2 CARBON STORAGE (FUTURE DEVELOPMENT)
STAGE 2 DISPATCH AREA (FUTURE DEVELOPMENT)
WETLAND BUFFER
STAGE 2 STORMWATER POND (FUTURE DEVELOPMENT)

A C-201
B C-201
C C-202
D C-202
E C-202
F C-202

LEGEND:

- LOT BOUNDARY
- OFFICIAL WETLAND BOUNDARY
- 50m WETLAND SEPARATION BUFFER
- 50m FIRE PROTECTION BUFFER
- ACCESS ROAD
- LEACHATE POND
- RECEPTION/OFFICES
- WORKSHOP
- STORMWATER POND
- SCREENING/DISPATCH
- LIQUID WASTE RECEIVAL
- FUEL STORE/SERVICE BAY
- TANK FARM
- RECEIVAL HALL
- COMPOST AREA
- CARBON STORAGE
- OPEN DRAIN
- FENCELINE

PRELIMINARY ONLY
NOT FOR CONSTRUCTION

80m 0m 80m 160m
1:4000 @ A3

VERTICAL DATUM: AUSTRALIAN HEIGHT DATUM
HORIZONTAL DATUM: MGA 94 ZONE 50

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Client: C-WISE Soil Carbon Solutions

NOTES

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No.	Date	Drwn.	Chk.	Amendment / Issue	App.
D	16.01.2023	MH	AB	SITE LAYOUT UPDATED	MH
C	15.11.2022	AB	MH	BOUNDARIES UPDATED	MH
B	02.03.2022	YJ	AB	SECTIONS AND ISOPACHYTE LAYOUT ADDED	MH
A	15.11.2021	YJ	AB	PRELIMINARY ISSUE	MH

Project: C-WISE DUE DILIGENCE AND APPROVALS

Title: SITE PLAN LAYOUT

Scale: 1:4000 @ A3 Date: 02.03.2022
Drawn: YJ Checked: AB Approved: MH
Job No: TW21124 Drg. No: C-101 Rev: D
Filename: TW21124-SET.DWG

2.3 BUSHFIRE RISK AND THE APPLIED ASSESSMENT PROCESS

THE RELEVANT RISKS

For this Bushfire Risk Report, the relevant risks are the potential for loss of life, injury, or destroyed or damaged assets which results in personal loss and economic loss due to disruption of services and/or repair or replacement of buildings and infrastructure. The source of the risks is a potential bushfire event as a natural hazard.

THE APPLIED RISK ASSESSMENT PROCESS

Bushfire Prone Planning (BPP) has adapted the concept for 'Understanding Disaster Risk' as recognised by the United Nations Office for Disaster Risk Reduction [46].

In applying this concept, bushfire risk can be considered a consequence of the interaction of bushfire hazard threats and the exposure and vulnerability of the elements at risk from those threats (i.e., the 'exposed elements' which can include various classes of persons and/or property).

The level of risk associated with bushfire will be reduced by applying bushfire protection measures that:

- Reduce the number and/or level of hazard threats; and/or
- Reduce the level of exposure and/or vulnerability of the elements at risk.

The risk assessment process framework is shown in Figure 2.2 and additional detail is presented in Appendix 1.

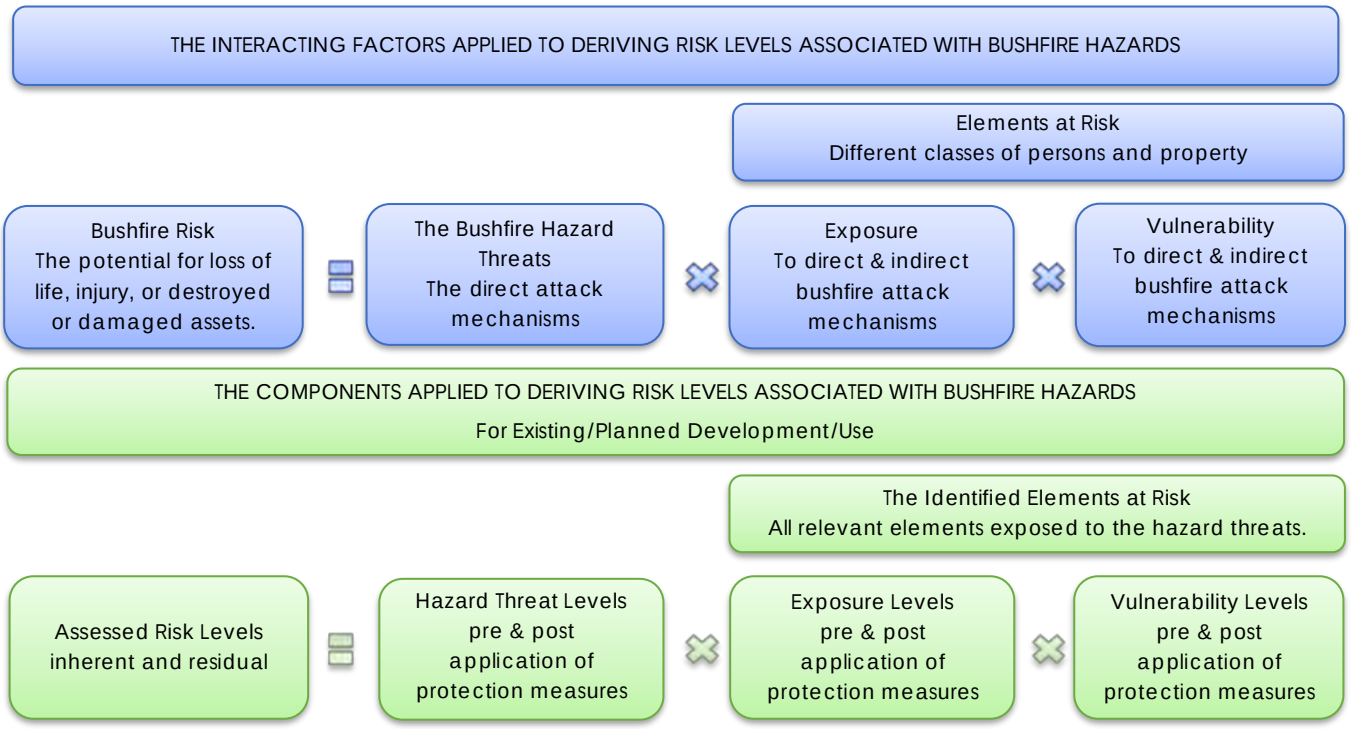
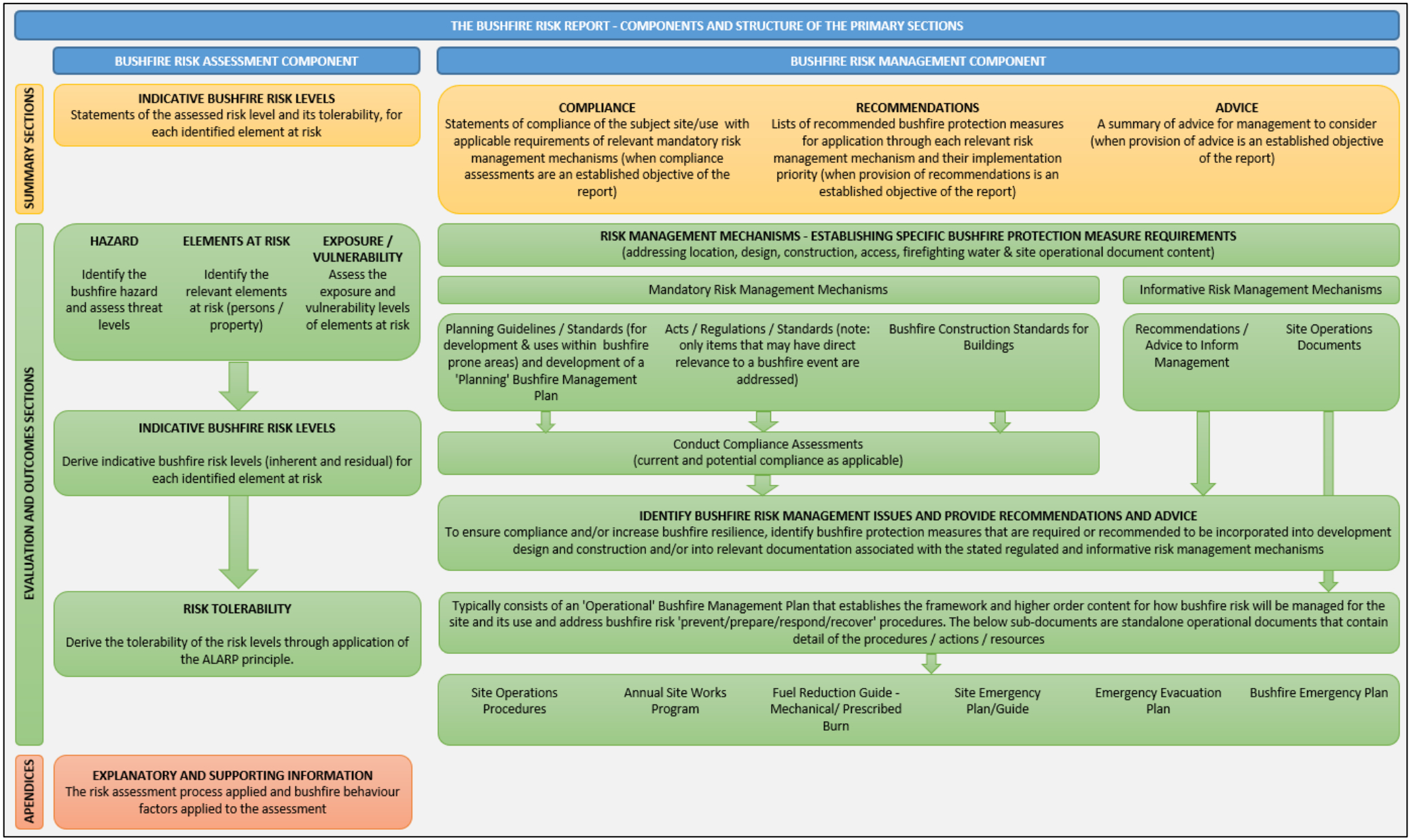


Figure 2.2: The framework of the applied bushfire risk assessment process.

2.4 REPORT STRUCTURE OVERVIEW



3 SUMMARY: BUSHFIRE INDICATIVE RISK LEVELS

The summary outcomes of the risk assessment process are presented on the next two pages. When the assessed bushfire risk levels are stated as 'indicative', they have been derived through the application of a largely qualitative assessment process that applies quantitative components where they exist.

[Appendix 1 explains the risk level analysis and tolerance methodologies applied, along with the terminology used. Details of the bushfire risk assessment for the subject site and use are presented in Section 5.]

3.1 ASSESSED BUSHFIRE INDICATIVE RISK LEVELS AND THEIR TOLERABILITY

For each identified element at risk, the worst assessed risk level is stated, along with its tolerability. This will correspond to the worst combination of bushfire hazard threats, and the element's exposure and vulnerability to those threats.

Refer to Section 3.2. for the relative contributions of each of these factors, as the primary drivers of the level of risk associated with bushfire events.

THE ASSESSED INDICATIVE BUSHFIRE RISK LEVEL AND ITS TOLERABILITY [1]					
ELEMENTS AT RISK [Section 5.2]	INDICATIVE LEVELS OF RISK ASSOCIATED WITH A BUSHFIRE EVENT [Appendix 1]		RISK LEVEL TOLERABILITY (ALARP) [Appendix 1 – A1.2.6]		
	Inherent [2]	Residual [2]	Inherent [2]	Residual [2]	Adjusted Residual Risk [3]
Persons onsite and temporarily offsite	Moderate M8	Low L4	Tolerable but NOT ALARP	Acceptable	N/A
Persons on access/egress routes in vehicles	High H9	Moderate M8	Intolerable as NOT ALARP	Acceptable as IS ALARP	N/A
Buildings/Structures - NCC classes 1-10	Moderate M8	Low L6	Tolerable but NOT ALARP	Acceptable	N/A
Built infrastructure assets	Moderate M7	Low L4	Tolerable but NOT ALARP	Acceptable	N/A
Materials stored outdoors	Moderate M7	Low L4	Tolerable but NOT ALARP	Acceptable	N/A
Supporting Comments: The factors that influencing the reduction in risk level and subsequent tolerability adjustments is the ability to reduce exposure by increasing the low threat areas (Asset Protection Zone) to achieve a maximum of 10kWm2 heat flux exposure on built assets, constructing the shelter in place building to NASH Standard, reducing consequential fires by implementing controls for managing combustible material around the site, and improving building resilience to ember attack. Other controls include staff training and documented guidance and procedures.					
Note [1] Refer to Appendix 1 for explanatory and supporting information.					

Note 2 Refer to Appendix 1 and the Glossary for explanatory information. Inherent risk accounts for the risk reducing impact of bushfire protection measures already implemented (i.e., the existing and planned measures) while residual risk additionally accounts for any protection measures recommended for implementation by the bushfire consultant.

Note 3 Refer to Section 3.3 for adjustment justification when applicable.

3.2 ASSESSED THREAT, EXPOSURE AND VULNERABILITY LEVELS (APPLIED TO DERIVING RISK LEVELS)

THE ASSESSED INDICATIVE BUSHFIRE HAZARD THREAT LEVEL AND THE EXPOSURE AND VULNERABILITY LEVELS OF THE IDENTIFIED ELEMENTS AT RISK [1]						
ELEMENT AT RISK	INHERENT LEVELS [Appendix 1 – A1.2.3]			RESIDUAL LEVELS [Appendix 1 – A1.2.3]		
	Bushfire Hazard Threat	Exposure of Element at Risk	Vulnerability of Element at Risk	Bushfire Hazard Threat	Exposure of Element at Risk	Vulnerability of Element at Risk
[Section 5.2]	[Section 5.1]	[Section 5.3]	[Section 5.4]	[Section 5.1]	[Section 5.3]	[Section 5.4]
Persons onsite and temporarily offsite	Moderate	Moderate	High	Low	Low	Low
Persons on access/egress routes in vehicles		High	High		High	High
Buildings/Structures - NCC classes 1-10		Moderate	High		Moderate	Moderate
Built infrastructure assets		Moderate	Moderate		Low	Low
Materials stored outdoors		Moderate	Moderate		Low	Low

Note [1] Refer to Appendix 1 and Appendix 2 for explanatory and supporting information.

Note [2] Inherent levels accounts for the threat/exposure/vulnerability reducing impact of applying existing and planned bushfire protection measures and residual levels additionally accounts for any protection measures recommended by the bushfire consultant.

3.3 ADJUSTMENT OF RESIDUAL RISK TOLERABILITY

Development/use scenarios can exist where a higher level of residual risk might be considered as tolerable or acceptable. Such a situation may exist when the exposed element is not persons and the economic cost due to the loss or damage of assets and/or disruption of services, is a risk that is retained by the owners as an informed decision. Consideration of the knock-on risk implications to persons who might be associated with these elements, or other nearby elements at risk, will be part of the tolerability adjustment assessment.

There may also be isolated scenarios where the limits for tolerability of risk need to be established at lower residual risk levels i.e. an additional margin of safety is required. The rationale for any residual risk tolerance adjustment is presented below.

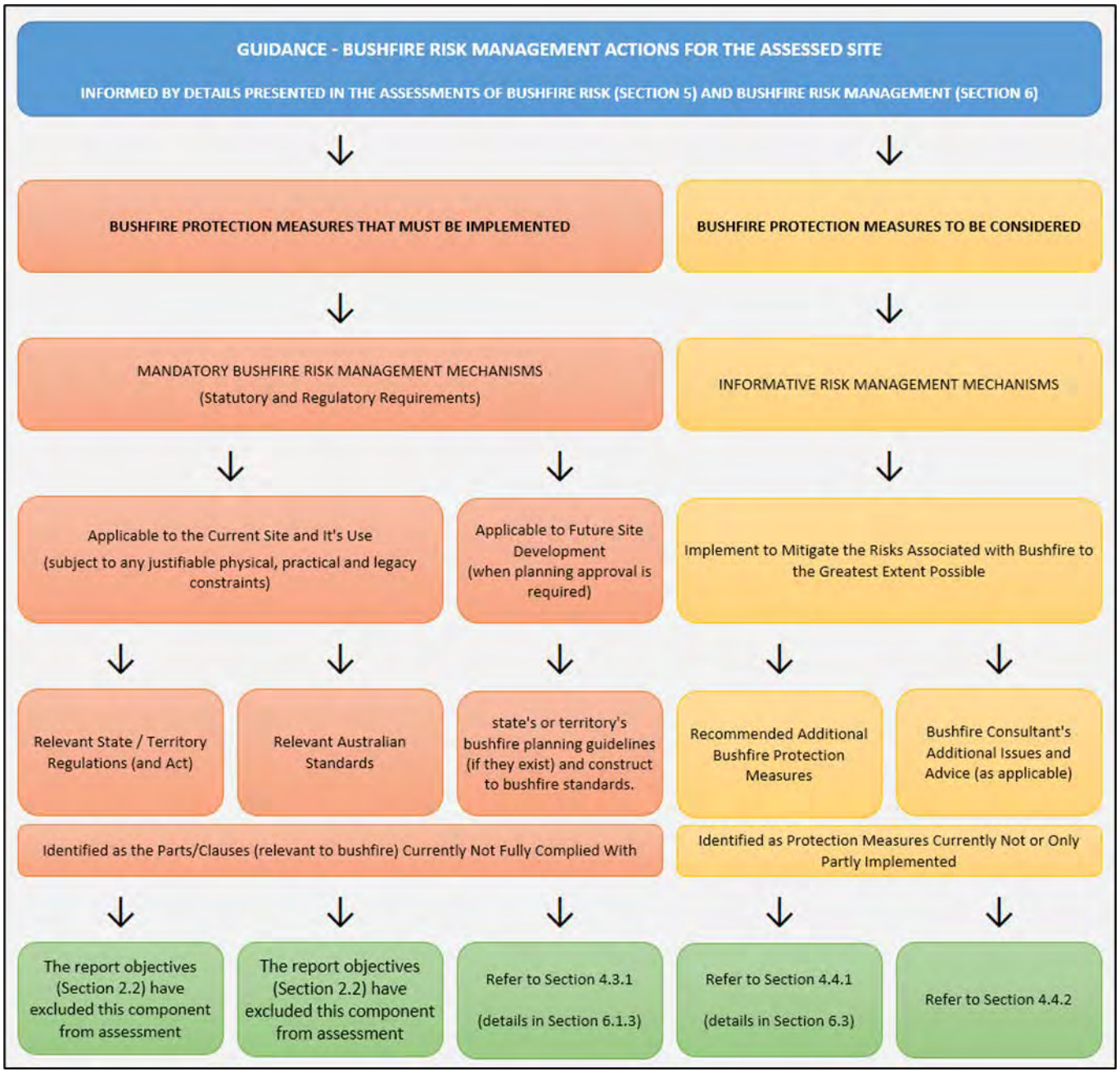
ELEMENTS AT RISK SUBJECT TO ADJUSTMENT OF RISK TOLERANCE	
Element At Risk [Section 5.2]	Adjustment Rationale
N/A	N/A

4 SUMMARY: BUSHFIRE RISK MANAGEMENT

4.1 MANAGEMENT ACTIONS TO BE ADDRESSED

The following diagram identifies:

1. The components associated with the mandatory and informative risk management mechanisms; and
2. The location within this summary that presents their corresponding bushfire protection measures as:
    a) Those currently not fully implemented that must be implemented; and
    b) Those that are recommended to be implemented.



4.2 INFORMATIVE MECHANISMS – ACTION IS RECOMMENDED

4.2.1.1 THREAT REDUCING MEASURES - BUSHFIRE HAZARD

BUSHFIRE HAZARD THREAT REDUCTION RECOMMENDED ADDITIONAL BUSHFIRE PROTECTION MEASURES				
The Protection Mechanism	Ref No	Brief Description [1]	Recommendation Details	Implementation Priority Rating [2]
Prevent Bushfire ignition and/or severity by managing the fuels	1.4	Remove onsite bushfire fuel	Before clearing, approval must be obtained from the local government before removing or managing native vegetation.	Highest
	1.6	Reduce onsite bushfire fuel - mechanical	Local government approval required before clearing or managing native vegetation.	Highest
	1.8	Enforce compliance with local government property management directives	Include ongoing management requirements in facility guidance and operational documents.	High
Prevent bushfire ignition by managing heat energy sources	1.9	Robust and effective site operational procedures	Develop guidance documents and operating procedures.	High
	1.11	Design and construct equipment to prevent airborne ignition	Monitor purchase and construction of plant equipment for adequate protection measure against potential ignition sources.	Medium
	1.12	Actively enforce activity restrictions	Develop Standard Operating Procedures to restrict operation during TFB days. Consider documenting the process for exemptions for certain critical operations.	High
	1.14	Bushfire awareness and 'good practices' education	Basic fire awareness to be included in company induction. Relevant staff training required, site specific Bushfire Awareness and emergency response.	Medium
Prevent bushfire ignition by managing the interactions of heat energy	1.15	Barriers (shielding) between ignition sources and fuels	Include in the facility design stage items and equipment that may be exposed to excessive radiant heat or has the potential to allow the spread of fire.	High
	1.16	Equipment design and construction to reduce heat transfer	Consider in the facility design stage, to reduce the potential of ignition and heat transfer.	Medium

BUSHFIRE HAZARD THREAT REDUCTION RECOMMENDED ADDITIONAL BUSHFIRE PROTECTION MEASURES				
The Protection Mechanism	Ref No	Brief Description [1]	Recommendation Details	Implementation Priority Rating [2]
sources and fuels	1.17	Separation distance between ignition sources and fuels	Include the critical assets within the 10kWm2 area.	Highest

[1] The full description of each bushfire protection measure and the detail of the assessment is presented in Section 5.1.5

[2] Refer to Appendix A1.2.5 for implementation priority rating explanation.

4.2.1.2 EXPOSURE REDUCING MEASURES - PERSONS

PERSONS EXPOSURE REDUCTION RECOMMENDED ADDITIONAL BUSHFIRE PROTECTION MEASURES				
The Protection Mechanism	Ref No	Brief Description [1]	Recommendation Details	Implementation Priority Rating [2]
	Persons Located Onsite and Temporarily Offsite			
Establish sufficient separation from relevant bushfire hazard threats	2.1	Stay away from the subject site	Recommend closing facility to non-essential staff and contractors during heightened fire conditions, being FDI above 75 and catastrophic fire danger days.	Medium
	2.2	Remote tourism sites - stay within the subject site	Apply protection measures. Include safer pathways in the facility design.	Medium
	2.4	Relocate (evacuate) to designated safer offsite location(s)	Include Bushfire Emergency Plan into operational documents including the site emergency plan. The cribroom is the nominated shelter in place building.	High
	2.6	Safer pathways for onsite movement	Apply protection measures. Include safer pathways in the facility design.	Highest
	2.7	Pre-emptively relocate to designated safer offsite location(s)	Develop guidelines and procedures to respond to pre-determined FDI and FDR days and other established conditions, eg restricted site access for non-essential people.	High
	Persons on Access / Egress Routes in Vehicles			
	3.2	Egress routes located to ensure driving away from hazard	Driveway verge to be managed. 3m from the limestone road base driveway will be slashed prior fire season.	Medium
	3.3	Greater road width	The driveway will meet public road requirements and additional verge slashing is required. 3m wide verge slashing is required.	Medium
	3.4	Reduce and maintain road verge fuel to low threat state	3m wide verge slashing is required.	Medium
	Persons Located Onsite and Temporarily Offsite			

PERSONS EXPOSURE REDUCTION RECOMMENDED ADDITIONAL BUSHFIRE PROTECTION MEASURES				
The Protection Mechanism	Ref No	Brief Description [1]	Recommendation Details	Implementation Priority Rating [2]
Establish shielding from relevant bushfire hazard threats	2.9	On-site shelter building – not to community refuge standard	Will be constructed to NASH Standard	High
	2.10	On-site shelter building – not a 'vulnerable' use	The flame temperature will be calculated at 1200k rather than 1090k and the office/crib room will be constructed to NASH standard	Highest
	Persons on Access / Egress Routes in Vehicles			
[1] The full description of each bushfire protection measure and the detail of the assessment is presented in Section 5.3.1.1 and Section 5.3.2.1 [2] Refer to Appendix A1.2.5 for implementation priority rating explanation.				

4.2.1.3 EXPOSURE REDUCING MEASURES – ALL STRUCTURES AND MATERIALS STORED OUTDOORS

ALL STRUCTURES & MATERIALS STORED OUTDOORS EXPOSURE REDUCTION RECOMMENDED ADDITIONAL BUSHFIRE PROTECTION MEASURES				
The Protection Mechanism	Ref No	Brief Description [1]	Recommendation Details	Implementation Priority Rating [2]
Establish sufficient separation from relevant bushfire hazard threats	4.2 5.2 6.2 6.1	Designed location of non-vegetated areas and/or managed open space	Use roads, hardstand areas and footpaths as open managed spaces. Construct and maintain the APZ to ensure maximum heat flux exposure does not exceed 10kWm2.	Medium
	4.3 5.3 6.2	Landscaping - asset protection zone (APZ)	• 10kWm2 @ 1200k APZ will be constructed and maintained around the nominated shelter in place building. • A Landscape Management Plan will be provided. • To minimise exposure from external radiant heat, a <10kWm2 @ 1090k APZ is required to be established. The dimensions for this APZ are provided within the associated BMP. The increased APZ to 10kWm2 will reduce the overall preheating on combustible materials. • Develop an emergency Management Plan • Install an appropriate fire hydrant system (and water runoff/catchment) • Install appropriate fire sprinkler suppression systems (and water runoff/catchment) External storage management of organic material • Maximum height of any stockpile loosed piled or baled <4.8m. • Maximum width of a stockpile is to be 20m • Maximum length of a stockpile to be <50m • Arrangement of stockpiles is to minimise the likelihood of fire spread and provide access for fire appliances. DFES Information Note September 2014 – Spontaneous combustion of green waste windrows and stockpiles due to elevated internal temperatures.	Highest

ALL STRUCTURES & MATERIALS STORED OUTDOORS EXPOSURE REDUCTION RECOMMENDED ADDITIONAL BUSHFIRE PROTECTION MEASURES				
The Protection Mechanism	Ref No	Brief Description [1]	Recommendation Details	Implementation Priority Rating [2]
			• Moisture content of the composting windrows will be maintained above 45% as part of the composting process, and by virtue will reduce the risk of spontaneous combustion. This will be maintained by watering once a day or as required. • Moisture content of the green waste received on site will not exceed 20% to prevent the generation of heat occurring through biological activity occurring and in turn resulting in spontaneous combustion.	
	4.4 5.4	Landscaping - tree location	Avoid planting trees that allow fire to ascend the trunk and produce embers and firebrands. A Landscape Management Plan will be provided.	High
	4.6 5.6 6.3	Separation from stored flammable products – fuels / other hazardous materials (consequential fire fuels)	Include in facility guidelines to direct the storage of fuel, flammable liquids and workshop gas bottles, used and new oils storage and other flammable items. Where external heat sources have not been considered by the manufacture or Standard, then the separation distance, than item # 7.7 is to be used. If cabling and other flammable items are exposed to direct radiant heat, than <10kWm2 will be the maximum exposure. Include in the facilities emergency plan and operational documents where to store the items, state the separation distances and provide direction on maintaining buildup of fine and heavy fuels. Provide staff training.	High
	4.7 5.7 6.4	Separation from stored and constructed combustible items (consequential fire fuels)	Details: Include in the guidance document separation distances required for flammable and combustible materials. Detail in the facilities guidance document and information in the Emergency Management Plan guidance on storage of heavy fuels and separation distances. It is recommended that this 10m buffer form all hard fix assets is sealed or compacted with concrete, compacted limestone, gravel, blue metal etc.	Highest

ALL STRUCTURES & MATERIALS STORED OUTDOORS EXPOSURE REDUCTION RECOMMENDED ADDITIONAL BUSHFIRE PROTECTION MEASURES				
The Protection Mechanism	Ref No	Brief Description [1]	Recommendation Details	Implementation Priority Rating [2]
Establish shielding from relevant bushfire hazard threats	4.8 5.8 6.5	Constructed barrier – shielding from bushfire	Fencing, external walls and retaining walls to be constructed using non-combustible materials.	Medium
	4.9 5.9 6.9 8.6	Constructed barrier – shielding from consequential fire	Ensure all subfloor spaces are sealed. Shield fuel lines and electrical components extending form the infrastructure. When Separating Masonry walls are used, the walls are to be marked showing the maximum height and width to identify the stockpile limits.	Medium
	4.11 5.11 6.8	Planted vegetation barrier	Include in the facility guidance documents and operational documents management of planted vegetation. Vegetation planting to be in accordance with the Landscape Plan. Plantings to be managed to low threat if located in the APZ and Guidelines for Planning lin Bushfire Prone Areas - Schedule 1.	Medium
	4.12 5.12	Shield operation critical non-structural elements	Position all critical non-structural items in less than 10kWms area and shield electrical cabling, poly tanks and pipes, valves and any other item susceptible to low radiant heat. Include a maintenance regime for debris accumulation management within the guidance document.	Highest

[1] The full description of each bushfire protection measure, the detail of the assessment and any recommendation, is presented in Section 5.3.3.1. and Section 5.3.4.1 & 5.3.5.1

[2] Refer to Appendix A1.2.5 for implementation priority rating explanation.

4.2.1.4 VULNERABILITY REDUCING MEASURES - PERSONS

PERSONS VULNERABILITY REDUCTION RECOMMENDED ADDITIONAL BUSHFIRE PROTECTION MEASURES				
The Protection Mechanism	Ref No	Brief Description [1]	Recommendation Details	Implementation Priority Rating [2]
Transport and multiple evacuation destinations and routes available	Persons Located Onsite and Temporarily Offsite			
	6.1	Sufficient evacuation transport available	People on site will have their own transport.	Lowest
	6.2	Multiple safer offsite locations available	A BEP has been developed for the facility	High
Provision of bushfire emergency information and education	6.3	Develop a bushfire emergency plan	A BEP has been developed and provided.	High
	6.4	Relevant operational documents to contain the bushfire protection measures to be implemented	Update the Fire Response Plan and develop Guidance documents before facility becomes operational	High
	6.5	Prominent display of bushfire emergency information	Bushfire information to be displayed at the weigh bridge office and the administration office.	Medium
	6.6	Direct to persons emergency messaging system	Emergency messaging system to be developed.	High
	6.7	Egress pathway signage	Identified safer onsite location.	Medium
	6.8	Personnel are trained to implement the bushfire emergency plan	Staff to be trained in emergency response and bushfire awareness.	Highest
Onsite persons capable of managing a bushfire emergency are available	6.12	Onsite persons available to manage bushfire emergency procedures	Ensure enough appropriately trained staff are onsite at all times during the bushfire season to assist with emergency procedures. Emergency procedures to be reviewed annually.	Highest
	6.13	Onsite persons can operate firefighting equipment	Provide a mobile response unit. Recommend 2 x slip-on units and basic bushfire awareness and response.	Highest
	6.14	External emergency response services available	Safe early evacuation is the preferred response. Local brigade turnout is 20 minutes.	Highest

PERSONS VULNERABILITY REDUCTION RECOMMENDED ADDITIONAL BUSHFIRE PROTECTION MEASURES				
The Protection Mechanism	Ref No	Brief Description [1]	Recommendation Details	Implementation Priority Rating [2]
Lower risk road construction (design and materials)	Persons on Access / Egress Routes in Vehicles			
	7.1	Greater road width	The driveway will be constructed to public road standards as per Table 6 of the Guidelines for planning in Bushfire Prone Areas.	Medium
	7.4	Stable road surfaces	Road surfaces will meet the technical requirement of the Guidelines. Recommend the driveway is limestone road base.	Medium
Evacuees are self-sufficient and have local awareness and own transport	7.8	Self-sufficient persons with local awareness	Site induction and contractor information to include information about the sites evacuation process. Include in the Facility guidelines and induction.	High
	7.9	Onsite persons have own transport	Include in facility training and induction program.	Medium

[1] The full description of each bushfire protection measure, the detail of the assessment and any recommendation, is presented in Section 5.4.1.1 and Section 5.3.5.1

[2] Refer to Appendix A1.2.5 for implementation priority rating explanation.

4.2.1.5 VULNERABILITY REDUCING MEASURES – STRUCTURES

STRUCTURES VULNERABILITY REDUCTION RECOMMENDED ADDITIONAL BUSHFIRE PROTECTION MEASURES				
The Protection Mechanism	Ref No	Brief Description [1]	Recommendation Details	Implementation Priority Rating [2]
Construction design and materials	9.1 10.1	Construct to AS 3959:2018	Built infrastructure assets - Fit ember screens, gaps to be 2mm or less. The built infrastructure assets where applicable will implement the protection measures. Comment - Nominated shelter in place building to comply with NASH standard.	Medium
	9.2 10.2	Construct to NASH Standard	Nominated shelter in place building to comply with NASH standard. The facilities built infrastructure assets where applicable will implement the protection measures.	Highest
	9.3 12.3 14.3	Construction materials for external and internal cavity building elements	Where possible use non-combustible material.	Medium
	9.4 10.4	Construction materials for consequential fire fuels	Use of non-combustible materials is preferred/recommended.	Medium
	9.5 10.5	Construction design/materials resistant to high wind damage	Construct shelter in place building to NASH standard. NASH Standard has been designed for impact of wind.	High
	9.7 10.7	Construction of electricity supply	Cabling to be underground wherever possible. Cabling above ground to be shielded and cradled a minimum 100mm above the ground.	High
	9.8 10.8	Minimise re-entrant detail to minimise debris and ember accumulation	The shelter in place building (office) to consider design features to minimise debris and ember accumulation.	Lowest
	9.9 10.9	Minimise debris and ember trapping surfaces	The facility is constructed for a specific industry use therefore the trapping surfaces may be flat.	Lowest
	9.10 10.10	Protect roof plumbing to minimise debris and ember accumulation	Design of facility, workshop pluming and associated structures and equipment to consider reducing the risk off ignition.	Medium

STRUCTURES VULNERABILITY REDUCTION RECOMMENDED ADDITIONAL BUSHFIRE PROTECTION MEASURES				
The Protection Mechanism	Ref No	Brief Description [1]	Recommendation Details	Implementation Priority Rating [2]
			The office (shelter in place building) will be constructed using the NASH protection measures.	
	9.11 10.11	Minimise construction cavities to minimise debris and ember accumulation	The office will be constructed the BAL-29 requirements. Built infrastructure Assets - Seal subfloor space and apply ember screening to opening.	Highest
	9.12 10.12	Minimise external openings to limit flame / radiant heat / ember / debris entry	For the facility, workshop and associated structures, protection measure to be applied where practicable. Office to comply with the NASH Standard protection measures.	High
	9.13 10.13	Screen and seal gaps and penetrations	For the facility, workshop and associated structures and built assets, protection measure to be applied where practicable. Office to comply with the NASH Standard protection measures.	High
	9.14 12.14 14.14	Screen external doors and windows	For the facility, workshop and associated structures, protection measure to be applied where practicable.	High
	10.16	Construction materials for critical non-structural elements	The critical non-structural elements to be located in <10kWm2 area or shielded.	Highest
Availability of a firefighting response capability	9.16 10.17	Firefighting water supply	Firefighting water tanks are to be non-combustible. Minimum 50,000lt are required and to be fitted with coupling as per BMP requirements. If hydrants are installed, the 50,000lt tank will not be required.	Highest
	9.17 10.18	Firefighting equipment actively operated	• Sprinkler system required for all stockpiles of flammable materials. • Training required for system operations. • Operational plans required for sprinkler operations. • As a minimum, 2 x slip-on firefighting units (not trailer type) are required. • Staff training required in unit operations. • Training operation manual to be developed in response and equipment operations.	Highest

STRUCTURES VULNERABILITY REDUCTION RECOMMENDED ADDITIONAL BUSHFIRE PROTECTION MEASURES				
The Protection Mechanism	Ref No	Brief Description [1]	Recommendation Details	Implementation Priority Rating [2]
			PPE to be provided to trained staff.	
	9.18 10.19	Firefighting equipment passively operated	• Sprinkler system required for all stockpiles of flammable materials. • Training required for system operations. • Operational plans required for sprinkler operations.	Highest
	9.19 10.20	Firefighting equipment operability maintained	Develop operational manual and maintenance schedule.	Highest
	12.20 10.21	Access via firebreaks provided	The site will comply with the Firebreak Notice.	Medium
Manage and maintain effectiveness of applied protection measures	9.21 10.22	Formal documents created to guide and enforce management	Guidance documents to be developed for site operations and emergency management (maintenance of equipment & training) The different documents will be able to satisfactorily perform this function to differing extents.	High

[1] The full description of each bushfire protection measure, the detail of the assessment and any recommendation, is presented in Sections 5.4.3.1 & 5.4.3.4

[2] Refer to Appendix A1.2.5 for implementation priority rating explanation.

4.2.1.6 VULNERABILITY REDUCING MEASURES – NON-BUILDING ACCOMMODATION AND MATERIALS STORED OUTDOORS

NON-BUILDING ACCOMMODATION AND MATERIALS STORED OUTDOORS VULNERABILITY REDUCTION RECOMMENDED ADDITIONAL BUSHFIRE PROTECTION MEASURES				
The Protection Mechanism	Ref No	Brief Description [1]	Recommendation Details	Implementation Priority Rating [2]
	11.1	Construction materials for consequential fire fuels	Fences, screen and retaining walls to be non-combustible.	High
Availability of a firefighting response capability	11.2	Firefighting water supply	A 50,000lt water supply for bushfire response is required. Comment: The tank may not be required if hydrants are installed. Comment: A booster, tanks and hydrants may be installed at a later stage	Highest
	11.3	Firefighting equipment actively operated	Appropriate training, response equipment and operational documents to be available.	High
	11.4	Firefighting equipment passively operated	Internal systems may be fitted, to be determined by DFES Built Environmental branch, the system may be automatically operated.	Highest
	11.5	Firefighting equipment operability maintained	Guidance manual will include maintenance schedules of all equipment and machinery.	Highest
	11.6	Access via firebreaks provided	Firebreaks to be compliant with the Shire's Firebreak Notice.	Medium
Manage and maintain effectiveness of applied protection measures	11.7	Formal documents created to guide and enforce management	Create documents to guide and enforce management and operations.	Highest

[1] The full description of each bushfire protection measure, the detail of the assessment and any recommendation, is presented in Section 5.4.5.1 and Section 5.4.5.2

[2] Refer to Appendix A1.2.5 for implementation priority rating explanation.

4.2.2 ADDITIONAL ISSUES AND ADVICE FOR CONSIDERATION

This section presents items the bushfire consultant has identified as being:

- Issues that are additional to or not specifically addressed within the assessment of bushfire risk management conducted in Section 6; and
- Advice for dealing with these issues or other issues that require emphasising, for consideration by management.

No relevant additional issues have been identified for the subject facility/premises.

5 BUSHFIRE RISK ASSESSMENT

5.1 THE IDENTIFIED BUSHFIRE HAZARDS WITHIN THE SURROUNDING LANDSCAPE

INFORMATION TO ASSIST INTERPRETATION

AREA OF LAND TO BE ASSESSED AS THE SURROUNDING LANDSCAPE

The assessment for this report considers the surrounding landscape to be comprised of two parts:

1. The subject site and all land surrounding the subject land extending out to 150 metres as the 'Subject Land + 150m Extent'; and
2. The land surrounding the 'Subject Land + 150m Extent' extending out to the maximum distance that will be established by one or more of the following factors:
    - The distance away from the subject land that will result in an area of land that, when supporting bushfire prone vegetation, is of sufficient size such that a large scale bushfire can develop (landscape scale fire);
    - The distance away from the subject land from which the bushfire direct attack mechanism of embers/ burning debris may reasonably be expected impact the subject land. This is highly dependent on the 'category' of vegetation present with regard to its potential ember/burning debris threat (refer to Appendix 2 for explanatory information); and/or
    - The distance away from the subject land that contains the road network that persons in vehicles (including emergency services) would traverse in evacuating or accessing the subject land in the event of a bushfire.

To achieve the required assessment outcomes a maximum distance of 5 km from the subject land is likely to be considered sufficient, with this distance being reduced when the vegetation categories presenting the higher ember/burning debris threat level do not exist.

ASSESSMENT PURPOSE

To identify whether the land surrounding the existing or proposed development and its use contains the physical factors necessary for any of the following scenarios to exist:

1. The potential exists for the bushfire hazard threat of embers/burning debris to impact elements at risk on the subject land. It is particularly important this threat is identified when any vegetation planned to be retained and/or established on the subject land and within 100 metres (the 'Subject Land + 150m Extent') may not present this threat - or at least not to the same level. Refer to Appendices A1.3 and A1.6 for additional information.

    Note: Scientific research indicates that at least 80% of building losses from past Australian bushfires can be attributed to ember/firebrand attack (mostly in isolation but also in combination with radiant heat), and the resultant consequential fires. It is a very important threat to be identified; and/or

2. The potential exists for development of a large scale bushfire event(s) that can impact the subject land because the necessary extent of bushfire prone vegetation exists. Such events may increase the severity of bushfire behaviour within the 'Subject Land + 150m Extent' vegetation, consequently increasing the levels of all bushfire hazard threats impacting elements at risk; and/or
3. The potential exists for development of dynamic fire behaviours and deep flaming that are associated with extreme bushfire events (including pyroconvective events). Dynamic fire propagation arises from complex interactions between the terrain, the atmosphere and the fire (refer to Appendix 3 for additional information).

    Extreme bushfire events have the potential to impact subject land through generating fire driven strong winds, increasing erratic fire behaviour and increasing the levels of all bushfire hazard threats impacting elements at risk.; and/or
4. The potential exists for increased levels of bushfire hazard threats, to persons in vehicles who need to move through this area of land (i.e., persons evacuating from the subject land and emergency services), thereby increasing level of risks associated with bushfire.

5.1.1 DETERMINATION OF ASSESSMENT EXTENT

THE APPLIED SURROUNDING LANDSCAPE ASSESSMENT EXTENT	
Basis for Determination	
The vegetation categories identified surrounding the subject land include significant extents and continuity of those that contain trees with bark hazards. These present the potential for developing significant ember/burning debris threat levels. These threats are either medium (up to 5km) and/or long distance (greater than 5km) spotting. [1]	
The vegetation categories identified surrounding the subject land only include those that have the potential for shorter distance spotting (ember/burning debris attack) of up to 500-750m. [1]	
The distance away from the subject land that contains the road network that persons in vehicles would traverse in evacuating or accessing the subject land in the event of a bushfire, has determined the assessment extent.	
Assessment Comments: Majority of the area up to 2kms was inaccessible, therefore arial imagery and sample vegetation assessments were used to assess the potential of the threat from the surrounding landscape. The Tree-1 area has more than 10% of trees with fine fibrous bark. See Appendix 5). This complex presents a potential short and medium range threat of ember or burning debris attack. The vegetation complex exists over a small area to the south of the proposed facility. The Tree/Shrub area is the predominant vegetation complex, it consist of regrowth scrub (Kunzea) interspersed with marri and in the wetter areas melaleuca (paperbark). This complex will potentially produce low density embers up to 700 metres. The Tree/Shrub and grassland vegetation categories exists over sufficiently large areas, however due to the potential for low density, and short distance embers, the assessment area was restricted to approximately 2 km.	
The extent of land surrounding the subject land that is to be considered as being the surrounding landscape for assessment purposes:	Approximately 2 km
Note 1: Refer to Appendix 2 and Appendix 3 for additional information.	

5.1.2 CATEGORIES OF VEGETATION IDENTIFIED AND ASSOCIATED INDICATIVE THREAT LEVEL RANGES

Vegetation categories are established to enable a comprehensive assessment of the type and severity of the bushfire attack mechanisms (i.e., the bushfire threats), potentially generated by bushfire prone vegetation on surrounding land. This enables variations in vegetation composition and structure to be more appropriately accounted for in the determination of the levels of risk associated with a local bushfire event.

The variations in indicative threat level ranges assigned to each vegetation category in the table below are the result of these differences.

The 'Categories' are necessarily different to the vegetation 'Classifications' applied in the BAL determination methodology of AS 3959:2018. The building Standard primarily considers the flame contact and radiant heat attack mechanisms and does not fully address ember/firebrand attack or other threats.

INDICATIVE THREAT LEVELS OF THE IDENTIFIED BUSHFIRE HAZARD IN THE SURROUNDING LANDSCAPE		
Vegetation Category [1 & 2]	Assessment Comments	Indicative Threat Level Range [2]
Tree-1	This area supports a complex of, marri, paperbark, banksia and various other eucalypt trees with associated shrub understorey (not always present). The species composition varies across locations. Jarrah is evident but not dominant.	Moderate to Very High
Tree-2	N/A	N/A
Tree/Shrub	These areas support a mixture of taller shrub type vegetation but also contain trees as a taller but less frequent vegetation type within the complex.	Moderate to High
Shrub	N/A	N/A
Grass	These areas support a range of broadleaf and grass pasture species. Some are managed more intensively and are stocked more regularly, and therefore eaten down. Others have various levels of management but will generally have some form of material reduction during the year or have inherently low fuel loads due to regular disturbance and/or lower quality soils. Rushes are supported in the lower wetter areas	Low to Moderate
No/Low Threat		N/A

Note 1: Refer to Figure 5.1: Surrounding landscape – the identified vegetation categories.

Note 2: Refer to Appendix 5 for a description of the criteria that establish the vegetation categories, the base bushfire hazard scenario and the indicative threat levels and the application of these levels.

Figure 5-1

Broader Landscape Categorised Vegetation

Lot 9500 on Plan 414516, Area : 1,608.9031 ha
320 Gull Road,
KERALUP 6182
SHIRE OF MURRAY

Lot 9500

GULL RD

YANGEDI RD

DRAFT

------ LEGEND ------

- Development Site
- Subject Site
- Other Lots
- Development
- Driveway

Vegetation Assessment Area

- 2 km from Subject Site

Broader Landscape Vegetation Categories

- Tree-1
- Tree-2
- Tree/Shrub
- Grass

0 200 400 600 800 1,000
Metres

------ LOCALITY ------

Aerial Imagery : Landgate/SLIP
Image Date : Feb 2022

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator Units: Metre
Map compiled by: Ian Ross 4/12/2023
Map updated by: Ian Ross 4/12/2023
A3 Scale 1:20,000

BUSHFIRE PRONE PLANNING

Map Document Path / Name: K:\Projects\Jobs 2022\220666 - 320 Gull Road Keralup (BMP)\Mapping\MXD\RISK Maps\220666_Fig5-1_VCAT_320 Gull Road Keralup.mxd

5.1.3 VISUAL REPRESENTATION OF FLAME CONTACT AND RADIANT HEAT THREATS – THE BAL CONTOUR MAP

INFORMATION TO ASSIST INTERPRETATION – THE BAL CONTOUR MAP AND BAL RATINGS

1. The Modelling Methodology (Calculations) Applied: AS 3959:2018 establishes the Bushfire Attack Level (BAL) determination methodology that will be applied to the relevant vegetation. When applicable, other bushfire behaviour models may be applied, and their application would be identified and justified in this report.
2. The Relevant Vegetation: This will be bushfire prone vegetation existing on the 'Subject Land + 150m Extent' that is classified according to the AS 3959:2018 BAL determination methodology. The classified vegetation maps and supporting vegetation photos and calculation data is presented in Appendix 6;
3. BAL Contour Map: The levels of potential flame contact and radiant heat transfer are assessed as indicative bushfire attack levels and presented as a 'BAL Contour Map'. The levels to which any element at risk (e.g., a building), whose location on the map is identified, can be derived from this map.

   Figure 5.2 illustrates the site specific separation distances from classified vegetation that will correspond to each Bushfire Attack Level (BAL) as coloured contours;
4. The BAL Contours: The contours, each of varying widths, extend out from each area of classified vegetation. Each different contour represents a set range of potential radiant heat transfer (in kW/m^2) to an element at risk located within the contour and is stated as a BAL rating;
5. The Vegetation Separation Distances: The horizontal distances from the edge of the classified vegetation to the start and the end of each different BAL contour, represent the separation distances (between the classified vegetation and the element at risk), that will correspond to that BAL rating for that site. The calculated distances have accounted for site specific vegetation types, ground slopes and other relevant input variables. These separation distances can also be presented in a table.

   In addition to BAL rating separation distances, a distance that corresponds to singular levels of radiant heat transfer such as 2 kW/m^2 and 10 kW/m^2, may also be presented for specific purposes including proposed vulnerable land uses; and
6. The Applicable BAL Rating: Any element at risk (as the receiver of the radiant heat), that exists wholly or partly within a given contour, will be subject to that BAL rating. The rating establishes the applicable bushfire construction standard requirements. These ratings can also be applied to the derivation of flame contact and radiant heat transfer levels when required as a component of bushfire risk assessment.

Figure 3.1.2

Classified Vegetation & Topography (Post Development) Showing 10kw APZ

Lot 9500 on Plan 414516, Area : 1,608.9031 ha
320 Gull Road,
KERALUP 6182
SHIRE OF MURRAY

------ LEGEND ------

- Development Site
- Subject Site
- Other Lots
- 50m Wetland Buffer
- Development

Radiant Heat Flux
- <10kw Zone (Within Subject Site)

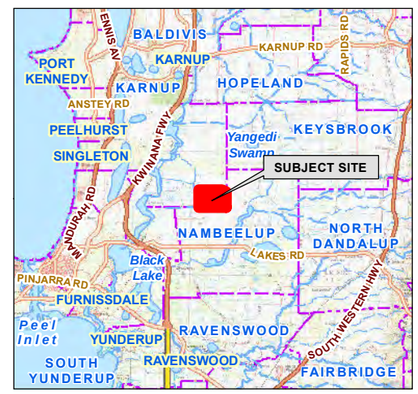
Description
- Office
- Office / Cribroom
- Workshop
- Receival Hall
- Weighbridge
- Liquid Waste Receival
- Fuel Store Service Bay
- Driveway

150m Vegetation Assessment Area
- 150m from Subject Site

Classified Vegetation
- Class (A) Forest
- Class (D) Scrub
- Class (G) Grassland
- Exclusion 2.2.3.2
- APZ Distance

0 100 200 300 400 500
Metres

------ LOCALITY ------



Aerial Imagery : Landgate/SLIP
Image Date : Feb 2022

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator Units: Metre
Map compiled by: Ian Ross 5/12/2023
Map updated by: Ian 5/12/2023
A3 Scale 1:7,500

BUSHFIRE PRONE PLANNING

Map Document Path / Name: K:\Projects\Jobs 2022\220666 - 320 Gull Road Keralup (BMP)\Mapping\MXD\220666_BRMP_Fig3-1-2_VEG_POST_320 Gull Road.mxd

Figure A5.4

Broader Landscape Road Network Map

Lot 9500 on Plan 414516, Area : 1,608.9031 ha
320 Gull Road,
KERALUP 6182
SHIRE OF MURRAY

------ LEGEND ------

- Development Site
- Development
- Driveway

Major Roads

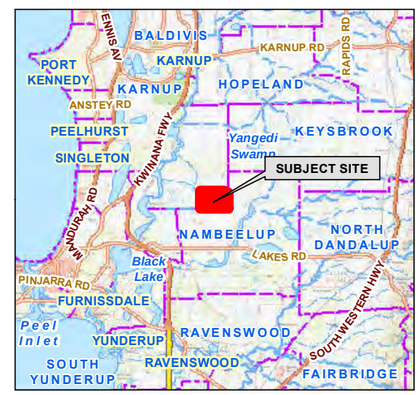
- State Highway / Freeway
- Main Road - Sealed

Minor Roads

- Minor Road - Sealed
- Minor Road - Unsealed

0 1 2 3
Kilometres

------ LOCALITY ------



Aerial Imagery : Landgate/SLIP
Image Date : Feb 2022

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator Units: Metre
Map compiled by: Ian Ross 4/12/2023
Map updated by: Ian Ross 4/12/2023
A3 Scale 1:50,000

BUSHFIRE PRONE PLANNING

Map Document Path / Name: K:\Projects\Jobs 2021\210723 - Binningup Beach Estate Lakes Parade (Consulting)\ COMPLETED\210723 - Broader Landscape Assessment & Tech Advice - June 2023 PO MF-326641\ Mapping\ MXD\ 220666_RM_FigA5-4_ACCESS_320 Gull Road Keralup.mxd

5.1.4 MODIFYING INDICATIVE THREAT LEVELS - ASSESS EXISTENCE OF RELEVANT PHYSICAL FACTORS

5.1.4.1 VEGETATION EXTENT AND CONTINUITY FACTORS

EXTENT AND CONTINUITY OF IDENTIFIED VEGETATION CATEGORIES – POTENTIAL TO MODIFY INDICATIVE THREAT LEVELS						
Relevant Physical Factors [1, 4 & 6]	Vegetation Location Within the Surrounding landscape [2]	Vegetation Classification AS 3959:2018 [3]	Vegetation Category [4]	Existence of Physical Factor	Assessment Comments (As Needed)	Resultant Modification of Indicative Threat Level [4 & 5]
The extent of vegetation is sufficient to support a fully developed bushfire but insufficient to result in an extreme bushfire event. [4] Note: Vegetation within the 'Subject Land + 150m Extent' is only assessed independently of the surrounding vegetation when it is sufficiently isolated. If the relevant area of vegetation is not isolated or can support an extreme bushfire event (see next physical factor) the assessment response will be N/A.	The 'Subject Land + 150m Extent'.	A. FOREST	Tree-1	N/A	The forest area to the south west is greater than 150m from the proposed facility.	N/A
		B. WOODLAND	Tree-1			
		D. SCRUB	Tree-2	N/A		N/A
		D. SCRUB	Tree/Shrub	Insignificant / Unlikely to Occur	This area is interspersed with grassland and pasture.	Minor Decrease
		C. SHRUBLAND	Shrub	N/A	-	N/A
		G. GRASSLAND	Grass	Partially Exists	Portions of partly managed (grazed) grassland vegetation are surrounding the subject site. This type of vegetation does not support extreme fire behaviour.	Significant Decrease
	The Land Surrounding the 'Subject Land + 150m Extent'		Tree-1	Does Not Exist	The area of forest fuels to the south west of the proposed facility is relatively small and surrounded by grassland. This area will not contribute to an extreme bushfire event.	Significant Decrease
			Tree-2	N/A	-	N/A
			Tree/Shrub	Partially Exists	This vegetation complex is interspersed with grassland	Minor Decrease
			Shrub	N/A	-	N/A
			Grass	Partially Exists	Large portions of partly managed grassland vegetation are surrounding the subject site. This type of vegetation does not support embers, spotting or extreme fire behaviour.	Significant Decrease

EXTENT AND CONTINUITY OF IDENTIFIED VEGETATION CATEGORIES – POTENTIAL TO MODIFY INDICATIVE THREAT LEVELS						
Relevant Physical Factors [1, 4 & 6]	Vegetation Location Within the Surrounding landscape [2]	Vegetation Classification AS 3959:2018 [3]	Vegetation Category [4]	Existence of Physical Factor	Assessment Comments (As Needed)	Resultant Modification of Indicative Threat Level [4 & 5]
The extent of vegetation is sufficient to support large active flaming zones (landscape scale fire). This presents one of the physical factors required for the development of an extreme bushfire event. [6]	The 'Subject Land + 150m Extent'.	A. FOREST	Tree-1	N/A	-	N/A
		B. WOODLAND	Tree-1			
		D. SCRUB	Tree-2	N/A		N/A
		Select.	Tree/Shrub	Possible to Occur	A small areas are within 150m from the proposed facility	Significant Decrease
		C. SHRUBLAND	Shrub	N/A	-	N/A
		G. GRASSLAND	Grass	Partially Exists	-	Neutral
	The Land Surrounding the 'Subject Land + 150m Extent'		Tree-1	Partially Exists	The area is small and greater than 200m form the proposed facility.	Significant Decrease
			Tree-2	N/A	-	N/A
			Tree/Shrub	Possible to Occur		Neutral
			Shrub	N/A	-	N/A
			Grass	Partially Exists		Neutral
The bushfire fuels are continuous. Fire is able to spread uninterrupted and not be slowed by the intermittent absence of fuels. This presents one of the physical factors required for the development of an extreme bushfire event. [6]	The 'Subject Land + 150m Extent'.	A. FOREST	Tree-1	N/A	The Tree 1 area is greater than 200m extent	N/A
		B. WOODLAND	Tree-1			N/A
		D. SCRUB	Tree-2	N/A		N/A
		D. SCRUB	Tree/Shrub	Substantially Exists	Regrowth will likely occur, particularly the Kunzea	Neutral
		C. SHRUBLAND	Shrub	Select.	-	Select.
		G. GRASSLAND	Grass	Predominantly Exists		Neutral
	The Land Surrounding the 'Subject Land + 150m Extent'		Tree-1	Partially Exists	Small areas within 200m from the proposed facilities southern boundary exist and a small line of forest to the north is unlikely to impact the proposed facility.	Significant Decrease

EXTENT AND CONTINUITY OF IDENTIFIED VEGETATION CATEGORIES – POTENTIAL TO MODIFY INDICATIVE THREAT LEVELS						
Relevant Physical Factors [1, 4 & 6]	Vegetation Location Within the Surrounding landscape [2]	Vegetation Classification AS 3959:2018 [3]	Vegetation Category [4]	Existence of Physical Factor	Assessment Comments (As Needed)	Resultant Modification of Indicative Threat Level [4 & 5]
			Tree-2	N/A	-	N/A
			Tree/Shrub	Predominantly Exists	To the north and west this vegetation is dominant and there is regrowth throughout the grassland extending greater than 2km radius	Neutral
			Shrub	N/A	-	N/A
			Grass	Substantially Exists	Substantially exist within and greater than the 2km radius, specifically to the south and east.	Neutral

Note 1: Refer to Appendix 2 for additional information.

Note 2: Refer to Figure 5.1 Surrounding landscape – the identified vegetation categories.

Note 3: Refer to Appendix A6.4.2 for the map of classified (AS 3959:2018) bushfire prone vegetation and topography within the 'Subject Land + 150m Extent'. The identified classified vegetation that best corresponds to the categorised vegetation will be specific to the subject land and its surrounds and is identified in this column.

Note 4: Refer to Appendix 5 for a description of the criteria that establish the vegetation category and the base bushfire hazard scenario and its indicative threat level range.

Note 5: The modification rating is derived for the identified area of vegetation/land after conducting a qualitative assessment of the existence of the relevant physical factor. It is applied to determining a 'Modified Indicative Threat Level' from the ranges of 'Indicative Threat Level' ranges that correspond to each vegetation category (refer to Appendix 5).

Note there is a base bushfire fuels, terrain and fire weather assumption that has been applied in establishing the initial 'Indicative Threat Level' ranges. It is a scenario of a sufficiently large area of bushfire prone vegetation, with continuous fuels, on flat to undulating terrain with no slopes greater than ten degrees, that can support a fully developed bushfire. It is assumed to be possible for the most adverse (catastrophic) fire weather to occur.

Note 6: A physical factor with identified links (from bushfire research) to dynamic bushfire propagation and subsequent development of extreme bushfire events, including the development of pyroconvective, coupled atmosphere events. Refer to Appendix 3 for additional information.

5.1.4.2 VEGETATION FUEL LOAD/ARRANGEMENT/BARK HAZARD FACTORS

FUEL LOAD/ARRANGEMENT/BARK HAZARD OF IDENTIFIED VEGETATION CATEGORIES – POTENTIAL TO MODIFY INDICATIVE THREAT LEVELS						
Relevant Physical Factors [1 & 6]	Vegetation Location Within the Surrounding landscape [2]	Vegetation Classification AS 3959:2018 [3]	Vegetation Category [4]	Existence of Physical Factor	Assessment Comments (As Needed)	Resultant Modification of Indicative Threat Level [4 & 5]
Managed Fuel Loads Evidence that management of fuel loads is planned, conducted regularly and enforced. Includes prescribed burning programs.	The 'Subject Land + 150m Extent'.	A. FOREST	Tree-1	N/A	-	N/A
		B. WOODLAND	Tree-1			
		D. SCRUB	Tree-2	N/A		N/A
		D. SCRUB	Tree/Shrub	Partially Exists	Onsite vegetation will be managed in accord with the BMP	Neutral
		C. SHRUBLAND	Shrub	N/A	-	N/A
		G. GRASSLAND	Grass	Does Not Exist	Onsite vegeation will be managed in accord with the BMP. Majority of the grassland is grazed; however this may discontinue in the future. The grassland has been considered unmanaged.	Neutral
	The Land Surrounding the 'Subject Land + 150m Extent'		Tree-1	Does Not Exist	Will not be managed	Neutral
			Tree-2	N/A	-	N/A
			Tree/Shrub	Does Not Exist	Will not be managed.	Neutral
			Shrub	N/A	-	N/A
			Grass	Does Not Exist	May be grazed, however have considered the grassland unmanaged.	Neutral
Adverse Fuel Loads and Arrangement [6] Fuel loads heavier than a normal range for the category or are uncharacteristic	The 'Subject Land + 150m Extent'.	A. FOREST	Tree-1	N/A	-	N/A
		B. WOODLAND	Tree-1			
		D. SCRUB	Tree-2	N/A		N/A
		D. SCRUB	Tree/Shrub	Insignificant / Unlikely to Occur		Neutral
		C. SHRUBLAND	Shrub	N/A	-	N/A

FUEL LOAD/ARRANGEMENT/BARK HAZARD OF IDENTIFIED VEGETATION CATEGORIES – POTENTIAL TO MODIFY INDICATIVE THREAT LEVELS						
Relevant Physical Factors [1 & 6]	Vegetation Location Within the Surrounding landscape [2]	Vegetation Classification AS 3959:2018 [3]	Vegetation Category [4]	Existence of Physical Factor	Assessment Comments (As Needed)	Resultant Modification of Indicative Threat Level [4 & 5]
for the category; and/or Worst case fuel arrangement exists. [Where heavy forest fuel types with loads in excess of 15-20 t/ha exist, the potential for vorticity-driven lateral spread exists (as a dynamic fire behaviour) if the required terrain characteristics are present].		G. GRASSLAND	Grass	Insignificant / Unlikely to Occur	-	Neutral
	The Land Surrounding the 'Subject Land + 150m Extent'		Tree-1	Insignificant / Unlikely to Occur	Excessive fuel loads will not occur due to the poor soils.	Neutral
			Tree-2	N/A	-	N/A
			Tree/Shrub	Insignificant / Unlikely to Occur	Excessive fuel loads will not occur due to the poor soils.	Neutral
			Shrub	N/A	-	N/A
			Grass	N/A	Grass fuels will not exceed 15-20t/ha	N/A
Bark Hazard The presence of high threat level bark hazards with potential for high levels of ember/burning debris production (spotting density) and long burnout times (travel distance).	The 'Subject Land + 150m Extent'.	A. FOREST	Tree-1	N/A	-	N/A
		B. WOODLAND	Tree-1			
		D. SCRUB	Tree-2	N/A		N/A
		D. SCRUB	Tree/Shrub	Substantially Exists	Marri trees exist within the scrub and will be the prominent producer of embers (loose coarse fibrous bark). The scrub bark is tight and coarse.	Minor Decrease
		C. SHRUBLAND	Shrub	N/A	-	N/A
		G. GRASSLAND	Grass	N/A	-	N/A
	The Land Surrounding the 'Subject Land + 150m Extent'		Tree-1	Possible to Occur	Marri and paperbark are present in the scrub vegetation. Marri will produce the dominant ember attack.. The scrub bark is tight and coarse.	Minor Decrease

FUEL LOAD/ARRANGEMENT/BARK HAZARD OF IDENTIFIED VEGETATION CATEGORIES – POTENTIAL TO MODIFY INDICATIVE THREAT LEVELS						
Relevant Physical Factors [1 & 6]	Vegetation Location Within the Surrounding landscape [2]	Vegetation Classification AS 3959:2018 [3]	Vegetation Category [4]	Existence of Physical Factor	Assessment Comments (As Needed)	Resultant Modification of Indicative Threat Level [4 & 5]
Refer to photo evidence in Appendix A6.3.					There is a low percentage of trees within the scrub fuels.	
			Tree-2	N/A	-	N/A
			Tree/Shrub	Substantially Exists	Marri trees exist within the scrub and will be the prominent producer of embers (loose coarse fibrous bark). The scrub bark is tight and coarse, thus producing limited embers.	Neutral
			Shrub	N/A	-	N/A
			Grass	N/A	-	N/A

Note 1: Refer to Appendix 2 for additional information.

Note 2: Refer to Figure 5.1 Surrounding landscape – the identified vegetation categories.

Note 3: Refer to Appendix A6.4.2 for the map of classified (AS 3959:2018) bushfire prone vegetation and topography within the 'Subject Land + 150m Extent'. The identified classified vegetation that best corresponds to the categorised vegetation will be specific to the subject land and its surrounds and is identified in this column.

Note 4: Refer to Appendix 5 for a description of the criteria that establish the vegetation category and its indicative threat level.

Note 5: The modification rating is derived for the identified area of vegetation/land after conducting a qualitative assessment of the existence of the relevant physical factor. It is applied to determining a 'Modified Indicative Threat Level' from the ranges of 'Indicative Threat Level' ranges that correspond to each vegetation category (refer to Appendix 5).

Note there is a base bushfire fuels, terrain and fire weather assumption that has been applied in establishing the initial 'Indicative Threat Level' ranges. It is a scenario of a sufficiently large area of bushfire prone vegetation, with continuous fuels, on flat to undulating terrain with no slopes greater than ten degrees, that can support a fully developed bushfire. It is assumed to be possible for the most adverse (catastrophic) fire weather to occur.

Note 6: A physical factor with identified links (from bushfire research) to dynamic bushfire propagation and subsequent development of extreme bushfire events, including the development of pyroconvective, coupled atmosphere events. Refer to Appendix 3 for additional information.

5.1.4.3 TERRAIN FACTORS

GROUND SLOPE AND SLOPE LENGTH UNDER IDENTIFIED VEGETATION CATEGORIES – POTENTIAL TO MODIFY INDICATIVE THREAT LEVELS						
Relevant Physical Factors [1 & 6]	Vegetation Location Within the Surrounding landscape [2]	Vegetation Classification AS 3959:2018 [3]	Vegetation Category [4]	Existence of Physical Factor	Assessment Comments (As Needed)	Resultant Modification of Indicative Threat Level [4 & 5]
Effective Slopes ≥ 10 Degrees Vegetation exists, at least partially, on terrain of 10 degrees or greater ground slope and of sufficient length (see slope length factor), that will increase fire rates of spread and consequent fire intensity.	The 'Subject Land + 150m Extent'.	A. FOREST	Tree-1	N/A	10 degrees or greater does not exist.	N/A
		B. WOODLAND	Tree-1			
		D. SCRUB	Tree-2	N/A		N/A
		D. SCRUB	Tree/Shrub	N/A		N/A
		C. SHRUBLAND	Shrub	N/A	-	N/A
		G. GRASSLAND	Grass	N/A	-	N/A
	The Land Surrounding the 'Subject Land + 150m Extent'		Tree-1	N/A	10 degrees or greater does not exist.	N/A
			Tree-2	N/A	-	N/A
			Tree/Shrub	N/A	-	N/A
			Shrub	N/A	-	N/A
			Grass	N/A	-	N/A
Effective Slopes ≥ 20 Degrees [6] Vegetation exists, at least partially, on steep terrain of 20 degrees or greater ground slope and of sufficient length (see slope length factor). The presence of ridges able to present steep	The 'Subject Land + 150m Extent'.	A. FOREST	Tree-1	N/A	20 degrees or greater does not exist	N/A
		B. WOODLAND	Tree-1			
		D. SCRUB	Tree-2	N/A		N/A
		Select.	Tree/Shrub	N/A		N/A
		C. SHRUBLAND	Shrub	N/A	-	N/A
		G. GRASSLAND	Grass	N/A	-	N/A
	The Land Surrounding the 'Subject Land + 150m Extent'		Tree-1	N/A	-	N/A
			Tree-2	N/A	-	N/A
			Tree/Shrub	N/A	-	N/A

GROUND SLOPE AND SLOPE LENGTH UNDER IDENTIFIED VEGETATION CATEGORIES – POTENTIAL TO MODIFY INDICATIVE THREAT LEVELS						
Relevant Physical Factors [1 & 6]	Vegetation Location Within the Surrounding landscape [2]	Vegetation Classification AS 3959:2018 [3]	Vegetation Category [4]	Existence of Physical Factor	Assessment Comments (As Needed)	Resultant Modification of Indicative Threat Level [4 & 5]
leeward slopes to exposed elements is an additional component of this factor.			Shrub	N/A	-	N/A
			Grass	N/A	-	N/A
Sufficient Length of Steep Slopes The identified 20 degree and greater slopes can support the entire flame depth of a fully developed fire.	The 'Subject Land + 150m Extent'.	A. FOREST	Tree-1	N/A	-	N/A
		B. WOODLAND	Tree-1			
		D. SCRUB	Tree-2	N/A		N/A
		Select.	Tree/Shrub	N/A		N/A
		C. SHRUBLAND	Shrub	N/A	-	N/A
		G. GRASSLAND	Grass	N/A	-	N/A
	The Land Surrounding the 'Subject Land + 150m Extent'		Tree-1	N/A	-	N/A
			Tree-2	N/A	-	N/A
			Tree/Shrub	N/A	-	N/A
			Shrub	N/A	-	N/A
			Grass	N/A	-	N/A

Note 1: Refer to Appendix 2 for additional information.

Note 2: Refer to Figure 5.1 Surrounding landscape – the identified vegetation categories.

Note 3: Refer to Appendix A6.4.2 for the map of classified (AS 3959:2018) bushfire prone vegetation and topography within the 'Subject Land + 150m Extent'. The identified classified vegetation that best corresponds to the categorised vegetation will be specific to the subject land and its surrounds and is identified in this column.

Note 4: Refer to Appendix 5 for a description of the criteria that establish the vegetation category and its indicative threat level.

Note 5: The modification rating is derived for the identified area of vegetation/land after conducting a qualitative assessment of the existence of the relevant physical factor. It is applied to determining a 'Modified Indicative Threat Level' from the ranges of 'Indicative Threat Level' ranges that correspond to each vegetation category (refer to Appendix 5).

GROUND SLOPE AND SLOPE LENGTH UNDER IDENTIFIED VEGETATION CATEGORIES – POTENTIAL TO MODIFY INDICATIVE THREAT LEVELS						
Relevant Physical Factors [1 & 6]	Vegetation Location Within the Surrounding landscape [2]	Vegetation Classification AS 3959:2018 [3]	Vegetation Category [4]	Existence of Physical Factor	Assessment Comments (As Needed)	Resultant Modification of Indicative Threat Level [4 & 5]
Note there is a base bushfire fuels, terrain and fire weather assumption that has been applied in establishing the initial 'Indicative Threat Level' ranges. It is a scenario of a sufficiently large area of bushfire prone vegetation, with continuous fuels, on flat to undulating terrain with no slopes greater than ten degrees, that can support a fully developed bushfire. It is assumed to be possible for the most adverse (catastrophic) fire weather to occur. Note 6: A physical factor with identified links (from bushfire research) to dynamic bushfire propagation and subsequent development of extreme bushfire events, including the development of pyroconvective, coupled atmosphere events. Refer to Appendix 3 for additional information. Note 7: Refer to Figure 5.3: Surrounding landscape - terrain slope map.						

Figure 5-1

Broader Landscape Terrain Elevation Map

Lot 9500 on Plan 414516, Area : 1,608.9031 ha
320 Gull Road,
KERALUP 6182
SHIRE OF MURRAY

Lot 9500

YANGEDI RD

NAMBEELUP RD

BUSH RTT

DIRK HARTOG DR

Elevation Key

Elevation (m)

2 - 3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26

------ LEGEND ------

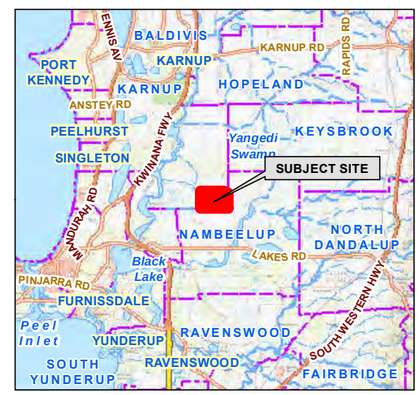
- Development Site
- Subject Site
- Other Lots
- Development
- Driveway

Vegetation Assessment Area

- 2 km from Subject Site

0 200 400 600 800 1,000
Metres

------ LOCALITY ------



N

Aerial Imagery : Landgate/SLIP
Image Date : Feb 2022

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator Units: Metre
Map compiled by: Ian Ross 4/12/2023
Map updated by: Ian Ross 4/12/2023
A3 Scale 1:20,000

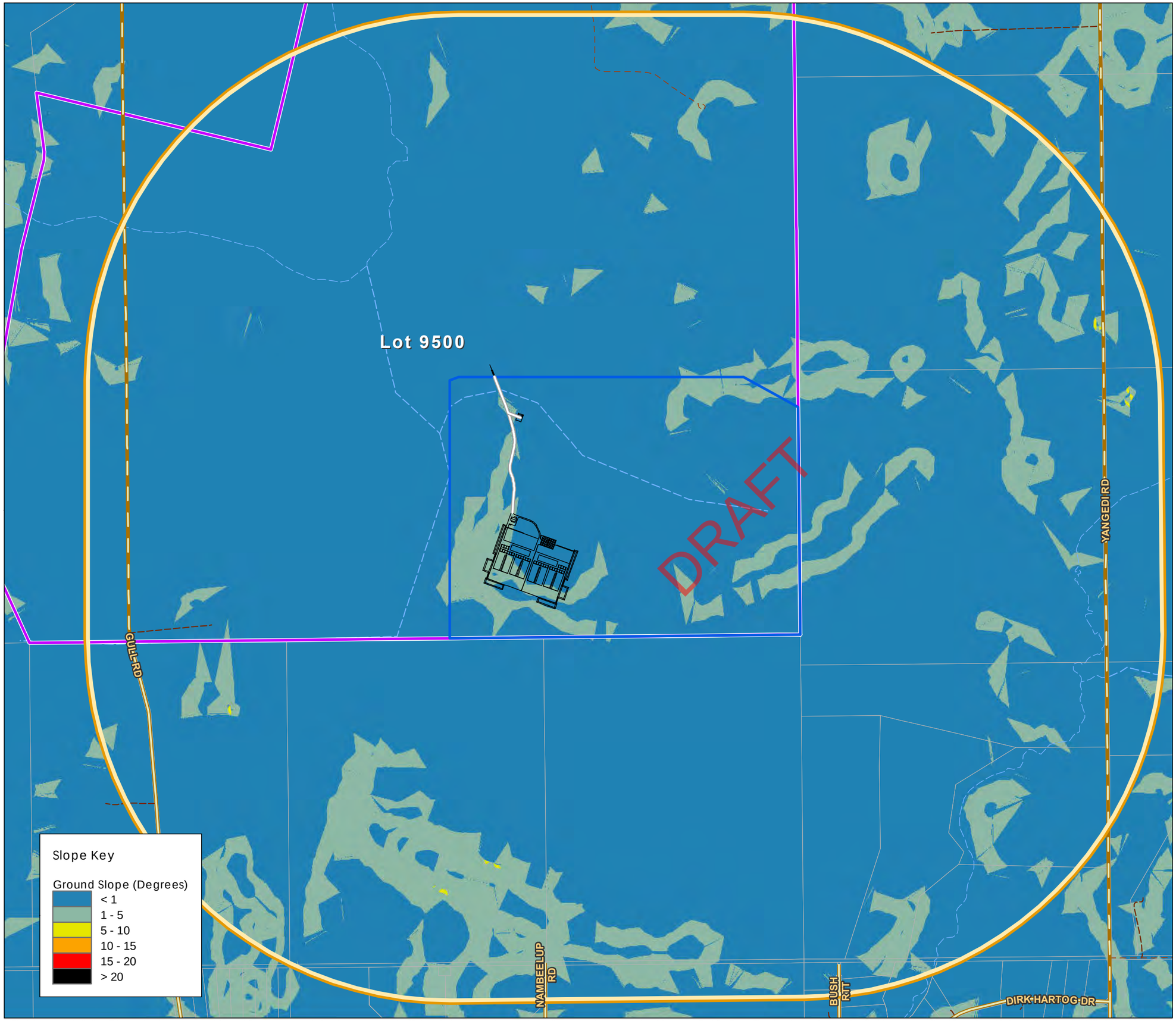
BUSHFIRE PRONE PLANNING

Map Document Path / Name: K:\Projects\Jobs 2022\220666 - 320 Gull Road Keralup (BMP)\Mapping\MXD\RISK Maps\220666_RM_Fig5-4_DEM_320 Gull Road Keralup.mxd

Figure 5-3

Broader Landscape Terrain Slope Map

Lot 9500 on Plan 414516, Area : 1,608.9031 ha
320 Gull Road,
KERALUP 6182
SHIRE OF MURRAY



------ LEGEND ------

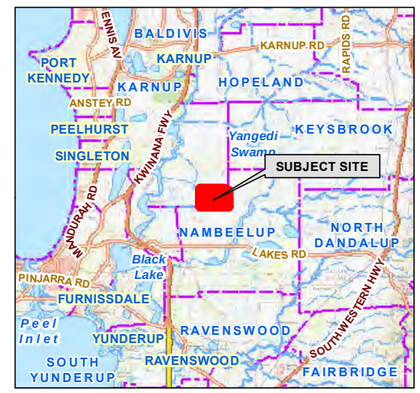
- Development Site
- Subject Site
- Other Lots
- Development
- Driveway

Vegetation Assessment Area

- 2 km from Subject Site

0 200 400 600 800 1,000
Metres

------ LOCALITY ------



N

Aerial Imagery : Landgate/SLIP
Image Date : Feb 2022

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator Units: Metre
Map compiled by: Ian Ross 4/12/2023
Map updated by: Ian Ross 4/12/2023
A3 Scale 1:20,000

BUSHFIRE PRONE PLANNING

Map Document Path / Name: K:\Projects\Jobs 2022\220666 - 320 Gull Road Keralup (BMP)\Mapping\MXD\RISK Maps\220666_RM_Fig5-3_SLOPE_320 Gull Road Keralup.mxd

5.1.4.4 FIRE WEATHER FACTORS

The purpose of including consideration of fire weather factors in the surrounding landscape assessment is to be able to account for those scenarios in which the most adverse (catastrophic) fire weather conditions are either (a) cannot occur; or (b) highly unlikely to occur and this can be fully justified. Otherwise, such conditions are accounted for in the 'Indicative Threat Levels' stated for each category of vegetation in Appendix 5.

FIRE WEATHER CONSIDERATIONS - POTENTIAL TO MODIFY INDICATIVE THREAT LEVELS			
Relevant Physical Factor	Existence of Physical Factor	Assessment Comments (As Needed)	Resultant Modification of Indicative Threat Level [1]
Associated with intensification of fire behaviour			
Location has persistent strong synoptic winds (i.e., not fire driven)	Possible to Occur	Westerly winds are dominant	Neutral
Very low relative humidity and very high ambient air temperature	Possible to Occur	It is possible during the summer months to sustain low humidity and high temperatures, usually does not exceed consecutively 4 days in a	Neutral
Associated with development of dynamic fire propagation behaviours, intensification of fire behaviour, and development of extreme bushfire events. [2]			
Wind speeds in excess of approximately 20 km/hr and wind direction within 30-40 degrees of ridge/scarp features – increasing the potential for vorticity-driven lateral spread.	N/A	-	N/A
Due to weather factors, fuel moisture contents can dry to around 5% or less.	Possible to Occur		Neutral
Atmospheric instability creating opportunity for atmospheric coupling and violent pyroconvection. [3]	Possible to Occur		Neutral
Note 1: The modification rating is derived for the identified area of vegetation/land after conducting a qualitative assessment of the existence of the relevant physical factor. It is applied to determining a 'Modified Indicative Threat Level' from the ranges of 'Indicative Threat Level' ranges that correspond to each vegetation category (refer to Appendix 5). Note there is a base bushfire fuels, terrain and fire weather assumption that has been applied in establishing the 'Indicative Threat Level' ranges. It is a scenario of a sufficiently large area of bushfire prone vegetation, with continuous fuels, on flat to undulating terrain with no slopes greater than ten degrees, that can support a fully developed bushfire. It is assumed to be possible for the most adverse (catastrophic) fire weather to occur. Note 2: Refer to Appendix 3 for additional information. Note 3: Regarding the potential for a pyroconvective fire event to occur, the default assumption is that most locations will have the potential for vertical movement of air without any resistance to that movement (e.g. temperature inversion), as one of the typical requirements for such an event to occur.			

It is not sufficiently risk averse to assume that atmospheric instability is unlikely to exist. Different temperature air masses can always interact as a consequence of the passage of different weather systems at any location. Justifying a variation to this is outside the scope of this assessment.

5.1.4.5 THE BUSHFIRE HAZARD MODIFIED INDICATIVE THREAT LEVELS

THE CATEGORISED SURROUNDING LANDSCAPE VEGETATION AND ITS ASSESSED BUSHFIRE HAZARD THREAT LEVEL							
Vegetation Location Within the Surrounding Landscape	Identified Vegetation Categories	Indicative Threat Level	Assessed Potential for the Stated Physical Factor to Modify the Indicative Threat Level				Modified Indicative Threat Level
			Vegetation Extent and Continuity	Fuel Load / Arrangement and Bark Hazard	Terrain - Ground Slope and Slope Length	Fire Weather	
(Section 5.1)	(Figure 5.1 & Appendix 5)	(Appendix 5)	(Section 5.2.1)	(Section 5.2.2)	(Section 5.2.3)	(Section 5.2.4)	
The 'Subject Land + 150m Extent'	Tree-1	N/A	N/A	N/A	N/A	N/A	N/A
	Tree-2	N/A	N/A	N/A	N/A	N/A	N/A
	Tree/Shrub	Moderate to High	Minor Decrease	Minor Decrease	Major Decrease	Neutral	Moderate
	Shrub	N/A	N/A	N/A	N/A	N/A	N/A
	Grass	Low to Moderate	Neutral	N/A	Major Decrease	Neutral	Moderate
	No/Low Threat	None to Low					Moderate
The Land Surrounding the 'Subject Land + 150m Extent'	Tree-1	Moderate to Extreme	Significant Decrease	Significant Decrease	Major Decrease	Neutral	Low
	Tree-2	Moderate to Extreme	N/A	N/A	N/A	N/A	N/A
	Tree/Shrub	Moderate to High	Neutral	Minor Decrease	Major Decrease	Neutral	Moderate
	Shrub	Low to Moderate	N/A	N/A	N/A	N/A	N/A
	Grass	Low to Moderate	Neutral	N/A	Major Decrease	Neutral	Moderate
	No/Low Threat	None to Low					Moderate

SURROUNDING LANDSCAPE BUSHFIRE HAZARD - MODIFIED INDICATIVE THREAT LEVEL [1]	No Threat ☐	Low ☐	Moderate ☒	High ☐	Very High ☐	Extreme ☐

Note 1: Derived qualitatively by considering the modified indicative threat level for each identified category of vegetation and the relative extents of each category. The highest level will apply unless it is associated with a less significant extent.

ASSESSMENT SUMMARY COMMENTS

5.1.5 THREAT LEVEL ASSESSMENT – BUSHFIRE PROTECTION MEASURE ANALYSIS

For each identified bushfire hazard, an assessment is conducted that considers the effectiveness and application status of all available threat reducing bushfire protection measures that are listed under their applicable bushfire protection mechanism. This information is subsequently applied to deriving threat levels.

5.1.5.1 PROTECTION MEASURES - IDENTIFICATION AND APPLICATION STATUS

PROTECTION MEASURES AVAILABLE TO REDUCE THREAT LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
THE PROTECTION MECHANISM – PREVENT BUSHFIRE IGNITION AND/OR SEVERITY BY MANAGING THE FUELS: Eliminate or reduce vegetation fuel loads, modify their properties (vegetation types and fuel arrangement). Maintain the measures over time to eliminate bushfire or lower the severity of fire behaviours and the consequent threat levels. Desired and mandatory environmental conservation will likely always be the most significant limitation to applying the mechanism.						
1.1	Remove Offsite Bushfire Fuel: Remove fuel permanently by clearing bushfire prone vegetation - only when permission and relevant agreements for removal have been established with the landowner and relevant authorities.	Very High	N/A	N/A	N/A	N/A
Assessment Comments: The facility will be located on a large portion of land that can meet all clearing and management requirements on site.. There is no requirement to manage vegetation off site. *Recommendation Details:* Not Applicable						
1.2	Reduce Offsite Bushfire Fuel - Prescribed Burning: Planned hazard reduction when permission and relevant agreements to conduct and maintain have been established with the landowner and relevant authorities.	High	N/A	N/A	N/A	N/A
Assessment Comments: Not Required *Recommendation Details:* Not Applicable						
1.3	Reduce Offsite Bushfire Fuel - Mechanical: Modify composition of vegetation types and/or the arrangement of fuels and maintain the modification over time e.g. reduce canopy, limit higher threat bark types (e.g. stringy, ribbon), minimise 'ladder' fuels'. Will likely require permission and relevant agreements to conduct and maintain from the landowner and relevant authorities.	High	N/A	N/A	N/A	N/A
Assessment Comments: Not Required *Recommendation Details:* Not Applicable						

PROTECTION MEASURES AVAILABLE TO REDUCE THREAT LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
1.4	Remove Onsite Bushfire Fuel: Remove fuel permanently by clearing bushfire prone vegetation – only after the necessary approvals from relevant authorities have been obtained.	Very High	Yes	Yes	Yes	Yes
Assessment Comments: Clearing can be achieved. Environmental assessment has been completed for the site. *Recommendation Details:* Before clearing, approval must be obtained from the local government before removing or managing native vegetation.						
1.5	Reduce Onsite Bushfire Fuel - Prescribed Burning: Planned hazard reduction only after the necessary approvals from relevant authorities have been obtained.	High	N/A	N/A	N/A	N/A
Assessment Comments: Not Required *Recommendation Details:* Not Applicable						
1.6	Reduce Onsite Bushfire Fuel - Mechanical: Modify composition of vegetation types and/or the arrangement of fuels and maintain the modification over time e.g. reduce canopy, limit higher threat bark types (e.g. stringy, ribbon), minimise 'ladder' fuels'. Approvals from relevant authorities regarding environmental considerations may be required.	High	Yes	Yes	Yes	Yes
Assessment Comments: Mechanical fuel reduction or grazing can be considered. *Recommendation Details:* Local government approval required before clearing or managing native vegetation.						
1.7	Reduce Road Verge Fuel: Road verges of designated evacuation routes are subject to fuel load reduction, tree management and ongoing maintenance when an authority exists to conduct and maintain.	Medium	No	No	No	No
Assessment Comments: Road verges are not in the control of the facility management. The road verges outside the facilities management control will not be managed. *Recommendation Details:* Not Applicable						
1.8	Enforce Compliance with Local Government Property Management Directives: Inform landowners of the high level of enforcement that will be applied by the relevant authority.	High	Yes	No	No	Yes
Assessment Comments: The local government Firebreak Notice must be complied with. The associated Bushfire Management Plan (BMP), Environment Plan and any local government and State government schemes and plans must be complied with. *Recommendation Details:* Include ongoing management requirements in facility guidance and operational documents.						

PROTECTION MEASURES AVAILABLE TO REDUCE THREAT LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
THE PROTECTION MECHANISM – PREVENT BUSHFIRE IGNITION BY MANAGING HEAT ENERGY SOURCES: The use of measures that control the existence of potential ignition sources. This includes human actions and/or faulty or poorly designed equipment. Natural causes of ignition (lightning) cannot be controlled and will remain an unmanageable limitation.						
1.9	Robust and Effective Site Operational Procedures: Apply fire safe principles to site operation procedures including: • Eliminating or reducing the potential for open air creation of fire, embers or sparks; and • Closing identified high risk operations when a bushfire event exists. • Ensure safe practices are carried out via appropriate guidelines, protocols, signage and education.	Medium	Yes	Partly	No	Yes
Assessment Comments: Guidelines and operating procedures for facility operations and during a fire event to be developed. The guidelines and procedures to include but not limited to hot works, TFB and VMB days, extreme and catastrophic fire danger days, and triggers in the event of a fire event. *Recommendation Details:* Develop guidance documents and operating procedures.						
1.10	Develop Planning and Management Procedures for Prescribed Burning: Ensure proper management of hazard reduction burning to prevent ignition of unintended fuels.	Medium	N/A	N/A	N/A	N/A
Assessment Comments: Not Required *Recommendation Details:* Not Applicable						
1.11	Design and Construct Equipment to Prevent Airborne Ignition: Apply fire safe design principles to equipment, vehicles, and energy transmission etc. Design to control rate of energy release and eliminate/reduce potential for open air creation of fire, embers or sparks.	Medium	Yes	Partly	Unknown	Yes
Assessment Comments: To be included in equipment design at purchase stage. All equipment must meet minimum national standards and standards associated with industry requirements, and this is considered adequate. *Recommendation Details:* Monitor purchase and construction of plant equipment for adequate protection measure against potential ignition sources.						
1.12	Actively Enforce Activity Restrictions: Impose restrictions on source of ignition operations by enforcing total fire bans.	Medium	Yes	No	No	Yes
Assessment Comments: Onsite activity capable of igniting a fire will be controlled by the Standard Operating Procedures.						

PROTECTION MEASURES AVAILABLE TO REDUCE THREAT LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Recommendation Details: Develop Standard Operating Procedures to restrict operation during TFB days. Consider documenting the process for exemptions for certain critical operations.						
1.13	Monitor and Penalise Illegal Activity: Reduce arson events as sources of ignition by monitoring and publicising enforcement of penalties.	Medium	N/A	N/A	N/A	N/A
Assessment Comments: Not Required *Recommendation Details:* Not Applicable						
1.14	Bushfire Awareness and **'Good Practices'** Education: Educate persons to reduce the occurrence of accidental ignitions in vegetation by persons and/or vehicles, including in road reserves.	Medium	Yes	No	No	Yes
Assessment Comments: Staff and contractors to be inducted. *Recommendation Details:* Basic fire awareness to be included in company induction. Relevant staff training required, site specific Bushfire Awareness and emergency response.						
THE PROTECTION MECHANISM - PREVENT BUSHFIRE IGNITION BY MANAGING INTERACTIONS OF HEAT ENERGY SOURCES AND FUELS: The use of measures that control the interaction of heat sources and fuels.						
1.15	Barriers (Shielding) between Ignition Sources and Fuels: Utilise physical barriers (shielding) between bushfire fuels and heat energy sources such as electricity generation / transmission, fuel supplies, stored flammable products etc. Examples include appropriate walls, enclosures, and underground transmission of electricity or liquid/gas fuels.	Medium	Yes	Partly	Unknown	Yes
Assessment Comments: Protection measures to be implemented during the design stage, this includes being aware of the critical point for heat exposure on equipment such as cabling, poly pipe, valves, conveyor belts etc. and potential ember/firebrand accumulation areas. *Recommendation Details:* Include in the facility design stage items and equipment that may be exposed to excessive radiant heat or has the potential to allow the spread of fire.						
1.16	Equipment Design and Construction to Reduce Heat Transfer: Through design (e.g., insulation) and materials, control heat energy transfer via conduction, convection and radiation.	Medium	Yes	Partly	Unknown	Yes
Assessment Comments: Common electrical cabling should not be exposed to greater than 10kWm2 heat flux and poly pipe critical point in 120 degrees Celsius. Equipment to be designed to minimise the potential of heat transfer. *Recommendation Details:* Consider in the facility design stage, to reduce the potential of ignition and heat transfer.						

PROTECTION MEASURES AVAILABLE TO REDUCE THREAT LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
1.17	Separation Distance Between Ignition Sources and Fuels: Establish sufficient separation distance between bushfire fuels and heat energy sources such as electricity generation / transmission, fuel supplies, stored flammable products etc.	Medium	Yes	No	Unknown	Yes

Assessment Comments: The Asset Protection Zone (APZ) to be constructed to achieve 10kWm2 or less to reduce the potential of the critical assets being rendered inoperable.

Recommendation Details: Include the critical assets within the 10kWm2 area.

[1] Protection Measure Effectiveness Rating: Refer to Appendix A1.2.4 for explanation and defining.

[2] Protection Measure Application Status:

- Possible: Protection measures that can potentially be applied to the proposed development/use.
- Fully or Partly Exists: A current state assessment of protection measures already implemented by existing components of the proposed development/use. The status of current implementation can also be fully or partly. These measures are accounted for in assessing 'inherent' risk levels (refer to Glossary).
- Currently Planned: Protection measures that:
  - Are incorporated into the site plans;
  - Exist in an approved Bushfire Management Plan (BMP) and/or Bushfire Emergency Plan (BEP) and are comprised of the applicable acceptable solutions (established by the 'Guidelines for planning in bushfire prone areas', DPLH as amended), alternative solutions and any additional recommended protection measures - for which a responsibility for their implementation has been created and approved; and/or
  - Exist in a yet to be submitted Bushfire Management Plan (BMP) and/or Bushfire Emergency Plan (BEP) and are comprised of the applicable acceptable solutions (established by the 'Guidelines for planning in bushfire prone areas', DPLH as amended), that can be met and for which a responsibility for their implementation can be created in the BMP.

  These planned measures are accounted for in assessing 'inherent' risk levels (refer to Glossary).
- Additionally Recommend: Protection measures that:
  - Exist in a yet to be submitted Bushfire Management Plan (BMP) and/or Bushfire Emergency Plan (BEP) and comprise alternative solutions and/or additional recommended protection measures (that can and should be implemented in the opinion of the bushfire consultant), and for which a responsibility for their implementation can be created in the BMP; and/or
  - Are developed in the process of producing this risk assessment and management report and for which a responsibility for their implementation can be created in the BMP.

  These additionally recommended measures, along with existing and planned measures, are accounted for in assessing 'residual' risk levels (refer to Glossary).

5.1.5.2 PROTECTION MEASURES - EFFECTIVENESS AND NUMBER APPLIED

For the identified bushfire hazard, the numbers of both available and potentially applied bushfire protection measures are summarised and the effectiveness of each measure at reducing threat levels is stated. This information is subsequently applied to assess the ability of applied protection measures to reduce threat levels. Refer to Appendix 1 for explanatory and supporting information.

	Not Relevant	2					
Prevent Bushfire Ignition by Managing Interactions of Heat Energy Sources and Fuels	Very High						
	High						
	Medium	3	3	2			3
	Not Relevant						
Number Analysis	Very High	1	1		1	1	1
	High	2	2	1	1	1	1
	Medium	8	7	2	2		7
	Not Relevant	6					
	Totals	17	10	3	4	2	9

[1] Protection Measure Effectiveness Rating: Refer to Appendix A1.2.4 for explanation and defining.

[2] Protection Measure Application Status: Refer to table footnotes in the preceding Section.

5.1.5.3 PROTECTION MEASURES - THREAT REDUCING POTENTIAL

For the identified bushfire hazard, the potential for applied bushfire protection measures to reduce indicative threat levels is assessed as a function of:

- The number of bushfire protection measures that can be applied compared to the number available; and
- The weighting applied to each protection measure that indicates how effective it can be at reducing hazard threat levels.

ASSESSED POTENTIAL OF APPLIED PROTECTION MEASURES TO REDUCE BUSHFIRE HAZARD THREAT LEVELS [1]			
ASSESSMENT OF PROTECTION MEASURES APPLIED TO THE DERIVATION OF AN INHERENT THREAT LEVEL [3]			
Bushfire Direct Attack Mechanisms [2]			
Flame Contact	Radiant Heat	Embers / Burning Debris	High / Erratic Fire Driven Wind
Minimal	Minimal	Moderate	Moderate
Moderate			
ASSESSMENT OF PROTECTION MEASURES APPLIED TO THE DERIVATION OF A RESIDUAL THREAT LEVEL [4]			
Bushfire Direct Attack Mechanisms [2]			
Flame Contact	Radiant Heat	Embers / Burning Debris	High / Erratic Fire Driven Wind
Very Significant	Significant	Significant	Moderate
Significant			

[1] Refer to Appendix 1 for explanatory and supporting information.

[2] Refer to Appendix 2 for explanatory information.

[3] Accounts for all currently implemented bushfire protection measures and those planned to be implemented.

[4] Additionally accounts for bushfire protection measures recommended to be implemented by the bushfire consultant.

Assessment Comments:

The above table has assumed all planning requirements are compliant including the Planning for bushfire guidelines. This Bushfire Risk Report has applied additional protection measures, and these are the applied to the derivation of the Residual Threat Level.

5.1.5.4 ASSESSED THREAT LEVEL (INHERENT AND RESIDUAL)

The preceding bushfire hazard assessments have facilitated the derivation of the indicative inherent and residual threat levels. The considered assessments are:

1. The assessed indicative threat levels for the different categories of bushfire prone vegetation identified in the surrounding landscape, as modified by the presence or not of relevant physical factors associated with vegetation, terrain and fire weather; and
2. The assessed threat reducing ability of applied bushfire protection measures.

The resultant inherent and residual threat levels (each applying to a different stage of bushfire protection measure application), are indicative as they are derived through a qualitative assessment process.

These threat levels, in combination with the corresponding assessed exposure and vulnerability levels, are later applied to deriving the indicative inherent and residual bushfire risk levels.

ASSESSED INDICATIVE THREAT LEVELS – POST APPLICATION OF BUSHFIRE PROTECTION MEASURES [1]				
INHERENT THREAT LEVEL [2]				
Very Low ☐	Low ☐	Moderate ☒	High ☐	Extreme ☐
RESIDUAL THREAT LEVEL [3]				
Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐

[1] Refer to Appendix 1 for explanatory information.

[2] Accounts for all currently implemented bushfire protection measures and those planned to be implemented.

[3] Additionally accounts for bushfire protection measures recommended to be implemented by the bushfire consultant.

Assessment Comments: The recommendation is to increase the separation distances, introduce shielding and improved equipment and structural design, including locating critical assets within the 10kWm2 area.

5.2 THE IDENTIFIED ELEMENTS AT RISK

THE IDENTIFIED ELEMENTS AT RISK AND SUBJECT TO ASSESSMENT			
Possible Types	Exists on Subject Site and is Exposed to Bushfire Hazard Threats	Bushfire Risk Report Objectives Establish Requirement to Assess	Description
Persons located onsite and temporarily offsite as part of site operations - includes occupants, staff, visitors and persons on day trips offsite (e.g. tourism)	✓	✓	Student educational day trips Contractors Staff
Persons on access/egress routes (roads, driveways, access ways) in vehicles:	✓	✓	Student educational day trips Contractors Staff
Buildings - NCC Classes 1 to 9 - residential, offices, shops (retail/services), warehouses, carparks, factories, workshops, laboratories, public buildings.	✓	✓	Recycling factory Workshop and storage
Buildings or Structures – NCC Class 10 - non-habitable – shed, carport, garage, fence, retaining wall etc.	✓	✓	Sheds
Park Vans – Long Term Installations – park vans with or without associated additions.			
Non-Building Accommodation - caravan / camper trailer / tent.			
Built Infrastructure Assets – structures associated with telecommunications / power generation / transport / water supply etc.	✓	✓	Generator, water recycling, communications tower
Materials Stored Outdoors – as part of recycling and/or waste management operations.	✓	✓	Recycling products and by-products (FOGO)
Livestock/Animals - as part of commercial or private operations (saleyards / events / wildlife sanctuaries).			

5.3 EXPOSURE LEVEL ASSESSMENT – BUSHFIRE PROTECTION MEASURE ANALYSIS

For each stated element at risk and each relevant bushfire hazard, an assessment is conducted that considers the effectiveness and application status of all available exposure reducing bushfire protection measures that are listed under their applicable bushfire protection mechanism. This information is subsequently applied to deriving exposure levels.

5.3.1 PERSONS ONSITE AND TEMPORARILY OFFSITE

5.3.1.1 PROTECTION MEASURES - IDENTIFICATION AND APPLICATION STATUS

PROTECTION MEASURES AVAILABLE TO REDUCE EXPOSURE LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk	Persons Onsite And Temporarily Offsite					
THE PROTECTION MECHANISM – ESTABLISH SUFFICIENT SEPARATION FROM RELEVANT BUSHFIRE HAZARD THREATS: To ensure that the persons are located or re-located at a sufficient distance from the bushfire hazard to ensure the level of exposure to the threats, and the associated risk of persons death or injury, is contained within acceptable parameters.						
2.1	Stay Away from the Subject Site: Prevent access to, occupancy or operation of the subject site (i.e. closure of use) in response to a pre-determined fire danger rating (FDR) or fire behaviour index (FBI) and/or activity restriction (e.g., total fire ban) or a defined period of the year (highest risk). The relevant conditions and the requirement to stay away will be established through relevant site operational documents such as a Bushfire Emergency Plan or Site Emergency Plan/Guide.	Very High	Yes	No	No	Yes
Assessment Comments: Closing of facility would be impractical based on facility use. *Recommendation Details:* Recommend closing facility to non-essential staff and contractors during heightened fire conditions, being FDI above 75 and catastrophic fire danger days.						
2.2	Remote Tourism Sites - Stay Within the Subject Site: Relevant when tourism operations are moving persons offsite as part of operations e.g., tourism day trips. All associated persons (staff, guests, visitors), in response to a pre-determined fire danger rating (FDR) or fire behaviour index (FBI) and/or activity restriction (e.g., total fire ban), will remain on-site as better communication and sheltering options exist on-site compared to travelling in a remote area – if possible. The relevant conditions and the requirement to stay will be established through relevant site operational documents such as a Bushfire Emergency Plan or Site Emergency Guide.	High	N/A	N/A	N/A	N/A
Assessment Comments: Not Required						

PROTECTION MEASURES AVAILABLE TO REDUCE EXPOSURE LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk	Persons Onsite And Temporarily Offsite					
Recommendation Details: Not Applicable						
2.3	Remote Tourism Sites - Relocate to Designated Safer Offsite Location: Relevant when tourism operations are moving persons offsite as part of operations e.g., tourism day trips. A suitable offsite alternative safer location(s) is identified as a destination should the subject site and/or the route back to the subject site, be impacted by a bushfire event during the time away from the site.	High	N/A	N/A	N/A	N/A
Assessment Comments: Not Required *Recommendation Details:* Not Applicable						
2.4	Relocate (Evacuate) to Designated Safer Offsite Location(s): A building, area or general location is identified and accessible from the subject site as an evacuation destination. The offsite location exists at a sufficient distance away ensuring that the destination and the subject site are not likely to be simultaneously impacted by a bushfire event.	High	Yes	No	No	Yes
Assessment Comments: The site office/cribroom is the nominated shelter in place, and staff will either go home or the contractors will return to their place of employment. A Bushfire Emergency Plan has been developed for the site. *Recommendation Details:* Include Bushfire Emergency Plan into operational documents including the site emergency plan. The cribroom is the nominated shelter in place building.						
2.5	Relocate to Safer Onsite Open Area: Provide an accessible area located in the open (i.e. not in an enclosed building), within the subject site and on which persons can assemble and that will not be subject to radiant heat flux in excess of 2 kW/m^2 (determined using a flame temperature of 1200 K). Consideration must also be given to potential exposure to embers, adverse weather, availability of water / facilities and the relative importance of these to the specific use proposal.	High	N/A	N/A	N/A	N/A
Assessment Comments: Onsite open area has not been nominated. *Recommendation Details:* Not Applicable						
2.6	Safer Pathways for Onsite Movement: To ensure lower risk movement (walking) of persons and firefighters on the site, heavy fuels are excluded from areas adjacent to pathways used to access designated safer locations onsite. The required minimum separation distances are [13] [31]: • At least 4m from stored heavy fuels (refer to Appendix 2).	Medium	Yes	No	Partly	Yes

PROTECTION MEASURES AVAILABLE TO REDUCE EXPOSURE LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk	Persons Onsite And Temporarily Offsite					
	• At least 6m from stored and constructed large heavy fuels (refer to Appendix 2). • At least 12m from constructed large heavy fuels that are buildings/structures. Additionally: • The pathway/route is constructed of non-combustible materials; • No gas bottles are venting towards the pathway/route; and • Shrubs are separated from the pathway/route corresponding to a distance to minimise the threats to persons on foot with consideration of their flammability and height.					
Assessment Comments: At the facility design stage, safer pathways are to be included. *Recommendation Details:* Apply protection measures. Include safer pathways in the facility design.						
2.7	Pre-Emptively Relocate to Designated Safer Offsite Location(s): In response to a pre-determined fire danger rating (FDR) or fire behaviour index (FBI) and/or activity restriction (e.g., total fire ban) or other established condition, all persons onsite will pre-emptively relocate offsite for the duration of the existence of the conditions. The relevant conditions and the requirement to pre-emptively relocate will be established through relevant site operational documents such as a Bushfire Emergency Plan or Site Emergency Guide.	High	Yes	No	No	Yes
Assessment Comments: It is not practicable to close the facility, however all no essential contractors and visitors should not enter site for the duration of the conditions. *Recommendation Details:* Develop guidelines and procedures to respond to pre-determined FDI and FDR days and other established conditions, eg restricted site access for non-essential people.						
THE PROTECTION MECHANISM – ESTABLISH SHIELDING FROM RELEVANT BUSHFIRE HAZARD THREATS: To utilise constructed or natural shielding to reduce the exposure of persons to the flame, radiant heat, and ember attack from bushfire and consequential fire.						
2.8	On-site Shelter Building – Community Refuge: For 'vulnerable' persons (refer to Glossary), provide a building which is constructed in accordance with the NCC and the ABCB Design and Construction of Community Bushfire Refuges – Information Handbook [20]. Note: The minimum requirement for floor area per person of 0.75 m^2 may be increased by relevant authorities in specific jurisdictions (e.g., to 1.0 m^2 in WA, Guidelines v1.4 [22]).	High	Yes	No	No	Yes
Assessment Comments: The building will be constructed to BAL-29 and the APZ will ensure 10kWm2 or less heat flux exposure.						

PROTECTION MEASURES AVAILABLE TO REDUCE EXPOSURE LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk	Persons Onsite And Temporarily Offsite					
Recommendation Details: Construct nominated shelter in place building to BAL-29 requirements and manage the APZ to ensure less than 10kWm2 heat flux exposure during a bushfire event.						
2.9	On-site Shelter Building **–** Not to Community Refuge [20] Standard: For 'vulnerable' persons (refer to Glossary) where accommodation is not part of the site use, provide a building that will not be subject to radiant heat flux in excess of 10 kW/m^2 (determined using AS 3959 BAL determination methodology [4] and applying a flame temperature of 1200 K) and constructed to the bushfire standard corresponding to the BAL-29 rating (to provide greater resistance to consequential fire).	High	N/A	N/A	N/A	N/A
Assessment Comments: The facility is not a vulnerable land use. *Recommendation Details:* Not Applicable						
2.10	On-site Shelter Building **–** No**t a 'Vulnerable' Use**: For sites and uses other than those involving 'vulnerable' persons (refer to Glossary), provide a building that incorporates sufficient design and construction protection measures to reduce the building vulnerability to bushfire and consequential fire threats to an appropriate level (refer to the section of this report that identifies bushfire protection measures to reduce the vulnerability of buildings/structures). Alternatively, provide a building that will not be subject to radiant heat flux in excess of 10 kW/m^2 (determined using AS 3959 BAL determination methodology [4] and applying a flame temperature of 1200 K) and constructed to the bushfire standard corresponding to the BAL-29 rating (to provide greater resistance to consequential fire).	High	Yes	No	No	Yes
Assessment Comments: The office/crib room building will be constructed to BAL-29 and the APZ will ensure less than 10kWm2 heat flux exposure. *Recommendation Details:* The flame temperature will be calculated at 1200k rather than 1090k and the office/crib room will be constructed to NASH standard						
2.11	On-site Shelter Structure **–** Class 10c: Provide a private bushfire shelter (Class 10c building) constructed in accordance with the NCC and the *Performance Standard – The design and construction of private bushfire shelter (ABCB 2014).* This is not a standalone measure but an additional measure as a last resort.	High	N/A	N/A	N/A	N/A
Assessment Comments: Not Required *Recommendation Details:* Not Applicable						
2.12	Constructed Barrier **–** Shield Persons in the Open: Construct walls / fences / landforms as shielding structures that are not buildings, applying appropriate fire resistant / non-combustible construction materials (e.g. masonry, steel, earthworks).	Medium	N/A	N/A	N/A	N/A

PROTECTION MEASURES AVAILABLE TO REDUCE EXPOSURE LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk	Persons Onsite And Temporarily Offsite					
	These are to withstand the impact of direct bushfire attack mechanisms for the required period of time and provide the required reduction in threat levels to persons in the open. Construction requirements will correspond, as a minimum, to the BAL-FZ requirements for walls as established by AS 3959:2018 [4] and/or the NASH Standard [33] and additionally informed by the research report 'Research and Investigation into the Performance of Residential Boundary Fencing Systems in Bushfires' [29].					
Assessment Comments: Not Required *Recommendation Details:* Not Applicable						
2.13	Natural Barrier – Shield Persons in the Open: Utilise natural landforms that have the potential to shield persons from the bushfire and consequential fire threats.	Medium	N/A	N/A	N/A	N/A
Assessment Comments: Not Required *Recommendation Details:* Not Applicable						
2.14	Constructed/Natural Barrier – Shielding for Persons on Pathways to Safer Onsite Area/Building: Where possible, alongside pathways to an on-site shelter building/area, utilise walls / fences / landforms as shielding structures constructed using fire resistant / non-combustible construction materials (e.g. masonry, steel, earthworks). These are to withstand the impact of direct bushfire attack mechanisms for the required period of time and provide the required reduction in threat levels to persons (including firefighters) traversing the pathway. Construction can be informed by the BAL-FZ requirements for walls as established by AS 3959:2018 [4] and/or the NASH Standard [33] and additionally informed by the research report 'Research and Investigation into the Performance of Residential Boundary Fencing Systems in Bushfires' [29].	Medium	N/A	N/A	N/A	N/A
Assessment Comments: Not Required *Recommendation Details:* Not Applicable						

[1] Protection Measure Effectiveness Rating: Refer to Appendix A1.2.4 for explanation and defining.

[2] Protection Measure Application Status:

- Possible: Protection measures that can potentially be applied to the proposed development/use.

PROTECTION MEASURES AVAILABLE TO REDUCE EXPOSURE LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk	Persons Onsite And Temporarily Offsite					

- Fully or Partly Exists: A current state assessment of protection measures already implemented by existing components of the proposed development/use. The status of current implementation can also be fully or partly. These measures are accounted for in assessing 'inherent' risk levels (refer to Glossary).
- Currently Planned: Protection measures that:
  - Are incorporated into the site plans;
  - Exist in an approved Bushfire Management Plan (BMP) and/or Bushfire Emergency Plan (BEP) and are comprised of the applicable acceptable solutions (established by the 'Guidelines for planning in bushfire prone areas', DPLH as amended), alternative solutions and any additional recommended protection measures - for which a responsibility for their implementation has been created and approved; and/or
  - Exist in a yet to be submitted Bushfire Management Plan (BMP) and/or Bushfire Emergency Plan (BEP) and are comprised of the applicable acceptable solutions (established by the 'Guidelines for planning in bushfire prone areas', DPLH as amended), that can be met and for which a responsibility for their implementation can be created in the BMP.

  These planned measures are accounted for in assessing 'inherent' risk levels (refer to Glossary).
- Additionally Recommend: Protection measures that:
  - Exist in a yet to be submitted Bushfire Management Plan (BMP) and/or Bushfire Emergency Plan (BEP) and comprise alternative solutions and/or additional recommended protection measures (that can and should be implemented in the opinion of the bushfire consultant), and for which a responsibility for their implementation can be created in the BMP; and/or
  - Are developed in the process of producing this risk assessment and management report and for which a responsibility for their implementation can be created in the BMP.

  These additionally recommended measures, along with existing and planned measures, are accounted for in assessing 'residual' risk levels (refer to Glossary).

5.3.1.2 PROTECTION MEASURES - EFFECTIVENESS AND NUMBER APPLIED

For the stated element at risk, the numbers of both available and potentially applied bushfire protection measures are summarised and the effectiveness of each measure at reducing exposure levels is stated (refer to Appendix 1 for explanatory and supporting information).

This information is applied in the following section of this report to the derivation of the potential for applied bushfire protection measures to reduce the exposure of the relevant element at risk to bushfire hazard threats.

EXPOSURE REDUCING PROTECTION MEASURE ANALYSIS							
Element at Risk	Persons Onsite and Temporarily Offsite						
The Protection Mechanism	Effectiveness Rating [1]	Numbers of Protection Measures					
		Total Availabl e	Application Status [2]				
			Possible	Fully Exists	Partly Exists	Currently Planned	Additionally Recommen
Establish Sufficient Separation from Relevant Bushfire Hazard Threats	Very High	1	1				1
	High	2	2				2
	Medium	1	1			1	1
	Not Relevant	3					
Establish Shielding from Relevant Bushfire Hazard Threats	Very High						
	High	2	2				2
	Medium						
	Not Relevant	3					
Number Analysis	Very High	1	1				1
	High	4	4				4
	Medium	1	1			1	1
	Not Relevant	6					
	Totals	12	6			1	6

[1] Protection Measure Effectiveness Rating: Refer to Appendix A1.2.4 for explanation and defining.

[2] Protection Measure Application Status: Refer to table footnotes in the preceding Section.

5.3.1.3 PROTECTION MEASURES - EXPOSURE REDUCING POTENTIAL

For the stated element at risk and identified bushfire hazard, the potential for applied bushfire protection measures to reduce indicative exposure levels is assessed as a function of:

- The number of bushfire protection measures that can be applied compared to the number available; and
- The weighting applied to each protection measure that indicates how effective it can be at reducing the exposure of elements at risk.

ASSESSED POTENTIAL OF APPLIED PROTECTION MEASURES TO REDUCE EXPOSURE TO BUSHFIRE HAZARD THREATS [1]							
Element at Risk	Persons Onsite and Temporarily Offsite						
ASSESSMENT OF PROTECTION MEASURES APPLIED TO THE DERIVATION OF AN INHERENT EXPOSURE LEVEL [3]							
Direct Attack Mechanisms [2]				Indirect Attack Mechanisms [2]			
Flame Contact	Radiant Heat	Embers / Burning Debris	High / Erratic Fire Driven Wind	Debris Production / Accumulation	Surface Fire	Tree Strike / Obstruction	Consequential (Local) Fire
Minimal	Moderate	Moderate	Minimal	Moderate	Minimal	None	Significant
Moderate				Moderate			
ASSESSMENT OF PROTECTION MEASURES APPLIED TO THE DERIVATION OF A RESIDUAL EXPOSURE LEVEL [4]							
Direct Attack Mechanisms [2]				Indirect Attack Mechanisms [2]			
Flame Contact	Radiant Heat	Embers / Burning Debris	High / Erratic Fire Driven Wind	Debris Production / Accumulation	Surface Fire	Tree Strike / Obstruction	Consequential (Local) Fire
None	Minimal	Moderate	Minimal	Minimal	Minimal	None	Minimal
Minimal				Minimal			

[1] Refer to Appendix 1 for explanatory and supporting information.

[2] Refer to Appendix 2 for explanatory information.

[3] Accounts for all currently implemented bushfire protection measures and those planned to be implemented.

[4] Additionally accounts for bushfire protection measures recommended to be implemented by the bushfire consultant.

Assessment Comments: No additional comment.

5.3.1.4 ASSESSED EXPOSURE LEVEL (INHERENT AND RESIDUAL)

The preceding bushfire protection measure analysis has enabled the derivation of the indicative inherent and residual exposure levels. These exposure levels are indicative as they are derived through a qualitative assessment process. In combination with the corresponding assessed threat and vulnerability levels, they will be applied to deriving the indicative inherent and residual bushfire risk levels.

ASSESSED INDICATIVE EXPOSURE LEVELS – POST APPLICATION OF BUSHFIRE PROTECTION MEASURES [1]							
ELEMENT AT RISK		Persons Onsite and Temporarily Offsite					
BUSHFIRE ATTACK MECHANISMS [2]		INHERENT EXPOSURE LEVEL [3]					OVERALL
DIRECT	Flame Contact [5]	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	Moderate
DIRECT	Radiant Heat [5]	Very Low ☐	Low ☐	Moderate ☒	High ☐	Extreme ☐	
DIRECT	Embers / Burning Debris	Very Low ☐	Low ☐	Moderate ☒	High ☐	Extreme ☐	
DIRECT	High/Erratic Fire Driven Wind	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Debris Production / Accumulation	Very Low ☐	Low ☐	Moderate ☒	High ☐	Extreme ☐	
INDIRECT	Surface Fire	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Tree Strike / Obstruction	Very Low ☒	Low ☐	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Consequential (Local) Fire	Very Low ☐	Low ☐	Moderate ☐	High ☒	Extreme ☐	
BUSHFIRE ATTACK MECHANISMS [2]		RESIDUAL EXPOSURE LEVEL [4]					OVERALL
DIRECT	Flame Contact [5]	Very Low ☒	Low ☐	Moderate ☐	High ☐	Extreme ☐	Low
DIRECT	Radiant Heat [5]	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	
DIRECT	Embers / Burning Debris	Very Low ☐	Low ☐	Moderate ☒	High ☐	Extreme ☐	
DIRECT	High/Erratic Fire Driven Wind	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Debris Production / Accumulation	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Surface Fire	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Tree Strike / Obstruction	Very Low ☒	Low ☐	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Consequential (Local) Fire	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	

[1] Refer to Appendix 1 for explanatory information.

[2] Refer to Appendix 2 for explanatory information.

[3] Accounts for all currently implemented bushfire protection measures and those planned to be implemented.

[4] Additionally accounts for bushfire protection measures recommended to be implemented by the bushfire consultant.

[5] The level of exposure to flames and radiant heat is derived from the assessed indicative BAL ratings (refer to the BAL contour map). The exposure levels applied are BAL-LOW/Very Low Exposure, BAL-12.5/Low Exposure, BAL-19/Moderate Exposure, BAL-29/High Exposure, BAL-40 and BAL-FZ/Extreme Exposure.

Assessment Comments: There will potentially be a significant reduction in exposure for persons on site during a bushfire event. The site exposure level will be a maximum 10kWm2 heat flux on built assets.

5.3.2 PERSONS ON ACCESS/EGRESS ROUTES IN VEHICLES

5.3.2.1 PROTECTION MEASURES - IDENTIFICATION AND APPLICATION STATUS

ACCESS/EGRESS ROUTE: Gull, Road

PROTECTION MEASURES AVAILABLE TO REDUCE EXPOSURE LEVELS				Effectiveness Rating [1]	Application Status [2]			
					Possible	Exists	Planned	Additionally Recommend
Element at Risk	Persons On Access / Egress Routes In Vehicles	Access Route Description	Gull Road is approximately 4kms from the nearest two-way access route at the lakes Road. Gull Rd is sealed with approximately 4m surface and is bordered by pastured paddocks and forest fuels within the road drainage area. Gull Rd has good line of site.					
THE PROTECTION MECHANISM - ESTABLISH SUFFICIENT SEPARATION FROM RELEVANT BUSHFIRE HAZARD THREATS: To utilise distance away from relevant bushfire hazard threats (primarily flames, radiant heat and tree strike/obstruction) while traversing an access/egress route in a vehicle to lower the exposure of persons for the expected time on the route.								
3.1	Locate Access/Egress Routes Away from Adjacent Hazards: Existing or to be installed vehicular access/egress route components (roads, access ways, and driveways) are positioned to maximise the distance away from any adjacent bushfire prone vegetation where possible.			High	No	No	No	Yes
Assessment Comments: Gull Road is a public road and cannot be moved or managed. The internal driveway verge can be managed *Recommendation Details:* Not Applicable								
3.2	Egress Routes Located to Ensure Driving Away from Hazard: Existing or to be installed vehicular access/egress route components (roads, access ways, and driveways) are positioned so that the direction of egress is away from the hazard into lower threat areas.			Very High	Yes	No	No	Yes
Assessment Comments: The driveway extending to Gull Road can be managed. The driveway verge will be managed. *Recommendation Details:* Driveway verge to be managed. 3m from the limestone road base driveway will be slashed prior fire season.								
3.3	Greater Road Width: Wider roads will allow for a greater separation distance between traversing vehicles and the bushfire hazard. The incorporation of non-vegetated and trafficable road verges/shoulders and adjacent footpaths can also safely increase effective separation for slower moving vehicles.			High	Yes	No	No	Yes
Assessment Comments: The driveway will meet public road requirements and additional verge slashing is required.								

PROTECTION MEASURES AVAILABLE TO REDUCE EXPOSURE LEVELS				Effectiveness Rating [1]	Application Status [2]			
					Possible	Exists	Planned	Additionally Recommend
Element at Risk	Persons On Access / Egress Routes In Vehicles	Access Route Description	Gull Road is approximately 4kms from the nearest two-way access route at the lakes Road. Gull Rd is sealed with approximately 4m surface and is bordered by pastured paddocks and forest fuels within the road drainage area. Gull Rd has good line of site.					
Recommendation Details: 3m wide verge slashing is required.								
3.4	Reduce and Maintain Road Verge Fuel to a Low Threat State: Road verges, or part off, support low threat vegetation or vegetation is removed or reduced and maintained to a minimal fuel condition to increase the separation distance from the bushfire hazard. This is practical when an authority exists to conduct the management and will have greater threat reducing impact as a protection measure, if there is certainty it will be carried out.			Medium	Yes	No	No	Yes
Assessment Comments: The driveway will meet public road requirements and additional verge slashing is required. *Recommendation Details:* 3m wide verge slashing is required.								
THE PROTECTION MECHANISM – ESTABLISH SHIELDING FROM RELEVANT BUSHFIRE HAZARD THREATS: To utilise constructed or natural shielding to reduce the exposure of persons, traversing the access/egress routes, to relevant bushfire threats (primarily flames, radiant heat and embers). To assist with ensuring the level of exposure to the threats is survivable for the expected time on the route while travelling in a vehicle.								
3.5	Ensure Evacuation Vehicle Types Provide a Degree of Protection: People can only tolerate low levels of radiant heat without some protection. Vehicles provide some protection from low intensity fires (if they stay on cleared area and remain in the vehicle) but they will not protect people in moderate to intense grass fires or in any location where scrub or forest adjoin the road. Protection provided by vehicles with predominantly metal bodies (including roof) and able to be enclosed (glass window), while limited is also still significant. It is particularly significant when compared to other potentially available modes of transport on roads (e.g. open top/backed vehicles, motorbikes, bicycles and being on foot). The availability such vehicles of required capacity can contribute to reduced exposure to the bushfire threats for persons on access/egress routes.			Medium	N/A	N/A	N/A	N/A
Assessment Comments: Shelter in place building is provided on site. Late evacuation will not occur. *Recommendation Details:* Not Applicable								
[1] Protection Measure Effectiveness Rating: Refer to Appendix A1.2.4 for explanation and defining. [2] Protection Measure Application Status:								

PROTECTION MEASURES AVAILABLE TO REDUCE EXPOSURE LEVELS				Effectiveness Rating [1]	Application Status [2]			
					Possible	Exists	Planned	Additionally Recommend
Element at Risk	Persons On Access / Egress Routes In Vehicles	Access Route Description	Gull Road is approximately 4kms from the nearest two-way access route at the lakes Road. Gull Rd is sealed with approximately 4m surface and is bordered by pastured paddocks and forest fuels within the road drainage area. Gull Rd has good line of site.					

- Possible: Protection measures that can potentially be applied to the proposed development/use.
- Fully or Partly Exists: A current state assessment of protection measures already implemented by existing components of the proposed development/use. The status of current implementation can also be fully or partly. These measures are accounted for in assessing 'inherent' risk levels (refer to Glossary).
- Currently Planned: Protection measures that:
  - Are incorporated into the site plans;
  - Exist in an approved Bushfire Management Plan (BMP) and/or Bushfire Emergency Plan (BEP) and are comprised of the applicable acceptable solutions (established by the 'Guidelines for planning in bushfire prone areas', DPLH as amended), alternative solutions and any additional recommended protection measures - for which a responsibility for their implementation has been created and approved; and/or
  - Exist in a yet to be submitted Bushfire Management Plan (BMP) and/or Bushfire Emergency Plan (BEP) and are comprised of the applicable acceptable solutions (established by the 'Guidelines for planning in bushfire prone areas', DPLH as amended), that can be met and for which a responsibility for their implementation can be created in the BMP.

  These planned measures are accounted for in assessing 'inherent' risk levels (refer to Glossary).
- Additionally Recommend: Protection measures that:
  - Exist in a yet to be submitted Bushfire Management Plan (BMP) and/or Bushfire Emergency Plan (BEP) and comprise alternative solutions and/or additional recommended protection measures (that can and should be implemented in the opinion of the bushfire consultant), and for which a responsibility for their implementation can be created in the BMP; and/or
  - Are developed in the process of producing this risk assessment and management report and for which a responsibility for their implementation can be created in the BMP.

  These additionally recommended measures, along with existing and planned measures, are accounted for in assessing 'residual' risk levels (refer to Glossary).

5.3.2.2 PROTECTION MEASURES - EFFECTIVENESS AND NUMBER APPLIED

For the stated element at risk, the numbers of both available and potentially applied bushfire protection measures are summarised and the effectiveness of each measure at reducing exposure levels is stated (refer to Appendix 1 for explanatory and supporting information).

This information is applied in the following section of this report to the derivation of the potential for applied bushfire protection measures to reduce the exposure of the relevant element at risk to bushfire hazard threats.

EXPOSURE REDUCING PROTECTION MEASURE ANALYSIS							
Element at Risk	Persons on Access / Egress Routes in Vehicles						
The Protection Mechanism	Effectiveness Rating [1]	Numbers of Protection Measures					
		Total Available	Application Status [2]				
			Possible	Fully Exists	Partly Exists	Currently Planned	Additionally Recommen
Establish Sufficient Separation from Relevant Bushfire Hazard Threats	Very High	1	1				1
	High	2	1				2
	Medium	1	1				1
	Not Relevant						
Establish Shielding from Relevant Bushfire Hazard Threats	Very High						
	High						
	Moderate						
	Not Relevant	1					
Number Analysis	Very High	1	1				1
	High	2	1				2
	Medium	1	1				1
	Not Relevant	1					
	Totals	5	3				4

[1] Protection Measure Effectiveness Rating: Refer to Appendix A1.2.4 for explanation and defining.

[2] Protection Measure Application Status: Refer to table footnotes in the preceding Section.

5.3.2.3 PROTECTION MEASURES - EXPOSURE REDUCING POTENTIAL

For the stated element at risk and identified bushfire hazard, the potential for applied bushfire protection measures to reduce indicative exposure levels is assessed as a function of:

- The number of bushfire protection measures that can be applied compared to the number available; and
- The weighting applied to each protection measure that indicates how effective it can be at reducing the exposure of elements at risk.

ASSESSED POTENTIAL OF APPLIED PROTECTION MEASURES TO REDUCE EXPOSURE TO BUSHFIRE HAZARD THREATS [1]							
Element at Risk	Persons On Access/Egress Routes In Vehicles						
ASSESSMENT OF PROTECTION MEASURES APPLIED TO THE DERIVATION OF AN INHERENT EXPOSURE LEVEL [3]							
Direct Attack Mechanisms [2]				Indirect Attack Mechanisms [2]			
Flame Contact	Radiant Heat	Embers / Burning Debris	High / Erratic Fire Driven Wind	Debris Production / Accumulation	Surface Fire	Tree Strike / Obstruction	Consequential (Local) Fire
Moderate	Significant	Moderate	Minimal	Moderate	Minimal	Moderate	None
Moderate				Moderate			
ASSESSMENT OF PROTECTION MEASURES APPLIED TO THE DERIVATION OF A RESIDUAL EXPOSURE LEVEL [4]							
Direct Attack Mechanisms [2]				Indirect Attack Mechanisms [2]			
Flame Contact	Radiant Heat	Embers / Burning Debris	High / Erratic Fire Driven Wind	Debris Production / Accumulation	Surface Fire	Tree Strike / Obstruction	Consequential (Local) Fire
Moderate	Significant	Moderate	Minimal	Moderate	Minimal	Moderate	None
Moderate				Moderate			

[1] Refer to Appendix 1 for explanatory and supporting information.

[2] Refer to Appendix 2 for explanatory information.

[3] Accounts for all currently implemented bushfire protection measures and those planned to be implemented.

[4] Additionally accounts for bushfire protection measures recommended to be implemented by the bushfire consultant.

Assessment Comments: No comment

5.3.2.4 ASSESSED EXPOSURE LEVEL (INHERENT AND RESIDUAL)

The preceding bushfire protection measure analysis has enabled the derivation of the indicative inherent and residual exposure levels. These exposure levels are indicative as they are derived through a qualitative assessment process. In combination with the corresponding assessed threat and vulnerability levels, they will be applied to deriving the indicative inherent and residual bushfire risk levels.

ASSESSED INDICATIVE EXPOSURE LEVELS – POST APPLICATION OF BUSHFIRE PROTECTION MEASURES [1]							
ELEMENT AT RISK		Persons On Access/Egress Routes in Vehicles					
BUSHFIRE ATTACK MECHANISMS [2]		INHERENT EXPOSURE LEVEL [3]					OVERALL
DIRECT	Flame Contact [5]	Very Low ☐	Low ☐	Moderate ☒	High ☐	Extreme ☒	Moderate
DIRECT	Radiant Heat [5]	Very Low ☐	Low ☐	Moderate ☐	High ☒	Extreme ☐	
DIRECT	Embers / Burning Debris	Very Low ☐	Low ☐	Moderate ☒	High ☐	Extreme ☐	
DIRECT	High/Erratic Fire Driven Wind	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Debris Production / Accumulation	Very Low ☐	Low ☐	Moderate ☒	High ☐	Extreme ☐	
INDIRECT	Surface Fire	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Tree Strike / Obstruction	Very Low ☐	Low ☐	Moderate ☒	High ☐	Extreme ☐	
INDIRECT	Consequential (Local) Fire	Very Low ☒	Low ☐	Moderate ☐	High ☐	Extreme ☐	
BUSHFIRE ATTACK MECHANISMS [2]		RESIDUAL EXPOSURE LEVEL [4]					OVERALL
DIRECT	Flame Contact [5]	Very Low ☐	Low ☐	Moderate ☒	High ☐	Extreme ☐	Moderate
DIRECT	Radiant Heat [5]	Very Low ☐	Low ☐	Moderate ☐	High ☒	Extreme ☐	
DIRECT	Embers / Burning Debris	Very Low ☐	Low ☐	Moderate ☒	High ☐	Extreme ☐	
DIRECT	High/Erratic Fire Driven Wind	Very Low ☐	Low ☒	Moderate ☒	High ☐	Extreme ☐	
INDIRECT	Debris Production / Accumulation	Very Low ☐	Low ☐	Moderate ☒	High ☐	Extreme ☐	
INDIRECT	Surface Fire	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Tree Strike / Obstruction	Very Low ☐	Low ☐	Moderate ☒	High ☐	Extreme ☐	
INDIRECT	Consequential (Local) Fire	Very Low ☒	Low ☐	Moderate ☐	High ☐	Extreme ☐	

[1] Refer to Appendix 1 for explanatory information.

[2] Refer to Appendix 2 for explanatory information.

[3] Accounts for all currently implemented bushfire protection measures and those planned to be implemented.

[4] Additionally accounts for bushfire protection measures recommended to be implemented by the bushfire consultant.

[5] The level of exposure to flames and radiant heat is derived from the assessed indicative BAL ratings (refer to the BAL contour map). The exposure levels applied are BAL-LOW/Very Low Exposure, BAL-12.5/Low Exposure, BAL-19/Moderate Exposure, BAL-29/High Exposure, BAL-40 and BAL-FZ/Extreme Exposure.

Assessment Comments: No comment

5.3.3 BUILDINGS AND STRUCTURES - NCC CLASSES 1-10

5.3.3.1 PROTECTION MEASURES - IDENTIFICATION AND APPLICATION STATUS

PROTECTION MEASURES AVAILABLE TO REDUCE EXPOSURE LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk:	Buildings/Structures - NCC Classes 1-10					
THE PROTECTION MECHANISM – ESTABLISH SUFFICIENT SEPARATION FROM RELEVANT BUSHFIRE HAZARD THREATS: To reduce exposure to the relevant direct and indirect attack mechanisms of bushfire by locating buildings and attached/adjacent structures at sufficient distances away from the bushfire hazard and consequential fire fuels. The required distances will be dependent on the indicative threat levels and the degree of bushfire resilience that exists or is planned to be incorporated into the exposed elements through design and construction.						
4.1	Siting of Buildings/Structures Considering Potential High Wind Exposure: Site buildings and attached/adjacent structures in locations that have less exposure to terrain influenced prevailing synoptic winds, and in particular, those locations with potential for significant terrain/bushfire threat intensification interactions (refer to Appendix 3). Avoid the top and sides of ridges. Strong winds can directly or indirectly (airborne materials/debris) cause damage to the external building envelope, potentially allowing flame, radiant heat and ember entry.	High	N/A	N/A	N/A	N/A
Assessment Comments: The site is located on flat ground and will be exposed to little fire driven wind. *Recommendation Details:* Not Applicable						
4.2	Designed Location of Non-Vegetated Areas and/or Managed Open Space: Non-vegetated land uses include footpaths, paved areas, roads, parking, open drainage channels, and major services delivery (power, water, gas) installed in common corridors. Managed open space is land for public or private use on which the vegetation is either low threat due to type or situation or is continually managed in a minimal fuel condition. This can include public open space providing recreation facilities. Use these design elements to create or increase separation from any bushfire prone vegetation by positioning them adjacent to the bushfire hazard.	Very High	Yes	Partly	Partly	No
Assessment Comments: Operational areas including trafficable area frequented by trunks will be included as part of the APZ (Low Threat area). *Recommendation Details:* Not Applicable						

PROTECTION MEASURES AVAILABLE TO REDUCE EXPOSURE LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk:	Buildings/Structures - NCC Classes 1-10					
4.3	Landscaping - Asset Protection Zone (APZ): Ensure an APZ is established surrounding the relevant element(s) at risk to create the required separation distance from the bushfire hazard to protect against the direct attack mechanisms of flame contact and radiant heat and reduce exposure to embers. *In addition to providing separation from the direct bushfire attack mechanisms, the nature of the APZ design and management requirements is intended to minimise the potential impact of the indirect bushfire attack mechanisms of surface fire attack, debris production and accumulation, tree strike and consequential fire (refer to Appendix 2).* This is achieved by ensuring the APZ contains low threat vegetation; and/or has potential fire fuels managed in a minimal fuel condition; and/or contains non-vegetated areas (e.g. footpaths, paved areas, driveways, parking, swimming pools etc) and/or limits the presence/location of constructed/stored combustible items. For different States and local government areas, APZ establishment and maintenance guides ideally need to be local environment specific. Some authorities establish general requirements while specific requirements may also be established through site specific management documents (e.g. bushfire management plan). The required dimensions of the APZ will correspond to the maximum level of radiant heat the exposed element is to be exposed to – or a greater distance if it is stipulated by a relevant authority. As a minimum avoid dimensions (separation distances) that correspond to BAL-FZ and BAL-40 ratings for any given site/vegetation combination of relevant parameters. This will also apply to BAL-29 separation distances if flame length modelling indicates potential contact due to specific site and effective slope configurations. The location of an APZ should be entirely within the boundaries of each lot so that landowners can have control and responsibility for its implementation and maintenance. Exceptions exist for instances where adjoining land is not vegetated or it can be justified that the fire fuels will be managed in a minimal fuel, low threat state on an ongoing basis, in perpetuity.	Very High	Yes	No	Partly	Yes
Assessment Comments: The planning APZ (BAL-29) will be established and maintained as per the BMP. *Recommendation Details:* 10kWm2 @ 1200k APZ will be constructed and maintained around the nominated shelter in place building.						
4.4	Landscaping - Tree Location: Use separation to minimise the potential for debris accumulation and tree strike damage to the building/structures that will allow flame, radiant heat and ember entry to internal spaces. Principles to apply are: • The buildings/structures are separated from trees (or trees from buildings) by a distance of at least 1.5 times the height of the tallest tree; and	Medium	Yes	No	Yes	Partly

PROTECTION MEASURES AVAILABLE TO REDUCE EXPOSURE LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk:	Buildings/Structures - NCC Classes 1-10					
	• Trees that produce significant quantities of debris (fine fuels) during the bushfire season should be located a sufficient distance away from vulnerable exposed elements to ensure debris cannot drop and accumulate within at least 4m of buildings/structures or be likely to be relocated by wind to closer than 4m to buildings / structures. Avoid planting trees with ribbon or stringy bark (ember/firebrand production). • If the minimum distance cannot be achieved with an existing tree either remove the tree or at least ensure tree branches are sufficiently separated from buildings and attached/adjacent structures (at a minimum to not overhang) to ensure branches cannot fall onto or be blown onto the buildings/structures.					
Assessment Comments: Not Required *Recommendation Details:* Avoid planting trees that allow fire to ascend the trunk and produce embers and firebrands.						
4.5	Separation from Stored Flammable Products - Gas in Cylinders: To reduce the potential for gas flaring or explosion (consequential fire), installation of LPG cylinders is to apply as a minimum, the principles and requirements established in AS 1596 'The Storage and Handling of LP Gas'. Readily available guidance is provided by CSIRO Best Practice Bushfire Guide (https://research.csiro.au/bushfire/new-builds/water-electricity-gas/) and WA Dept. Mines, Industry, Regulation and Safety 'LP Gas cylinder safety in bushfire prone areas' (https://www.commerce.wa.gov.au/publications/lp-gas-cylinder-safety-bushfire-prone-areas). Otherwise, the required separation distance is 6m from any combustible materials. Heat from bushfire or consequential fire can be sufficient to cause cylinder pressure to reach critical levels and the pressure relief valve release large quantities of gas (flare). If the cylinder falls over the pressure relief valve may not function correctly, and the cylinder may rupture (explosion).	Medium	N/A	N/A	N/A	N/A
Assessment Comments: No gas cylinders on site. *Recommendation Details:* Not Applicable						
4.6	Separation from Stored Flammable Products – Fuels / Other Hazardous Materials (Consequential Fire Fuels): Establish sufficient separation distance between these consequential fire fuels and buildings/structures. The required separation distance will be dependent on the fuel and storage type.	High	Yes	No	No	Yes
Assessment Comments: Include in facility guidance document appropriate storage of flammable liquids and stored items to reduce the risk of consequential fire.						

PROTECTION MEASURES AVAILABLE TO REDUCE EXPOSURE LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk:	Buildings/Structures - NCC Classes 1-10					
Recommendation Details: Include in facility guidelines to direct the storage of fuel, flammable liquids and workshop gas bottles, used and new oils storage and other flammable items.						
4.7	Separation from Stored and Constructed Combustible Items (Consequential Fire Fuels): These consequential fire fuels include: • Stored Combustible Items - Heavy Fuels (>6mm diameter) e.g. building materials, packaging materials, firewood, branches, sporting/playground equipment, outdoor furniture, rubbish bins etc; • Stored Combustible Items – Large Heavy Fuels e.g. vehicles, caravans, boats and large quantities of dead vegetation materials stored as part of site use; • Constructed Combustible Items – Heavy Fuels e.g. landscaping structures including fences, screens, walls, plastic water tanks; and • Constructed Combustible Items – Large Heavy Fuels e.g. adjacent buildings/structures including houses, sheds, garages, carports. (Note: If the adjacent structure is constructed to BAL-29 requirements or greater and can implement a significant number of additional bushfire protection measures associated with reducing exposure and vulnerability, these minimum separation distances could be reduced by 30%) [31]. *Apply the rule of thumb [13] "assume flames produced from a consequential fire source will be twice as high as the object itself … where the consequential fire source is a structure, then the maximum eave height is a reasonable measure of maximum height".* Apply the following separation distances from the subject building/structure as a multiple of the height of the consequential fire source and dependent on the bushfire construction standard applied to the building/structure [13 and 31]: • At least six times the height when the building/structure construction incorporates design and materials that is only intended to resist low levels of radiant heat up to 12.5 kW/m^2) and no flame contact; • Between 4 and 6 six times the height when the building/structure construction incorporates design and materials intended to resist radiant heat up to 29 kW/m^2 and no flame contact. • Between 2 and 4 times the height when the building/structure construction incorporates design and materials intended to resist up to 40kW/m^2 and potential flame contact.	High	Yes	No	No	Yes

PROTECTION MEASURES AVAILABLE TO REDUCE EXPOSURE LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk:	Buildings/Structures - NCC Classes 1-10					
	• Less than 2 times the height when the building/structure construction incorporates design and materials intended to resist extreme levels of radiant heat and flame contact. • Zero separation distance is required if the building/structure is separated by a non-combustible FRL 60/60/60 rated wall, or the potential consequential fire source is fully enclosed by the building/structure.					
Assessment Comments: When storage of flammable items or materials are stored on site temporarily (for maintenance etc), separation distances must be complied with. *Recommendation Details:* Include in the guidance document separation distances required for flammable and combustible materials.						
THE PROTECTION MECHANISM – ESTABLISH SHIELDING FROM RELEVANT BUSHFIRE HAZARD THREATS: Reduce exposure the direct bushfire attack mechanisms of flame, radiant heat, surface migration of embers and to a potentially limited extent, fire driven wind - by shielding buildings and attached/adjacent structures or other consequential fire fuels. To also reduce exposure to the indirect attack mechanism of debris accumulation against buildings/structures and other consequential fire fuels.						
4.8	Constructed Barrier – Shielding from Bushfire: Walls, fences and/or landforms to shield the subject building/structure from direct and indirect bushfire attack mechanisms and reduce the potential impact. Must be constructed using appropriate fire resistant / non-combustible construction materials (e.g. masonry, steel, earthworks). These are to withstand the impact of direct bushfire attack mechanisms for the required period of time. Apply the bushfire construction standards for external walls subject to the assessed level of radiant heat or flame contact to which the barrier will be exposed (or otherwise to BAL-FZ requirements). These are established by AS 3959:2018 [4] and/or the NASH Standard [33] and additionally informed by the research report 'Research and Investigation into the Performance of Residential Boundary Fencing Systems in Bushfires.' [29]	High	Yes	No	No	No
Assessment Comments: The measure is not cost-effective or necessary where greater separation distance can be achieved. *Recommendation Details:* Not Applicable. The buildings are not located in BAL-FZ.						
4.9	Constructed Barrier - Shielding from Consequential Fire: Applicable to all consequential fire fuel sources. Install a non-combustible barrier (including complete enclosure when appropriate), of required robustness, that can perform the following as relevant: • Reduce the exposure of the subject building/structure to the threats of consequential fire; and/or • Reduce the exposure of the consequential fire fuels to the bushfire hazard.	High	Yes	No	No	Yes
Assessment Comments: Nil						

PROTECTION MEASURES AVAILABLE TO REDUCE EXPOSURE LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk:	Buildings/Structures - NCC Classes 1-10					
Recommendation Details: Ensure all subfloor spaces are sealed.						
4.10	Natural Landforms Barrier: Use existing natural landforms to reduce buildings/structures exposure to radiant heat, and lower wind speeds (prevailing synoptic and/or fire driven).	High	N/A	N/A	N/A	N/A
Assessment Comments: Not Required *Recommendation Details:* Not Applicable						
4.11	Planted Vegetation Barrier: Use appropriate species (lower flammability) of hedges and trees strategically to reduce (to varying extents) buildings/structures exposure to radiant heat, to filter/trap embers and firebrands, and to lower wind speeds (prevailing synoptic and/or fire driven).	Medium	Yes	No	No	Yes
Assessment Comments: Plantings must be in compliance with the Landscape Management Plan and be complaint with Schedule 1 of the Guidelines for Planning in Bushfire Prone Areas. *Recommendation Details:* Include in the facility guidance documents and operational documents management of planted vegetation.						
4.12	Shield Operation Critical Non-Structural Elements: These are vulnerable elements essential to the continued operation of the building/structure which are potentially exposed to the attack mechanisms of both bushfire and consequential fire. These elements include cabling and plumbing associated with power delivery, data transmission, fuel and water transport. When the use of fire rated materials to the degree necessary is not possible or practical, the application of non-combustible shielding can be applied to reduce exposure to the threats. Shielding includes underground installation.	Medium	Yes	No	Partly	Yes
Assessment Comments: Generators, weighbridge, tank farm, liquid waste receival and any other critical non-structural items to be assessed for heat exposure vulnerabilities. *Recommendation Details:* Position all critical non-structural items in less than 10kWms area and shield electrical cabling, poly tanks and pipes, valves and any other item susceptible to low radiant heat. Include a maintenance regime for debris accumulation management within the guidance document.						

[1] Protection Measure Effectiveness Rating: Refer to Appendix A1.2.4 for explanation and defining.

[2] Protection Measure Application Status:

- Possible: Protection measures that can potentially be applied to the proposed development/use.

PROTECTION MEASURES AVAILABLE TO REDUCE EXPOSURE LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk:	Buildings/Structures - NCC Classes 1-10					

- Fully or Partly Exists: A current state assessment of protection measures already implemented by existing components of the proposed development/use. The status of current implementation can also be fully or partly. These measures are accounted for in assessing 'inherent' risk levels (refer to Glossary).
- Currently Planned: Protection measures that:
  - Are incorporated into the site plans;
  - Exist in an approved Bushfire Management Plan (BMP) and/or Bushfire Emergency Plan (BEP) and are comprised of the applicable acceptable solutions (established by the 'Guidelines for planning in bushfire prone areas', DPLH as amended), alternative solutions and any additional recommended protection measures - for which a responsibility for their implementation has been created and approved; and/or
  - Exist in a yet to be submitted Bushfire Management Plan (BMP) and/or Bushfire Emergency Plan (BEP) and are comprised of the applicable acceptable solutions (established by the 'Guidelines for planning in bushfire prone areas', DPLH as amended), that can be met and for which a responsibility for their implementation can be created in the BMP.

  These planned measures are accounted for in assessing 'inherent' risk levels (refer to Glossary).
- Additionally Recommend: Protection measures that:
  - Exist in a yet to be submitted Bushfire Management Plan (BMP) and/or Bushfire Emergency Plan (BEP) and comprise alternative solutions and/or additional recommended protection measures (that can and should be implemented in the opinion of the bushfire consultant), and for which a responsibility for their implementation can be created in the BMP; and/or
  - Are developed in the process of producing this risk assessment and management report and for which a responsibility for their implementation can be created in the BMP.

  These additionally recommended measures, along with existing and planned measures, are accounted for in assessing 'residual' risk levels (refer to Glossary).

5.3.3.2 PROTECTION MEASURES - EFFECTIVENESS AND NUMBER APPLIED

For the stated element at risk, the numbers of both available and potentially applied bushfire protection measures are summarised and the effectiveness of each measure at reducing exposure levels is stated (refer to Appendix 1 for explanatory and supporting information).

This information is applied in the following section of this report to the derivation of the potential for applied bushfire protection measures to reduce the exposure of the relevant element at risk to bushfire hazard threats.

EXPOSURE REDUCING PROTECTION MEASURE ANALYSIS							
Element at Risk	Buildings / Structures - NCC Classes 1-10						
The Protection Mechanism	Effectiveness Rating [1]	Numbers of Protection Measures					
		Total Available	Application Status [2]				
			Possible	Fully Exists	Partly Exists	Currently Planned	Additionally Recommen
Establish Sufficient Separation from Relevant Bushfire Hazard Threats	Very High	2	2			2	1
	High	2	2				2
	Medium	1					
	Not Relevant	1	1			1	1
Establish Shielding from Relevant Bushfire Hazard Threats	Very High						
	High	3					
	Medium	2					
	Not Relevant						
Number Analysis	Very High	2	2			2	1
	High	5	2				2
	Moderate	3					
	Not Relevant	1	1			1	1
	Totals	11	5			3	4

[1] Protection Measure Effectiveness Rating: Refer to Appendix A1.2.4 for explanation and defining.

[2] Protection Measure Application Status: Refer to table footnotes in the preceding Section.

5.3.3.3 PROTECTION MEASURES - EXPOSURE REDUCING POTENTIAL

For the stated element at risk and identified bushfire hazard, the potential for applied bushfire protection measures to reduce indicative exposure levels is assessed as a function of:

- The number of bushfire protection measures that can be applied compared to the number available; and
- The weighting applied to each protection measure that indicates how effective it can be at reducing the exposure of elements at risk.

ASSESSED POTENTIAL OF APPLIED PROTECTION MEASURES TO REDUCE EXPOSURE TO BUSHFIRE HAZARD THREATS [1]							
Element at Risk	Buildings/Structures - NCC Classes 1-10						
ASSESSMENT OF PROTECTION MEASURES APPLIED TO THE DERIVATION OF AN INHERENT EXPOSURE LEVEL [3]							
Direct Attack Mechanisms [2]				Indirect Attack Mechanisms [2]			
Flame Contact	Radiant Heat	Embers / Burning Debris	High / Erratic Fire Driven Wind	Debris Production / Accumulation	Surface Fire	Tree Strike / Obstruction	Consequential (Local) Fire
Minimal	Moderate	Moderate	Minimal	Moderate	Minimal	None	Significant
Moderate				Moderate			
ASSESSMENT OF PROTECTION MEASURES APPLIED TO THE DERIVATION OF A RESIDUAL EXPOSURE LEVEL [4]							
Direct Attack Mechanisms [2]				Indirect Attack Mechanisms [2]			
Flame Contact	Radiant Heat	Embers / Burning Debris	High / Erratic Fire Driven Wind	Debris Production / Accumulation	Surface Fire	Tree Strike / Obstruction	Consequential (Local) Fire
Minimal	Moderate	Moderate	Minimal	Minimal	Minimal	None	Minimal
Moderate				Minimal			

[1] Refer to Appendix 1 for explanatory and supporting information.

[2] Refer to Appendix 2 for explanatory information.

[3] Accounts for all currently implemented bushfire protection measures and those planned to be implemented.

[4] Additionally accounts for bushfire protection measures recommended to be implemented by the bushfire consultant.

Assessment Comments: It is recommended to reduce consequential fire by sealing subfloors, shielding or reducing the radiant heat exposure to electrical cabling, poly tanks and pipes and also consider the vulnerability od valves etc.

5.3.3.4 ASSESSED EXPOSURE LEVEL (INHERENT AND RESIDUAL)

The preceding bushfire protection measure analysis has enabled the derivation of the indicative inherent and residual exposure levels. These exposure levels are indicative as they are derived through a qualitative assessment process. In combination with the corresponding assessed threat and vulnerability levels, they will be applied to deriving the indicative inherent and residual bushfire risk levels.

ASSESSED INDICATIVE EXPOSURE LEVELS – POST APPLICATION OF BUSHFIRE PROTECTION MEASURES [1]							
ELEMENT AT RISK		Buildings and Structures – NCC Classes 1-10					
BUSHFIRE ATTACK MECHANISMS [2]		INHERENT EXPOSURE LEVEL [3]					OVERALL
DIRECT	Flame Contact [5]	Very Low ☐	Low ☐	Moderate ☒	High ☐	Extreme ☐	Moderate
DIRECT	Radiant Heat [5]	Very Low ☐	Low ☐	Moderate ☒	High ☐	Extreme ☐	
DIRECT	Embers / Burning Debris	Very Low ☐	Low ☐	Moderate ☒	High ☐	Extreme ☐	
DIRECT	High/Erratic Fire Driven Wind	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Debris Production / Accumulation	Very Low ☐	Low ☐	Moderate ☒	High ☐	Extreme ☐	
INDIRECT	Surface Fire	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Tree Strike / Obstruction	Very Low ☒	Low ☐	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Consequential (Local) Fire	Very Low ☐	Low ☐	Moderate ☐	High ☒	Extreme ☐	
BUSHFIRE ATTACK MECHANISMS [2]		RESIDUAL EXPOSURE LEVEL [4]					OVERALL
DIRECT	Flame Contact [5]	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	Moderate
DIRECT	Radiant Heat [5]	Very Low ☐	Low ☐	Moderate ☒	High ☐	Extreme ☐	
DIRECT	Embers / Burning Debris	Very Low ☐	Low ☐	Moderate ☒	High ☐	Extreme ☐	
DIRECT	High/Erratic Fire Driven Wind	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Debris Production / Accumulation	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Surface Fire	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Tree Strike / Obstruction	Very Low ☒	Low ☐	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Consequential (Local) Fire	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	

[1] Refer to Appendix 1 for explanatory information.

[2] Refer to Appendix 2 for explanatory information.

[3] Accounts for all currently implemented bushfire protection measures and those planned to be implemented.

[4] Additionally accounts for bushfire protection measures recommended to be implemented by the bushfire consultant.

[5] The level of exposure to flames and radiant heat is derived from the assessed indicative BAL ratings (refer to the BAL contour map). The exposure levels applied are BAL-LOW/Very Low Exposure, BAL-12.5/Low Exposure, BAL-19/Moderate Exposure, BAL-29/High Exposure, BAL-40 and BAL-FZ/Extreme Exposure.

5.3.4 BUILT INFRASTRUCTURE ASSETS

5.3.4.1 PROTECTION MEASURES - IDENTIFICATION AND APPLICATION STATUS

PROTECTION MEASURES AVAILABLE TO REDUCE EXPOSURE LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk	Built (Hard) Infrastructure Assets					
THE PROTECTION MECHANISM – ESTABLISH SUFFICIENT SEPARATION FROM RELEVANT BUSHFIRE HAZARD THREATS: To reduce exposure to the relevant direct and indirect attack mechanisms of bushfire by locating buildings and attached/adjacent structures at sufficient distances away from the bushfire hazard and consequential fire fuels. The required distances will be dependent on the indicative threat levels and the degree of bushfire resilience that exists or is planned to be incorporated into the exposed elements through design and construction.						
5.1	Siting of Buildings/Structures Considering Potential High Wind Exposure: Site buildings and attached/adjacent structures in locations that have less exposure to terrain influenced prevailing synoptic winds, and in particular, those locations with potential for significant terrain/bushfire threat intensification interactions (refer to Appendix 3). Avoid the top and sides of ridges. Strong winds can directly or indirectly (airborne materials/debris) cause damage to the external building envelope, potentially allowing flame, radiant heat and ember entry.	High	N/A	N/A	N/A	N/A
Assessment Comments: Not Required *Recommendation Details:* Not Applicable						
5.2	Designed Location of Non-Vegetated Areas and/or Managed Open Space: Non-vegetated land uses include footpaths, paved areas, roads, parking, open drainage channels, and major services delivery (power, water, gas) installed in common corridors. Managed open space is land for public or private use on which the vegetation is either low threat due to type or situation or is continually managed in a minimal fuel condition. This can include public open space providing recreation facilities. Use these design elements to create or increase separation from any bushfire prone vegetation by positioning them adjacent to the bushfire hazard.	Very High	Yes	No	Partly	Yes
Assessment Comments: Generator, tank farm and other critical infrastructure to be located, if possible, in 10kWm2 or less heat flux exposure. *Recommendation Details:* Use roads, hardstand areas and footpaths as open managed spaces.						

PROTECTION MEASURES AVAILABLE TO REDUCE EXPOSURE LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk	Built (Hard) Infrastructure Assets					
5.3	Landscaping - Asset Protection Zone (APZ): Ensure an APZ is established surrounding the relevant element(s) at risk to create the required separation distance from the bushfire hazard to protect against the direct attack mechanisms of flame contact and radiant heat and reduce exposure to embers. *In addition to providing separation from the direct bushfire attack mechanisms, the nature of the APZ design and management requirements is intended to minimise the potential impact of the indirect bushfire attack mechanisms of surface fire attack, debris production and accumulation, tree strike and consequential fire (refer to Appendix 2).* This is achieved by ensuring the APZ contains low threat vegetation; and/or has potential fire fuels managed in a minimal fuel condition; and/or contains non-vegetated areas (e.g. footpaths, paved areas, driveways, parking, swimming pools etc) and/or limits the presence/location of constructed/stored combustible items. For different States and local government areas, APZ establishment and maintenance guides ideally need to be local environment specific. Some authorities establish general requirements while specific requirements may also be established through site specific management documents (e.g. bushfire management plan). The required dimensions of the APZ will correspond to the maximum level of radiant heat the exposed element is to be exposed to – or a greater distance if it is stipulated by a relevant authority. As a minimum avoid dimensions (separation distances) that correspond to BAL-FZ and BAL-40 ratings for any given site/vegetation combination of relevant parameters. This will also apply to BAL-29 separation distances if flame length modelling indicates potential contact due to specific site and effective slope configurations. The location of an APZ should be entirely within the boundaries of each lot so that landowners can have control and responsibility for its implementation and maintenance. Exceptions exist for instances where adjoining land is not vegetated or it can be justified that the fire fuels will be managed in a minimal fuel, low threat state on an ongoing basis, in perpetuity.	Very High	Yes	No	No	Yes

Assessment Comments: The required separation distance is a function of the relevant levels of the bushfire threats (attack mechanisms) presented by the vegetation and the relevant vulnerabilities of the identified elements at risk (the generator, communication arial, tank farm and associated infrastructure).

The relevant threats are the flame lengths and the potential for radiant heat transfer as determined from the design fire modelling for the grassland and woodland vegetation types that have been identified.

The relevant vulnerability that has been adopted for the calculations is the identified critical heat exposure for the FOGO Facility (Generator, tank farm and associated infrastructure).

PROTECTION MEASURES AVAILABLE TO REDUCE EXPOSURE LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk	Built (Hard) Infrastructure Assets					
Recommendation Details: To minimise exposure from external radiant heat, a <10kWm2 @ 1090k APZ is required to be established. The dimensions for this APZ are provided within the associated BMP. It is recommended the APZ be increased to 10kWm2 to reduce the overall preheating on combustible materials.						
5.4	Landscaping - Tree Location: Use separation to minimise the potential for debris accumulation and tree strike damage to the building envelop potentially allowing flame, radiant heat and ember entry to internal spaces. • The buildings/structures are separated from trees (or trees from buildings) by a distance of at least 1.5 times the height of the tallest tree. • Trees that produce significant quantities of debris (fine fuels) during the bushfire season should be located a sufficient distance away from vulnerable exposed elements to ensure debris cannot drop and accumulate within at least 4m of buildings/structures or be likely to be relocated by wind to closer than 4m to buildings / structures. • If the minimum distances cannot be achieved with an existing tree either remove the tree or at least ensure tree branches are sufficiently separated from buildings and attached/adjacent structures (at a minimum to not overhang) to ensure branches cannot fall onto or be blown onto the buildings/structures.	Medium	Yes	No	No	No
Assessment Comments: there are not trees on the site. Planting any trees must comply with the landscape plan and BMP_ requirements. *Recommendation Details:* Not Applicable						
5.5	Separation from Stored Flammable Products - Gas in Cylinders: To reduce the potential for gas flaring or explosion (consequential fire), installation of LPG cylinders is to apply as a minimum, the principles and requirements established in AS 1596 'The Storage and Handling of LP Gas'. Readily available guidance is provided by CSIRO Best Practice Bushfire Guide (https://research.csiro.au/bushfire/new-builds/water-electricity-gas/) and WA Dept. Mines, Industry, Regulation and Safety 'LP Gas cylinder safety in bushfire prone areas' (https://www.commerce.wa.gov.au/publications/lp-gas-cylinder-safety-bushfire-prone-areas). Otherwise, the required separation distance is 6m from any combustible materials. Heat from bushfire or consequential fire can be sufficient to cause cylinder pressure to reach critical levels and the pressure relief valve release large quantities of gas (flare). If the cylinder falls over the pressure relief valve may not function correctly, and the cylinder may rupture (explosion).	Medium	N/A	N/A	N/A	N/A
Assessment Comments: There are no LPG gas bottles on site. The workshop may have other gas bottles for workshop use.						

PROTECTION MEASURES AVAILABLE TO REDUCE EXPOSURE LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk	Built (Hard) Infrastructure Assets					
Recommendation Details: Not Applicable						
5.6	Separation from Stored Flammable Products – Fuels / Other Hazardous Materials (Consequential Fire Fuels): Establish sufficient separation distance between these consequential fire fuels and buildings/structures. The required separation distance will be dependent on the fuel and storage type.	High	Yes	No	No	Yes
Assessment Comments: Hazards fuels and material will be stored in accord with manufacturers and Australian Standards requirements. *Recommendation Details:* Where external heat sources have not been considered by the manufacture or Standard, then the separation distance (below item # 7.7) to be used. If cabling and other flammable items are exposed to direct radiant heat, than <10kWm2 will be the maximum exposure.						
5.7	Separation from Stored and Constructed Combustible Items (Consequential Fire Fuels): These consequential fire fuels include: • Stored Combustible Items - Heavy Fuels e.g. building materials, packaging materials, rubbish bins etc; • Stored Combustible Items – Large Heavy Fuels e.g. vehicles, caravans and large quantities of dead vegetation materials stored as part of site use; • Constructed Combustible Items – Heavy Fuels e.g. landscaping structures including fences, screens, walls, plastic water tanks; and • Constructed Combustible Items – Large Heavy Fuels e.g. adjacent buildings/structures including houses, sheds, garages, carports. (Note: If the adjacent structure is constructed to BAL-29 requirements or greater and can implement a significant number of additional bushfire protection measures associated with reducing exposure and vulnerability, these minimum separation distances could be reduced by 30%) [31]. *Apply the rule of thumb [13] "assume flames produced from a consequential fire source will be twice as high as the object itself … where the consequential fire source is a structure, then the maximum eave height is a reasonable measure of maximum height".* Apply the following separation distances from the subject building/structure as a multiple of the height of the consequential fire source and dependent on the construction standard applied to the building/structure [13 and 31]: • At least six times the height when the building/structure construction incorporates design and materials that is only intended to resist low levels of radiant heat up to 12.5 kW/m^2) and no flame contact; • Between 4 and 6 six times the height when the building/structure construction incorporates design and materials intended to resist radiant heat up to 29 kW/m^2 and no flame contact.	High	Yes	No	No	Yes

PROTECTION MEASURES AVAILABLE TO REDUCE EXPOSURE LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk	Built (Hard) Infrastructure Assets					
	• Between 2 and 4 times the height when the building/structure construction incorporates design and materials intended to resist up to 40kW/m^2 and potential flame contact. • Less than 2 times the height when the building/structure construction incorporates design and materials intended to resist extreme levels of radiant heat and flame contact. • Zero separation distance is required if the building/structure is separated by a non-combustible FRL 60/60/60 rated wall, or the potential consequential fire source is fully enclosed by the building/structure.					
Assessment Comments: When storage of flammable items or materials are stored on site temporarily (for maintenance etc), separation distances must be complied with. All combustible are to be removed within 10m of structures onsite. All vegetation, flammable and combustible material is to be removed within 10 metres of the genertor. This includes but is not limited to; waste, leaf litter, machinery, grasses, vehicles, fuel, furniture, and timber. *Recommendation Details:* It is recommended that this 10 metre buffer is sealed or compacted with concrete, compacted limestone, gravel, blue metal etc.						
THE PROTECTION MECHANISM – ESTABLISH SHIELDING FROM RELEVANT BUSHFIRE HAZARD THREATS: To shield buildings and attached/adjacent structures (or other consequential fire fuels) from the direct bushfire attack mechanisms of flame, radiant heat, surface fire and surface migration of embers. To also reduce exposure to the indirect attack mechanism of debris accumulation against buildings/structures and other consequential fire fuels and wind attack.						
5.8	Constructed Barrier – Shielding from Bushfire: Walls, fences and/or landforms to shield the subject building/structure from direct and indirect bushfire attack mechanisms and reduce the potential impact of these. Must be constructed using appropriate fire resistant / non-combustible construction materials (e.g. masonry, steel, earthworks). These are to withstand the impact of direct bushfire attack mechanisms for the required period of time. Apply the bushfire construction standards for external walls subject to the assessed level of radiant heat or flame contact to which the barrier will be exposed (or otherwise to BAL-FZ requirements). These are established by AS 3959:2018 [4] and/or the NASH Standard [33] and additionally informed by the research report 'Research and Investigation into the Performance of Residential Boundary Fencing Systems in Bushfires.' [29]	High	Yes	No	No	No
Assessment Comments: Not Required *Recommendation Details:* Not Applicable						

PROTECTION MEASURES AVAILABLE TO REDUCE EXPOSURE LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk	Built (Hard) Infrastructure Assets					
5.9	Constructed Barrier - Shielding from Consequential Fire: Applicable to all consequential fire fuel sources. Install a non-combustible barrier (including complete enclosure when appropriate), of required robustness, that can perform the following as relevant: • Reduce the exposure of the subject building/structure to the threats of consequential fire; and/or • Reduce the exposure of the consequential fire fuels to the bushfire hazard.	High	Yes	Partly	Partly	Yes
Assessment Comments: Ensure all subfloor spaces are sealed to reduce ember and firebrand penetration. *Recommendation Details:* All subfloors to be enclosed. Shield fuel lines and electrical components extending form the infrastructure						
5.10	Natural Landforms Barrier: Use existing natural landforms to reduce buildings/structures exposure to radiant heat, and lower wind speeds (prevailing synoptic and/or fire driven).	High	N/A	N/A	N/A	N/A
Assessment Comments: There are no natural landforms. *Recommendation Details:* Not Applicable						
5.11	Planted Vegetation Barrier: Use appropriate hedges and trees strategically to reduce (to varying extents) buildings/structures exposure to radiant heat, to filter/trap embers and firebrands, and to lower wind speeds (prevailing synoptic and/or fire driven).	Medium	Yes	No	No	Yes
Assessment Comments: Planting can be applied to the site, however, must be in accordance with the Landscape Plan and Guidelines for Planning lin Bushfire Prone Areas - Schedule 1. *Recommendation Details:* Vegetation planting to be in accordance with the Landscape Plan and Guidelines for Planning lin Bushfire Prone Areas - Schedule 1.						
5.12	Shield Operation Critical Non-Structural Elements: These are vulnerable elements essential to the continued operation of the building/structure which are potentially exposed to the attack mechanisms of both bushfire and consequential fire. These elements include cabling and plumbing associated with power delivery, data transmission, fuel and water transport. When the use of fire rated materials to the degree necessary is not possible or practical, the application of non-combustible shielding can be applied to reduce exposure to the threats. Shielding includes underground installation.	Medium	Yes	No	Partly	Yes

PROTECTION MEASURES AVAILABLE TO REDUCE EXPOSURE LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk	Built (Hard) Infrastructure Assets					

Assessment Comments: Use non-combustible or products with high heat ratings to assist with maintaining their operability.

Recommendation Details: Shielding to include cabling and plumbing associated with power / data transmission, tank farm and associated piping and valves.

[1] Protection Measure Effectiveness Rating: Refer to Appendix A1.2.4 for explanation and defining.

[2] Protection Measure Application Status:

- Possible: Protection measures that can potentially be applied to the proposed development/use.
- Fully or Partly Exists: A current state assessment of protection measures already implemented by existing components of the proposed development/use. The status of current implementation can also be fully or partly. These measures are accounted for in assessing 'inherent' risk levels (refer to Glossary).
- Currently Planned: Protection measures that:
  - Are incorporated into the site plans;
  - Exist in an approved Bushfire Management Plan (BMP) and/or Bushfire Emergency Plan (BEP) and are comprised of the applicable acceptable solutions (established by the 'Guidelines for planning in bushfire prone areas', DPLH as amended), alternative solutions and any additional recommended protection measures - for which a responsibility for their implementation has been created and approved; and/or
  - Exist in a yet to be submitted Bushfire Management Plan (BMP) and/or Bushfire Emergency Plan (BEP) and are comprised of the applicable acceptable solutions (established by the 'Guidelines for planning in bushfire prone areas', DPLH as amended), that can be met and for which a responsibility for their implementation can be created in the BMP.

  These planned measures are accounted for in assessing 'inherent' risk levels (refer to Glossary).
- Additionally Recommend: Protection measures that:
  - Exist in a yet to be submitted Bushfire Management Plan (BMP) and/or Bushfire Emergency Plan (BEP) and comprise alternative solutions and/or additional recommended protection measures (that can and should be implemented in the opinion of the bushfire consultant), and for which a responsibility for their implementation can be created in the BMP; and/or
  - Are developed in the process of producing this risk assessment and management report and for which a responsibility for their implementation can be created in the BMP.

  These additionally recommended measures, along with existing and planned measures, are accounted for in assessing 'residual' risk levels (refer to Glossary).

5.3.4.2 PROTECTION MEASURES - EFFECTIVENESS AND NUMBER APPLIED

For the stated element at risk, the numbers of both available and potentially applied bushfire protection measures are summarised and the effectiveness of each measure at reducing exposure levels is stated (refer to Appendix 1 for explanatory and supporting information).

This information is applied in the following section of this report to the derivation of the potential for applied bushfire protection measures to reduce the exposure of the relevant element at risk to bushfire hazard threats.

The Protection Mechanism	Effectiveness Rating [1]	Total Available	Application Status [2]				
			Possible	Fully Exists	Partly Exists	Currently Planned	Additionally Recommen
Establish Sufficient Separation from Relevant Bushfire Hazard Threats	Very High	2	2			1	2
	High	2	2				2
	Medium	2	1				
	Not Relevant	2					
Establish Shielding from Relevant Bushfire Hazard Threats	Very High						
	High	2	2			1	1
	Medium	2	2			1	1
	Not Relevant						
Number Analysis	Very High	2	2			1	2
	High	4	4			1	3
	Medium	4	3			1	1
	Not Relevant	2					
	Totals	12	9			3	6

[1] Protection Measure Effectiveness Rating: Refer to Appendix A1.2.4 for explanation and defining.

[2] Protection Measure Application Status: Refer to table footnotes in the preceding Section.

5.3.4.3 PROTECTION MEASURES - EXPOSURE REDUCING POTENTIAL

For the stated element at risk and identified bushfire hazard, the potential for applied bushfire protection measures to reduce indicative exposure levels is assessed as a function of:

- The number of bushfire protection measures that can be applied compared to the number available; and
- The weighting applied to each protection measure that indicates how effective it can be at reducing the exposure of elements at risk.

ASSESSED POTENTIAL OF APPLIED PROTECTION MEASURES TO REDUCE EXPOSURE TO BUSHFIRE HAZARD THREATS [1]							
Element at Risk	Built Infrastructure Assets						
ASSESSMENT OF PROTECTION MEASURES APPLIED TO THE DERIVATION OF AN INHERENT EXPOSURE LEVEL [3]							
Direct Attack Mechanisms [2]				Indirect Attack Mechanisms [2]			
Flame Contact	Radiant Heat	Embers / Burning Debris	High / Erratic Fire Driven Wind	Debris Production / Accumulation	Surface Fire	Tree Strike / Obstruction	Consequential (Local) Fire
Minimal	Moderate	Moderate	Minimal	Moderate	Minimal	None	Moderate
Moderate				Moderate			
ASSESSMENT OF PROTECTION MEASURES APPLIED TO THE DERIVATION OF A RESIDUAL EXPOSURE LEVEL [4]							
Direct Attack Mechanisms [2]				Indirect Attack Mechanisms [2]			
Flame Contact	Radiant Heat	Embers / Burning Debris	High / Erratic Fire Driven Wind	Debris Production / Accumulation	Surface Fire	Tree Strike / Obstruction	Consequential (Local) Fire
Minimal	Minimal	Minimal	Minimal	Significant	Significant	None	Minimal
Significant				Significant			

[1] Refer to Appendix 1 for explanatory and supporting information.

[2] Refer to Appendix 2 for explanatory information.

[3] Accounts for all currently implemented bushfire protection measures and those planned to be implemented.

[4] Additionally accounts for bushfire protection measures recommended to be implemented by the bushfire consultant.

Assessment Comments: There will be minimal embers and debris and accumulation with the increase in exposure distances and shielding.

5.3.4.4 ASSESSED EXPOSURE LEVEL (INHERENT AND RESIDUAL)

The preceding bushfire protection measure analysis has enabled the derivation of the indicative inherent and residual exposure levels. These exposure levels are indicative as they are derived through a qualitative assessment process. In combination with the corresponding assessed threat and vulnerability levels, they will be applied to deriving the indicative inherent and residual bushfire risk levels.

ASSESSED INDICATIVE EXPOSURE LEVELS – POST APPLICATION OF BUSHFIRE PROTECTION MEASURES [1]							
ELEMENT AT RISK		Built Infrastructure Assets					
BUSHFIRE ATTACK MECHANISMS [2]		INHERENT EXPOSURE LEVEL [3]					OVERALL
DIRECT	Flame Contact [5]	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	Moderate
DIRECT	Radiant Heat [5]	Very Low ☐	Low ☐	Moderate ☒	High ☐	Extreme ☐	
DIRECT	Embers / Burning Debris	Very Low ☐	Low ☐	Moderate ☒	High ☐	Extreme ☐	
DIRECT	High/Erratic Fire Driven Wind	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Debris Production / Accumulation	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Surface Fire	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Tree Strike / Obstruction	Very Low ☒	Low ☐	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Consequential (Local) Fire	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	
BUSHFIRE ATTACK MECHANISMS [2]		RESIDUAL EXPOSURE LEVEL [4]					OVERALL
DIRECT	Flame Contact [5]	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	Low
DIRECT	Radiant Heat [5]	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	
DIRECT	Embers / Burning Debris	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	
DIRECT	High/Erratic Fire Driven Wind	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Debris Production / Accumulation	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Surface Fire	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Tree Strike / Obstruction	Very Low ☒	Low ☐	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Consequential (Local) Fire	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	

[1] Refer to Appendix 1 for explanatory information.

[2] Refer to Appendix 2 for explanatory information.

[3] Accounts for all currently implemented bushfire protection measures and those planned to be implemented.

[4] Additionally accounts for bushfire protection measures recommended to be implemented by the bushfire consultant.

[5] The level of exposure to flames and radiant heat is derived from the assessed indicative BAL ratings (refer to the BAL contour map). The exposure levels applied are BAL-LOW/Very Low Exposure, BAL-12.5/Low Exposure, BAL-19/Moderate Exposure, BAL-29/High Exposure, BAL-40 and BAL-FZ/Extreme Exposure.

Assessment Comments: Cabling, fuel lines and piping and other flammable materials/structures, where possible to be shielded and raised from the ground by approximately 100mm.

5.3.5 MATERIALS STORED OUTDOORS

5.3.5.1 PROTECTION MEASURES - IDENTIFICATION AND APPLICATION STATUS

PROTECTION MEASURES AVAILABLE TO REDUCE EXPOSURE LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk	Materials Stored Outdoors					
THE PROTECTION MECHANISM – ESTABLISH SUFFICIENT SEPARATION FROM RELEVANT BUSHFIRE HAZARD THREATS: To reduce exposure to the relevant direct and indirect attack mechanisms of bushfire by locating buildings and attached/adjacent structures at sufficient distances away from the bushfire hazard and consequential fire fuels. The required distances will be dependent on the indicative threat levels and the degree of bushfire resilience that exists or is planned to be incorporated into the exposed elements through design and construction.						
6.1	Designed Location of Non-Vegetated Areas and/or Managed Open Space: Non-vegetated land uses include footpaths, paved areas, roads, parking, open drainage channels, and major services delivery (power, water, gas) installed in common corridors. Managed open space is land for public or private use on which the vegetation is either low threat due to type or situation or is continually managed in a minimal fuel condition. This can include public open space providing recreation facilities. Use these design elements to create or increase separation from any bushfire prone vegetation by positioning them adjacent to the bushfire hazard.	Very High	Yes	No	No	Yes
Assessment Comments: The materials stored outdoors should have reduced exposure to ember and firebrand attack, and minimal level of radiant heat exposure. This can be reduced by increasing the separation distances to ensure heat flux exposure does not exceed 10kWm2 on recycled materials. *Recommendation Details:* Construct and maintain the APZ to ensure maximum heat flux exposure does not exceed 10kWm2						
6.2	Landscaping - Asset Protection Zone (APZ): Ensure an APZ is established surrounding the relevant element(s) at risk to create the required separation distance from the bushfire hazard to protect against the direct attack mechanisms of flame contact and radiant heat and reduce exposure to embers. *In addition to providing separation from the direct bushfire attack mechanisms, the nature of the APZ design and management requirements is intended to minimise the potential impact of the indirect bushfire attack mechanisms of surface fire attack, debris production and accumulation, tree strike and consequential fire (refer to Appendix 2).*	Very High	Yes	Yes	Partly	Yes

PROTECTION MEASURES AVAILABLE TO REDUCE EXPOSURE LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk	Materials Stored Outdoors					
	This is achieved by ensuring the APZ contains low threat vegetation; and/or has potential fire fuels managed in a minimal fuel condition; and/or contains non-vegetated areas (e.g. footpaths, paved areas, driveways, parking, swimming pools etc) and/or limits the presence/location of constructed/stored combustible items. For different States and local government areas, APZ establishment and maintenance guides ideally need to be local environment specific. Some authorities establish general requirements while specific requirements may also be established through site specific management documents (e.g. bushfire management plan). The required dimensions of the APZ will correspond to the maximum level of radiant heat the exposed element is to be exposed to – or a greater distance if it is stipulated by a relevant authority. As a minimum avoid dimensions (separation distances) that correspond to BAL-FZ and BAL-40 ratings for any given site/vegetation combination of relevant parameters. This will also apply to BAL-29 separation distances if flame length modelling indicates potential contact due to specific site and effective slope configurations. The location of an APZ should be entirely within the boundaries of each lot so that landowners can have control and responsibility for its implementation and maintenance. Exceptions exist for instances where adjoining land is not vegetated or it can be justified that the fire fuels will be managed in a minimal fuel, low threat state on an ongoing basis, in perpetuity.					

Assessment Comments: The required separation distance is a function of the relevant levels of the bushfire threats (attack mechanisms) presented by the vegetation and the relevant vulnerabilities of the identified elements at risk (the stored organic materials).

The relevant threats are the flame lengths and the potential for radiant heat transfer as determined from the design fire modelling for the grassland and Scrub/woodland vegetation types that have been identified.

DFES Guidance Note: GN04 must be complied with.

The relevant vulnerability that has been adopted for the calculations is the identified critical heat exposure for the FOGO facility (structures and stored outdoor materials).

Recommendation Details:

- To minimise exposure from external radiant heat, a <10kWm2 APZ is required to be established. The dimensions for this APZ are provided within the associated BMP.
- Develop an emergency Management Plan
- Install an appropriate fire hydrant system (and water runoff/catchment)
- Install appropriate fire sprinkler suppression systems (and water runoff/catchment)

Storage management of organic material

PROTECTION MEASURES AVAILABLE TO REDUCE EXPOSURE LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk	Materials Stored Outdoors					

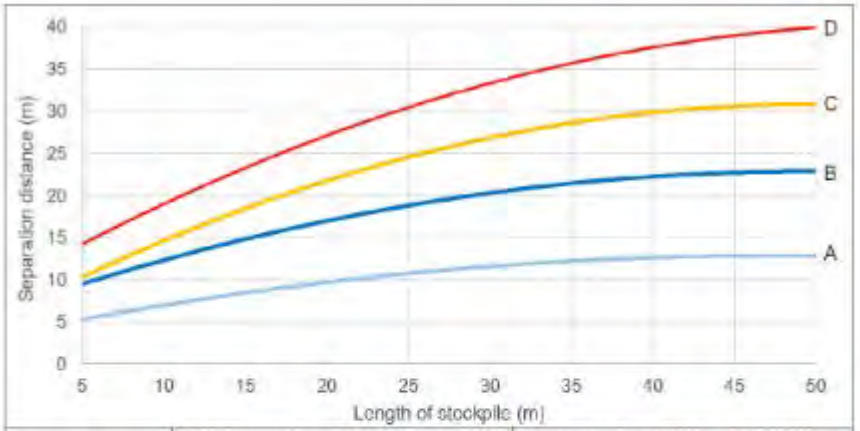
- Maximum height of any stockpile loosed piled or baled ≤4.8m.
- Maximum width of a stockpile is to be 20m
- Maximum length of a stockpile to be ≤50m
- Arrangement of stockpiles is to minimise the likelihood of fire spread and provide access for fire appliances.

DFES Information Note September 2014 – Spontaneous combustion of green waste windrows and stockpiles due to elevated internal temperatures.

- Moisture content of the composting windrows will be maintained above 45% as part of the composting process, and by virtue will reduce the risk of spontaneous combustion. This will be maintained by watering once a day or as required.
- Moisture content of the green waste received on site will not exceed 20% to prevent the generation of heat occurring through biological activity occurring and in turn resulting in spontaneous combustion.

PROTECTION MEASURES AVAILABLE TO REDUCE EXPOSURE LEVELS	Effectiveness Rating [1]	Application Status [2]			
		Possible	Exists	Planned	Additionally Recommend
Element at Risk	Materials Stored Outdoors				

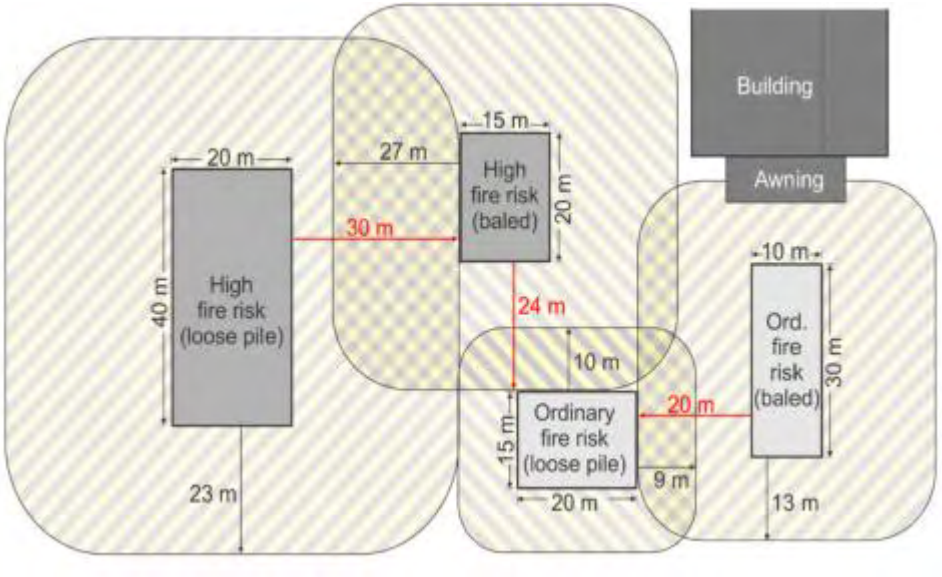
Minimum separation distances between external stockpiles (DFES GN04)(NSW Fire Safety Guidelines Fire Safety in Waste Facilities)



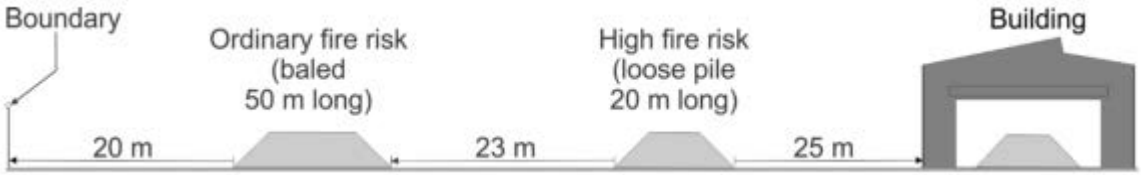
Length of stockpile (m)	Ordinary fire risk (i.e. ≤ 1000°C)		High fire risk (i.e. >1000°C)	
	Loose pile (A)	Baled (B)	Loose pile (C)	Baled (D)
5	5 m	9 m	10 m	14 m
10	7 m	13 m	15 m	19 m
15	9 m	15 m	18 m	24 m
20	10 m	17 m	23 m	27 m
30	11 m	20 m	26 m	34 m
50	13 m	23 m	31 m	40 m

PROTECTION MEASURES AVAILABLE TO REDUCE EXPOSURE LEVELS	Effectiveness Rating [1]	Application Status [2]			
		Possible	Exists	Planned	Additionally Recommend
Element at Risk	Materials Stored Outdoors				

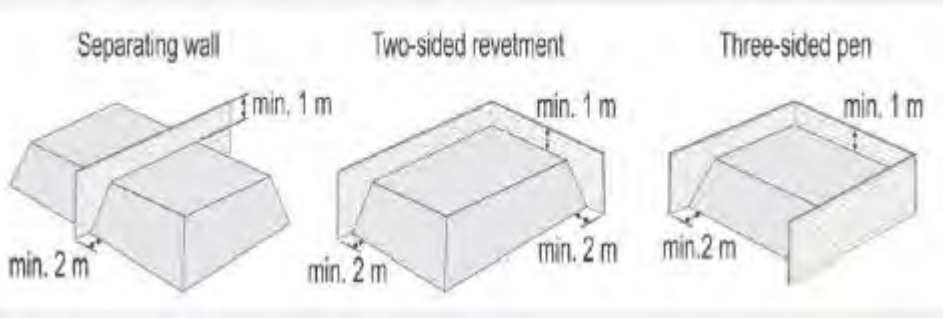
Examples minimum separation between external stockpiles (DFES GN04, NSW Gov)

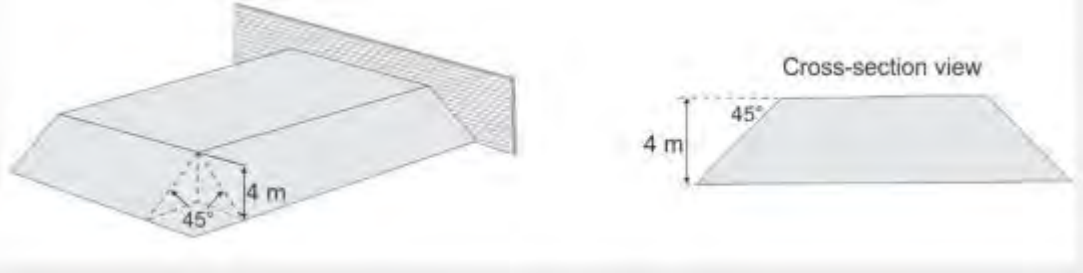


Examples of separation between stockpiles and fire-source features (DFES GN04)



PROTECTION MEASURES AVAILABLE TO REDUCE EXPOSURE LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk	Materials Stored Outdoors					
6.3	Separation from Stored Flammable Products – Fuels / Other Hazardous Materials (Consequential Fire Fuels): Establish sufficient separation distance between these consequential fire fuels and the stored materials. The required separation distance will be dependent on the fuel and storage type.	High	Yes	No	No	Yes
Assessment Comments: Other flammable products/materials are to be stared appropriately, to available guidance documents and standards. *Recommendation Details:* Include in the facilities emergency plan and operational documents where to store the items, state the separation distances and provide direction on maintaining buildup of fine and heavy fuels. Provide staff training.						
6.4	Separation from Stored and Constructed Combustible Items (Consequential Fire Fuels): Apply a separation distance of at least six times the height of the stored and constructed combustible items. These consequential fire fuels include: • Stored Combustible Items - Heavy Fuels e.g. building materials, packaging materials, rubbish bins etc; • Stored Combustible Items – Large Heavy Fuels e.g. vehicles, caravans etc; • Constructed Combustible Items – Heavy Fuels e.g. landscaping structures including fences, screens, walls, plastic water tanks; and • Constructed Combustible Items – Large Heavy Fuels e.g. adjacent buildings/structures such as sheds and offices. *Apply the rule of thumb [13] "assume flames produced from a consequential fire source will be twice as high as the object itself … where the consequential fire source is a structure, then the maximum eave height is a reasonable measure of maximum height".*	High	Yes	No	Partly	Yes
Assessment Comments: Detail guidance, compliance and maintenance requirements for heavy fuels *Recommendation Details:* Detail in the facilities guidance document and information in the Emergency Management Plan guidance on storage of heavy fuels and separation distances.						
THE PROTECTION MECHANISM – ESTABLISH SHIELDING FROM RELEVANT BUSHFIRE HAZARD THREATS: To shield buildings and attached/adjacent structures (or other consequential fire fuels) from the direct bushfire attack mechanisms of flame, radiant heat, surface fire and surface migration of embers. To also reduce exposure to the indirect attack mechanism of debris accumulation against buildings/structures and other consequential fire fuels and wind attack.						
6.5	Constructed Barrier – Shielding from Bushfire: Walls, fences and/or landforms to shield the stored materials from direct and indirect bushfire attack mechanisms and reduce the potential impact of these threats.	High	Yes	Unknown	Partly	Yes

PROTECTION MEASURES AVAILABLE TO REDUCE EXPOSURE LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk	Materials Stored Outdoors					
	Must be constructed using appropriate fire resistant / non-combustible construction materials (e.g. masonry, steel, earthworks). These are to withstand the impact of direct bushfire attack mechanisms for the required period of time. Apply the bushfire construction standards for external walls subject to the assessed level of radiant heat or flame contact to which the barrier will be exposed (or otherwise to BAL-FZ requirements). These are established by AS 3959:2018 [4] and/or the NASH Standard [33] and additionally informed by the research report 'Research and Investigation into the Performance of Residential Boundary Fencing Systems in Bushfires.' [29]					
*Assessment Comments: non-combustible w*alls, fencing and retaining walls are effective in reducing radiant heat exposure onto flammable organic material. The use of combustible materials for walls, fencing and retaining walls are heavy fuels and will carry fire, thus increasing the risk of ignition in the organic material. *Recommendation Details:* Fencing, external walls and retaining walls to be constructed using non-combustible materials.						
6.6	Constructed Barrier - Shielding from Consequential Fire: Applicable to all consequential fire fuel sources. Install a non-combustible barrier (including complete enclosure when appropriate), of required robustness, that can perform the following as relevant: • Reduce the exposure of the stored materials to the threats of consequential fire; and/or • Reduce the exposure of the consequential fire fuels to the bushfire hazard.	High	Yes	Unknown	Partly	Yes
Assessment Comments: Separating masonry or non-combustible walls will reduce the risk of fire spreading in other stockpiles of organic materials. *Recommendation Details:* When Separating Masonry walls are used, the walls are to be marked showing the maximum height and width to identify the stockpile limits. Examples separating walls (DFES GN04, NSW Gov)  						

PROTECTION MEASURES AVAILABLE TO REDUCE EXPOSURE LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk	Materials Stored Outdoors					
						
6.7	Natural Landforms Barrier: Use existing natural landforms to reduce stored materials exposure to radiant heat, and lower wind speeds (prevailing synoptic and/or fire driven).	High	N/A	N/A	N/A	N/A
Assessment Comments: Not Required *Recommendation Details:* Not Applicable						
6.8	Planted Vegetation Barrier: Use appropriate hedges and trees strategically to reduce (to varying extents) stored materials exposure to radiant heat, to filter/trap embers and firebrands, and to lower wind speeds (prevailing synoptic and/or fire driven).	Medium	Yes	No	No	Yes
Assessment Comments: Plantings to be managed if located in the APZ to ensure the vegetation does not contribute to increased fire intensity or consequential fire. Managed vegetation within the APZ will offer a degree of shielding. *Recommendation Details:* Plantings to be managed to low threat if located in the APZ						

[1] Protection Measure Effectiveness Rating: Refer to Appendix A1.2.4 for explanation and defining.

[2] Protection Measure Application Status:

- Possible: Protection measures that can potentially be applied to the proposed development/use.
- Fully or Partly Exists: A current state assessment of protection measures already implemented by existing components of the proposed development/use. The status of current implementation can also be fully or partly. These measures are accounted for in assessing 'inherent' risk levels (refer to Glossary).
- Currently Planned: Protection measures that:

PROTECTION MEASURES AVAILABLE TO REDUCE EXPOSURE LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk	Materials Stored Outdoors					

- Are incorporated into the site plans;
- Exist in an approved Bushfire Management Plan (BMP) and/or Bushfire Emergency Plan (BEP) and are comprised of the applicable acceptable solutions (established by the 'Guidelines for planning in bushfire prone areas', DPLH as amended), alternative solutions and any additional recommended protection measures - for which a responsibility for their implementation has been created and approved; and/or
- Exist in a yet to be submitted Bushfire Management Plan (BMP) and/or Bushfire Emergency Plan (BEP) and are comprised of the applicable acceptable solutions (established by the 'Guidelines for planning in bushfire prone areas', DPLH as amended), that can be met and for which a responsibility for their implementation can be created in the BMP.

These planned measures are accounted for in assessing 'inherent' risk levels (refer to Glossary).

- Additionally Recommend: Protection measures that:
  - Exist in a yet to be submitted Bushfire Management Plan (BMP) and/or Bushfire Emergency Plan (BEP) and comprise alternative solutions and/or additional recommended protection measures (that can and should be implemented in the opinion of the bushfire consultant), and for which a responsibility for their implementation can be created in the BMP; and/or
  - Are developed in the process of producing this risk assessment and management report and for which a responsibility for their implementation can be created in the BMP.

These additionally recommended measures, along with existing and planned measures, are accounted for in assessing 'residual' risk levels (refer to Glossary).

5.3.5.2 PROTECTION MEASURES - EFFECTIVENESS AND NUMBER APPLIED

For the stated element at risk, the numbers of both available and potentially applied bushfire protection measures are summarised and the effectiveness of each measure at reducing exposure levels is stated (refer to Appendix 1 for explanatory and supporting information).

This information is applied in the following section of this report to the derivation of the potential for applied bushfire protection measures to reduce the exposure of the relevant element at risk to bushfire hazard threats.

EXPOSURE REDUCING PROTECTION MEASURE ANALYSIS							
Element at Risk	Materials Stored Outdoors						
The Protection Mechanism	Effectiveness Rating [1]	Numbers of Protection Measures					
		Total Available	Application Status [2]				
			Possible	Fully Exists	Partly Exists	Currently Planned	Additionally Recommen
Establish Sufficient Separation from Relevant Bushfire Hazard Threats	Very High	2	2	1	1	1	2
	High	2	2			1	2
	Medium						
	Not Relevant						
Establish Shielding from Relevant Bushfire Hazard Threats	Very High						
	High	3	3	3	2	3	3
	Medium	1	1				1
	Not Relevant						
Number Analysis	Very High	2	2	1	1	1	2
	High	5	5	3	2	4	5
	Medium	1	1				1
	Not Relevant						
	Totals	8	8	4	3	5	8

[1] Protection Measure Effectiveness Rating: Refer to Appendix A1.2.4 for explanation and defining.

[2] Protection Measure Application Status: Refer to table footnotes in the preceding Section.

5.3.5.3 PROTECTION MEASURES - EXPOSURE REDUCING POTENTIAL

For the stated element at risk and identified bushfire hazard, the potential for applied bushfire protection measures to reduce indicative exposure levels is assessed as a function of:

- The number of bushfire protection measures that can be applied compared to the number available; and
- The weighting applied to each protection measure that indicates how effective it can be at reducing the exposure of elements at risk.

ASSESSED POTENTIAL OF APPLIED PROTECTION MEASURES TO REDUCE EXPOSURE TO BUSHFIRE HAZARD THREATS [1]							
Element at Risk	Materials Stored Outdoors						
ASSESSMENT OF PROTECTION MEASURES APPLIED TO THE DERIVATION OF AN INHERENT EXPOSURE LEVEL [3]							
Direct Attack Mechanisms [2]				Indirect Attack Mechanisms [2]			
Flame Contact	Radiant Heat	Embers / Burning Debris	High / Erratic Fire Driven Wind	Debris Production / Accumulation	Surface Fire	Tree Strike / Obstruction	Consequential (Local) Fire
Minimal	Moderate	Moderate	Minimal	Minimal	Minimal	None	Moderate
Moderate				Moderate			
ASSESSMENT OF PROTECTION MEASURES APPLIED TO THE DERIVATION OF A RESIDUAL EXPOSURE LEVEL [4]							
Direct Attack Mechanisms [2]				Indirect Attack Mechanisms [2]			
Flame Contact	Radiant Heat	Embers / Burning Debris	High / Erratic Fire Driven Wind	Debris Production / Accumulation	Surface Fire	Tree Strike / Obstruction	Consequential (Local) Fire
Minimal	Minimal	Moderate	Minimal	Minimal	Minimal	None	Minimal
Minimal				Minimal			

[1] Refer to Appendix 1 for explanatory and supporting information.

[2] Refer to Appendix 2 for explanatory information.

[3] Accounts for all currently implemented bushfire protection measures and those planned to be implemented.

[4] Additionally accounts for bushfire protection measures recommended to be implemented by the bushfire consultant.

Assessment Comments: Materials stored outdoors are exposed to ember attack and increasing the APZ to ensure a maximum 10kWm2 heat flux exposure will reduce the likelihood of the detached flame from a bushfire event impacting the stored organic material, and reduce the preheating of material from the fire front.

5.3.5.4 ASSESSED EXPOSURE LEVEL (INHERENT AND RESIDUAL)

The preceding bushfire protection measure analysis has enabled the derivation of the indicative inherent and residual exposure levels. These exposure levels are indicative as they are derived through a qualitative assessment process. In combination with the corresponding assessed threat and vulnerability levels, they will be applied to deriving the indicative inherent and residual bushfire risk levels.

ASSESSED INDICATIVE EXPOSURE LEVELS – POST APPLICATION OF BUSHFIRE PROTECTION MEASURES [1]							
ELEMENT AT RISK		Materials Stored Outdoors					
BUSHFIRE ATTACK MECHANISMS [2]		INHERENT EXPOSURE LEVEL [3]					OVERALL
DIRECT	Flame Contact [5]	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	Moderate
DIRECT	Radiant Heat [5]	Very Low ☐	Low ☐	Moderate ☒	High ☐	Extreme ☐	
DIRECT	Embers / Burning Debris	Very Low ☐	Low ☐	Moderate ☒	High ☐	Extreme ☐	
DIRECT	High/Erratic Fire Driven Wind	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Debris Production / Accumulation	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Surface Fire	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Tree Strike / Obstruction	Very Low ☒	Low ☐	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Consequential (Local) Fire	Very Low ☐	Low ☐	Moderate ☒	High ☐	Extreme ☐	
BUSHFIRE ATTACK MECHANISMS [2]		RESIDUAL EXPOSURE LEVEL [4]					OVERALL
DIRECT	Flame Contact [5]	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	Low
DIRECT	Radiant Heat [5]	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	
DIRECT	Embers / Burning Debris	Very Low ☐	Low ☐	Moderate ☒	High ☐	Extreme ☐	
DIRECT	High/Erratic Fire Driven Wind	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Debris Production / Accumulation	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Surface Fire	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Tree Strike / Obstruction	Very Low ☒	Low ☐	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Consequential (Local) Fire	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	

[1] Refer to Appendix 1 for explanatory information.

[2] Refer to Appendix 2 for explanatory information.

[3] Accounts for all currently implemented bushfire protection measures and those planned to be implemented.

[4] Additionally accounts for bushfire protection measures recommended to be implemented by the bushfire consultant.

[5] The level of exposure to flames and radiant heat is derived from the assessed indicative BAL ratings (refer to the BAL contour map). The exposure levels applied are BAL-LOW/Very Low Exposure, BAL-12.5/Low Exposure, BAL-19/Moderate Exposure, BAL-29/High Exposure, BAL-40 and BAL-FZ/Extreme Exposure.

Assessment Comments: Nil

5.4 VULNERABILITY LEVEL ASSESSMENT – BUSHFIRE PROTECTION MEASURE ANALYSIS

For each stated element at risk an assessment is conducted that considers the effectiveness and application status of all available vulnerability reducing bushfire protection measures that are listed under their applicable bushfire protection mechanism. This information is subsequently applied to deriving vulnerability levels.

5.4.1 PERSONS ONSITE AND TEMPORARILY OFFSITE

5.4.1.1 PROTECTION MEASURES - IDENTIFICATION AND APPLICATION STATUS

PROTECTION MEASURES AVAILABLE TO REDUCE VULNERABILITY LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk:	Persons Located Onsite and Temporarily Offsite					
THE PROTECTION MECHANISM – TRANSPORT AND MULTIPLE EVACUATION DESTINATIONS AND ROUTES AVAILABLE						
7.1	Sufficient Evacuation Transport Available: Ensure that all persons likely to be on site have access to transport. This can be through own vehicles, facility vehicles, a formal arrangement with an external provider or a combination of these.	Very High	Yes	Yes	Yes	No
Assessment Comments: People on site will have their own transport. *Recommendation Details:* Nil						
7.2	Multiple Safer Offsite Locations Available: Increasing the route and destination options decreases vulnerability of persons as the exposed element. Multiple buildings/areas are accessible from the subject site as evacuation destinations. The offsite locations exist at a sufficient distance from the subject site ensuring that the destination and the subject site are very unlikely to be simultaneously impacted by a bushfire event. For the most robust scenario: • Multiple access/egress route are available to the safer locations from the subject site; • The entirety of at least two routes is unlikely to be simultaneously impacted by a bushfire event; and • The availability of water and amenities corresponding to person numbers increases the effectiveness of the measure.	Very High	Yes	No	Yes	No
Assessment Comments: Early evacuation will be the primary bushfire response procedure. Staff or contractors will be directed to either go to their home address or go to their primary place of employment.						

PROTECTION MEASURES AVAILABLE TO REDUCE VULNERABILITY LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk:	Persons Located Onsite and Temporarily Offsite					
Recommendation Details: A BEP has been developed for the facility						
THE PROTECTION MECHANISM – PROVISION OF BUSHFIRE EMERGENCY INFORMATION AND EDUCATION						
7.3	Develop a Bushfire Emergency Plan: This will provide operational guidance for the implementation of prevention, preparation, response and recovery procedures and their associated actions. The format and content of the plan documents will be aligned with the specific needs of the site and its use. Development of the Plan considers site specific information that includes: • The site's use and the numbers and types of persons who will be on the site at any time; • The physical characteristics of the site and its structures; and • The surrounding topography and bushfire prone vegetation; and • The surrounding human settlement and road networks. It is produced for use by the site owners, managers, operators and occupants (as relevant).	High	Yes	Yes	Yes	No
Assessment Comments: Nil *Recommendation Details:* A BEP has been developed and provided.						
7.4	Operational Documents are to Contain the Bushfire Protection Measures to be Implemented: The documents include the 'planning' or 'operational' Bushfire Management Plan (BMP), the Bushfire Emergency Plan (BEP), the Site Emergency Plan and any relevant documents associated with a projects design phase. The purpose of this measure is to ensure the application of applicable protection measures identified in this Report, will be acted upon through responsibilities created within the operational documents.	High	Yes	Partly	Partly	Yes
Assessment Comments: The existing BEP and operational document has some information, however requires additional detail and updating. *Recommendation Details:* Update the Fire Response Plan and develop Guidance documents.						
7.5	Prominent Display of Bushfire Emergency Information: The relevant format and content of the site specific bushfire emergency response information, taken from the planning developed for a bushfire emergency, is made readily available to all persons on site.	Medium	Yes	Yes	Yes	Yes

PROTECTION MEASURES AVAILABLE TO REDUCE VULNERABILITY LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk:	Persons Located Onsite and Temporarily Offsite					
Assessment Comments: A display BEP map and information has been provided. *Recommendation Details:* Bushfire information to be displayed at the weigh bridge office and the administration office.						
7.6	Direct to Persons Emergency Messaging System: Have a process and system (e.g. SMS) for site managers to provide persons onsite and temporarily offsite with emergency information as necessary. Consideration will need to be given to availability and reliability of the infrastructure that is to facilitate this system.	Medium	Yes	No	No	Yes
Assessment Comments: Nil *Recommendation Details:* Emergency messaging system to be developed.						
7.7	Egress Pathway Signage: Where pathways exist onsite for occupants to relocate to an identified safer onsite location, appropriate signage to guide unfamiliar persons can reduce their vulnerability.	Medium	Yes	No	Partly	No
Assessment Comments: Signage will be provided to guide delivery of materials, this will also be relevant for emergencies (exit signs etc). *Recommendation Details:* Identified safer onsite location.						
7.8	Personnel are Trained to Implement the Bushfire Emergency Plan: Operational persons (staff) are provided with appropriate training, aligned with the subject site's prepared Bushfire Emergency Plan (BEP). The process will also identify specific roles and persons to fill those roles.	High	Yes	No	No	Yes
Assessment Comments: Not Required *Recommendation Details:* Staff to be trained in emergency response and bushfire awareness.						
7.9	Build Community Resilience Through Education: When relevant to the type and scale of proposed development/use, the delivery of effective community education programs, to ensure information is acted upon and packages of protection measures are put in place, will result in lowering the vulnerability of the community to a bushfire event, once the. Local government develops an ongoing program of innovative and leading edge community and landowner education that builds on the information presented within this Report. Implementation of recommended/required protection measures can be encouraged through legislation, education, audits, enforcement and penalties as appropriate.	High	N/A	N/A	N/A	N/A

PROTECTION MEASURES AVAILABLE TO REDUCE VULNERABILITY LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk:	Persons Located Onsite and Temporarily Offsite					
	Examples of such community education programs exist in various jurisdictions. The CSIRO (2020) Climate and Disaster Resilience Overview Report in 'Recommendation No. 5' [18] encourages collaboration with research agencies on the issue of building community resilience.					
Assessment Comments: Not Required *Recommendation Details:* Not Applicable						
7.10	**Encourage 'Property Bushfire Resilience Assessments'**: Local government to promote (and potentially incentivise) the conducting of these assessments and the implementation of any recommendations. These assessments address bushfire hazard threat levels and the level of exposure and vulnerability of specific buildings and persons. It identifies appropriate protection measures that can be implemented to increase bushfire resilience.	High	Yes	N/A	N/A	N/A
Assessment Comments: This DA will include documents (BMP< BEP & BRR) to reduce the risk to a tolerable level. *Recommendation Details:* Not Applicable						
7.11	Locations of Vulnerable Persons are Registered: Relevant department of local government and their emergency services maintains a register of the location of land uses that are likely to result in a number of 'vulnerable' persons (see Glossary) residing onsite, so that their needs can be addressed as a priority in a bushfire emergency. The subject development/use would exist on that register.	Medium	N/A	N/A	N/A	N/A
Assessment Comments: Not Required *Recommendation Details:* Not Applicable						
THE PROTECTION MECHANISM – ONSITE PERSONS CAPABLE OF MANAGING A BUSHFIRE EMERGENCY ARE AVAILABLE						
7.12	Onsite Persons Available to Manage Bushfire Emergency Procedures: Different categories of persons can perform this role in different scenarios, with potentially varying levels of expertise and effectiveness. These include: • Appropriately trained person(s) will be onsite at all times, or able to be onsite at short notice. They are trained in bushfire emergency procedures in general and have specific knowledge of the site's Bushfire Emergency Plan, and the environment in which the development/use exists. This person(s) may have the official title of fire warden.	High	Yes	No	No	Yes

PROTECTION MEASURES AVAILABLE TO REDUCE VULNERABILITY LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk:	Persons Located Onsite and Temporarily Offsite					
	• An untrained person familiar with the local area will be onsite at all times. They have knowledge and instruction gained from the site's Bushfire Emergency Plan and can implement the required procedures. They can guide and assist persons onsite.					
Assessment Comments: Onsite personnel will trained in emergency response and persons allocated the role of fire wardens. *Recommendation Details:* Ensure enough appropriately trained staff are onsite at all times during the bushfire season to assist with emergency procedures. Emergency procedures to be reviewed annually.						
7.13	Onsite Persons Can Operate Firefighting Equipment: Such person(s) is suitably capable of maintaining and operating any installed firefighting water supply and associated pumps, hoses/nozzles and sprinklers.	Medium	Yes	No	No	Yes
Assessment Comments: Fire hose reels and fire extinguishers will be available onsite. *Recommendation Details:* Provide a mobile response unit. Recommend 2 x slip-on units and basic bushfire awareness and response.						
7.14	External Emergency Response Services Available: An emergency service with a bushfire response capability is located within a realistic operational distance of the subject development/use. This includes services provided by government (e.g., career fire and rescue services or other agencies) and volunteer services. Note: The services of these limited resources should not be relied upon, as their availability for a given event can be compromised by other obligations at the crucial time. *Bushfire Verification Method – Handbook s6.6 [14] states "During significant bushfires, there will be conflicting demands on fire brigade resources and reliance should not be placed on fire brigade intervention to protect a specific property.* *Prior to the 2009 Black Saturday fires, an early evacuation or stay and defend policy was in place and data from major fires indicated that the presence of occupants significantly increased the probability of house survival (refer Table 7.1). However, in response to the subsequent Royal Commission findings there is now a greater emphasis on early evacuation. Whilst this is expected to reduce fatalities by reducing the numbers of people at risk, a negative consequence will be an increase in property losses for buildings constructed to similar standards. It should therefore be assumed that there will be no fire brigade or occupant intervention with respect to protecting a specific property."*	Medium	Yes	No	No	Yes
Assessment Comments: Karnup Volunteer Fire & Emergency Services is located 20 minutes from the subject site and staff will be trained bushfire awareness and emergency evacuation. *Recommendation Details:* Safe early evacuation is the preferred response.						

PROTECTION MEASURES AVAILABLE TO REDUCE VULNERABILITY LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk:	Persons Located Onsite and Temporarily Offsite					

[1] Protection Measure Effectiveness Rating: Refer to Appendix A1.2.4 for explanation and defining.

[2] Protection Measure Application Status:

- Possible: Protection measures that can potentially be applied to the proposed development/use.
- Fully or Partly Exists: A current state assessment of protection measures already implemented by existing components of the proposed development/use. The status of current implementation can also be fully or partly. These measures are accounted for in assessing 'inherent' risk levels (refer to Glossary).
- Currently Planned: Protection measures that:
  - Are incorporated into the site plans;
  - Exist in an approved Bushfire Management Plan (BMP) and/or Bushfire Emergency Plan (BEP) and are comprised of the applicable acceptable solutions (established by the 'Guidelines for planning in bushfire prone areas', DPLH as amended), alternative solutions and any additional recommended protection measures - for which a responsibility for their implementation has been created and approved; and/or
  - Exist in a yet to be submitted Bushfire Management Plan (BMP) and/or Bushfire Emergency Plan (BEP) and are comprised of the applicable acceptable solutions (established by the 'Guidelines for planning in bushfire prone areas', DPLH as amended), that can be met and for which a responsibility for their implementation can be created in the BMP.

  These planned measures are accounted for in assessing 'inherent' risk levels (refer to Glossary).
- Additionally Recommend: Protection measures that:
  - Exist in a yet to be submitted Bushfire Management Plan (BMP) and/or Bushfire Emergency Plan (BEP) and comprise alternative solutions and/or additional recommended protection measures (that can and should be implemented in the opinion of the bushfire consultant), and for which a responsibility for their implementation can be created in the BMP; and/or
  - Are developed in the process of producing this risk assessment and management report and for which a responsibility for their implementation can be created in the BMP.

  These additionally recommended measures, along with existing and planned measures, are accounted for in assessing 'residual' risk levels (refer to Glossary).

5.4.1.2 PROTECTION MEASURES - EFFECTIVENESS AND NUMBER APPLIED

For the stated element at risk, the numbers of both available and potentially applied bushfire protection measures are summarised and the effectiveness of each measure at reducing vulnerability levels is stated (refer to Appendix 1 for explanatory and supporting information).

This information is applied in the following section of this report to the derivation of the potential for applied bushfire protection measures to reduce the vulnerability of the relevant element at risk to bushfire hazard threats.

VULNERABILITY REDUCING PROTECTION MEASURE ANALYSIS							
Element at Risk	Persons Located Onsite and Temporarily Offsite						
The Protection Mechanism	Effectiveness Rating [1]	Numbers of Protection Measures					
		Total Available	Application Status [2]				
			Possible	Fully Exists	Partly Exists	Currently Planned	Additionally Recommen
Transport and multiple evacuation destinations and routes available	Very High	2	2	1		1	2
	High						
	Medium						
	Not Relevant						
Provision of bushfire emergency information and education	Very High						
	High	5	4			3	3
	Medium	4	4	1		1	2
	Not Relevant	1					
Onsite Persons Capable of Managing a Bushfire Emergency Are Available	Very High						
	High	1	1				1
	Medium	2	2				2
	Not Relevant						
Number Analysis	Very High	2	2	1		1	2
	High	6	5			3	4
	Medium	6	6	1		1	4
	Not Relevant	1					
	Totals	15	13	2		5	10

[1] Protection Measure Effectiveness Rating: Refer to Appendix A1.2.4 for explanation and defining.

[2] Protection Measure Application Status: Refer to table footnotes in the preceding Section.

5.4.1.3 PROTECTION MEASURES - VULNERABILITY REDUCING POTENTIAL

For the stated element at risk and identified bushfire hazard, the potential for applied bushfire protection measures to reduce inherent vulnerability levels is assessed as a function of:

- The number of bushfire protection measures that can be applied compared to the number available; and
- The weighting applied to each protection measure that indicates how effective it can be at reducing the vulnerability of elements at risk.

ASSESSED POTENTIAL OF APPLIED PROTECTION MEASURES TO REDUCE VULNERABILITY TO BUSHFIRE HAZARD THREATS [1]	
Element at Risk	Persons Located Onsite And Temporarily Offsite
ASSESSMENT OF PROTECTION MEASURES APPLIED TO THE DERIVATION OF VULNERABILITY LEVELS	
REDUCTION IN THE INHERENT VULNERABILITY LEVEL [2]	REDUCTION IN THE RESIDUAL VULNERABILITY LEVEL [3]
Minimal	Significant

[1] Refer to Appendix 1 for explanatory and supporting information.

[2] Accounts for all currently implemented bushfire protection measures and those planned to be implemented.

[3] Additionally accounts for bushfire protection measures recommended to be implemented by the bushfire consultant.

Assessment Comments: A Bushfire Emergency Plan and training will be provided. A shelter in place building will be constructed for people on site.

5.4.1.4 ASSESSED VULNERABILITY LEVEL (INHERENT AND RESIDUAL)

The preceding bushfire protection measure analysis has enabled the derivation of the indicative inherent and residual vulnerability levels. These vulnerability levels are indicative as they are derived through a qualitative assessment process. In combination with the corresponding assessed threat and exposure levels, they will be applied to deriving the indicative inherent and residual bushfire risk levels.

ASSESSED INDICATIVE VULNERABILITY LEVELS – POST APPLICATION OF BUSHFIRE PROTECTION MEASURES [1]				
ELEMENT AT RISK	Persons Located Onsite And Temporarily Offsite			
THE INHERENT VULNERABILITY LEVEL [2]				
Very Low ☐	Low ☐	Moderate ☐	High ☒	Extreme ☐
THE RESIDUAL VULNERABILITY LEVEL [3]				
Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐

[1] Refer to Appendix 1 for explanatory and supporting information.

[2] Accounts for all currently implemented bushfire protection measures and those planned to be implemented.

[3] Additionally accounts for bushfire protection measures recommended to be implemented by the bushfire consultant.

Assessment Comments: Nill

5.4.2 PERSONS ON ACCESS/EGRESS ROUTES (IN VEHICLES) OR PATHWAYS

5.4.2.1 PROTECTION MEASURES - IDENTIFICATION AND APPLICATION STATUS

PROTECTION MEASURES AVAILABLE TO REDUCE VULNERABILITY LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk	Persons On Access/Egress Routes In Vehicles	Access/Egress Route ID	Internal road / driveway			
THE PROTECTION MECHANISM – LOWER RISK ROAD CONSTRUCTION (DESIGN AND MATERIALS): The application of as many of the following protection measures as possible ensures a greater level of safety for users and lowers the associated risk when roads need to be used to evacuate to a safer offsite location in potentially high stress situations within a threatening environment. Safety for persons using the route is increased through reducing the likelihood of vehicle/terrain or vehicle/vehicle accidents and the ability to maintain travelling speed.						
8.1	Greater Road Width: Ensure appropriate width roads are installed. Wider roads allow safer passing of the anticipated traffic that can be travelling in both directions (e.g. emergency services travelling towards the emergency event). The effectiveness of road width to reduce vulnerability is also a function of the required carriage capacity - which may be increased by the proposed development/use when it will increase traffic intensity. The incorporation of non-vegetated and trafficable road verges/shoulders and adjacent footpaths can also be considered to increase effective width for slower moving vehicles (providing additional separation from the hazard and passing opportunities).	High	Yes	No	Partly	Yes
Assessment Comments: The driveway will be used by staff and contractors; therefore the road will be considered a public road. *Recommendation Details:* The driveway will be constructed to public road standards as per Table 6 of the Guidelines for planning in Bushfire Prone Areas.						
8.2	Lower Road Gradient: Ensure appropriate road gradients are available. Lower gradients help ensure traction and speed can be maintained. Steep gradients can also be associated with driver visibility. Appropriate gradients will depend on the constructed surface materials and the weights and tractive capability of expected vehicle types.	Medium	Yes	No	N/A	N/A
Assessment Comments: The land is flat, there are not steep gradients. *Recommendation Details:* Not Applicable						
8.3	Greater Road Clearance: Ensure appropriate clearance can exist and is established. Sufficient horizontal and vertical clearances from obstructions ensure unhindered movement of all possible vehicle types;	Medium	Yes	No	Partly	Yes
Assessment Comments: Not Required						

PROTECTION MEASURES AVAILABLE TO REDUCE VULNERABILITY LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk	Persons On Access/Egress Routes In Vehicles	Access/Egress Route ID	Internal road / driveway			
Recommendation Details: Roads are to maintain as a minimum 4.5m vertical and 6m horizontal clearances						
8.4	Stable Road Surfaces: Ensure that roads are constructed of materials that will provide the necessary traction (also a function of gradient), can support the weight of all expected vehicle types and remain operational in all weather. The required supportive capacity also applies to associated structures such as bridges.	Medium	Yes	No	Partly	Yes
Assessment Comments: Not Required *Recommendation Details:* Road surfaces will meet the technical requirement of the Guidelines. Recommend the driveway is limestone road base.						
8.5	Driver Visibility and Road Ahead Signage: Ensure that road design provides high levels of visibility ahead (in the absence of smoke and embers) and informative signage indicating relevant 'up ahead' route information (includes information stating distance to turnaround area for narrow roads in more remote locations). Good visibility is associated with the avoidance of 'blind' corners and crests to the greatest extent possible.	Medium	Yes	Partly	Partly	No
Assessment Comments: Not Required *Recommendation Details:* Not Applicable						
8.6	Shorter Road Length: Shorter distances to safer locations reduce the length of time persons remain vulnerable to bushfire threats.	High	No	No	No	No
Assessment Comments: The road cannot be shortened, however the intent in the future is to extend Gull Road to another destination. *Recommendation Details:* Not Applicable						
8.7	Interconnected Road Network to Provide Route Options: Ensuring that the design of the road network provides through roads and avoids dead-end roads, provides the choice of alternative routes to for minimising close contact with a bushfire event. Otherwise vehicles and persons can be trapped.	Very High	No	No	No	No
Assessment Comments: The road cannot be shortened, however the intent in the future is to extend Gull Road to another destination. *Recommendation Details:* Not Applicable						
THE PROTECTION MECHANISM – EVACUEES ARE SELF-SUFFICIENT AND HAVE LOCAL AWARENESS AND OWN TRANSPORT: The 'type' of persons that will be present on the site of the proposed development/use influences their degree of vulnerability to both bushfire threats and to risk associated with vehicular accidents in a stressful environment.						

PROTECTION MEASURES AVAILABLE TO REDUCE VULNERABILITY LEVELS				Effectiveness Rating [1]	Application Status [2]			
					Possible	Exists	Planned	Additionally Recommend
Element at Risk	Persons On Access/Egress Routes In Vehicles	Access/Egress Route ID	Internal road / driveway					
Persons that have local knowledge, are self-supportive, have their own transport and are physically and mentally capable present the lowest degree of vulnerability for this factor. This contrasts with persons who can be considered 'vulnerable' and are likely to be less capable or effective at making the required decisions and carrying out the required actions in the timeframe required. They are likely to be dependent on others for both information and transport and will not have any local knowledge.								
8.8	Self Sufficient Persons with Local Awareness: The sites use and location increases the likelihood these are the type of persons that will be present on the site.			High	Yes	No	Partly	Yes
Assessment Comments: Staff and most contractors will be familiar with the site. *Recommendation Details:* Site induction and contractor information to include information about the sites evacuation process. Include in the Facility guidelines and induction.								
8.9	Onsite Persons Have Own Transport: There is no need to have arrangements in place for external provision of evacuation vehicles. Transport will always be available.			High	Yes	No	Yes	Yes
Assessment Comments: Not Required *Recommendation Details:* Include in facility training and induction program.								

[1] Protection Measure Effectiveness Rating: Refer to Appendix A1.2.4 for explanation and defining.

[2] Protection Measure Application Status:

- Possible: Protection measures that can potentially be applied to the proposed development/use.
- Fully or Partly Exists: A current state assessment of protection measures already implemented by existing components of the proposed development/use. The status of current implementation can also be fully or partly. These measures are accounted for in assessing 'inherent' risk levels (refer to Glossary).
- Currently Planned: Protection measures that:
  - Are incorporated into the site plans;
  - Exist in an approved Bushfire Management Plan (BMP) and/or Bushfire Emergency Plan (BEP) and are comprised of the applicable acceptable solutions (established by the 'Guidelines for planning in bushfire prone areas', DPLH as amended), alternative solutions and any additional recommended protection measures - for which a responsibility for their implementation has been created and approved; and/or
  - Exist in a yet to be submitted Bushfire Management Plan (BMP) and/or Bushfire Emergency Plan (BEP) and are comprised of the applicable acceptable solutions (established by the 'Guidelines for planning in bushfire prone areas', DPLH as amended), that can be met and for which a responsibility for their implementation can be created in the BMP.

  These planned measures are accounted for in assessing 'inherent' risk levels (refer to Glossary).

PROTECTION MEASURES AVAILABLE TO REDUCE VULNERABILITY LEVELS				Effectiveness Rating [1]	Application Status [2]			
					Possible	Exists	Planned	Additionally Recommend
Element at Risk	Persons On Access/Egress Routes In Vehicles	Access/Egress Route ID	Internal road / driveway					

- Additionally Recommend: Protection measures that:
  - Exist in a yet to be submitted Bushfire Management Plan (BMP) and/or Bushfire Emergency Plan (BEP) and comprise alternative solutions and/or additional recommended protection measures (that can and should be implemented in the opinion of the bushfire consultant), and for which a responsibility for their implementation can be created in the BMP; and/or
  - Are developed in the process of producing this risk assessment and management report and for which a responsibility for their implementation can be created in the BMP.

These additionally recommended measures, along with existing and planned measures, are accounted for in assessing 'residual' risk levels (refer to Glossary).

5.4.2.2 PROTECTION MEASURES - EFFECTIVENESS AND NUMBER APPLIED

For the stated element at risk, the numbers of both available and potentially applied bushfire protection measures are summarised and the effectiveness of each measure at reducing vulnerability levels is stated (refer to Appendix 1 for explanatory and supporting information).

This information is applied in the following section of this report to the derivation of the potential for applied bushfire protection measures to reduce the vulnerability of the relevant element at risk to bushfire hazard threats.

VULNERABILITY REDUCING PROTECTION MEASURE ANALYSIS							
Element at Risk	Persons on Access/Egress Routes in Vehicles						
Access/Egress Route ID							
The Protection Mechanism	Effectiveness Rating [1]	Numbers of Protection Measures					
		Total Available	Application Status [2]				
			Possible	Fully Exists	Partly Exists	Currently Planned	Additionally Recommen
Lower Risk Road Construction (Design and Materials)	Very High	1					
	High	2	1			1	1
	Medium	4	4	1		3	2
	Not Relevant						
Evacuees are Self-Sufficient and Have Local Awareness and Own Transport	Very High						
	High	2	2			2	2
	Medium						
	Not Relevant						
Number Analysis	Very High	1					
	High	4	3			3	3
	Medium	4	4	1		3	2
	Not Relevant						
	Totals	9	7	1		6	5

[1] Protection Measure Effectiveness Rating: Refer to Appendix A1.2.4 for explanation and defining.

[2] Protection Measure Application Status: Refer to table footnotes in the preceding Section.

5.4.2.3 PROTECTION MEASURES - VULNERABILITY REDUCING POTENTIAL

For the stated element at risk and identified bushfire hazard, the potential for applied bushfire protection measures to reduce inherent vulnerability levels is assessed as a function of:

- The number of bushfire protection measures that can be applied compared to the number available; and
- The weighting applied to each protection measure that indicates how effective it can be at reducing the vulnerability of elements at risk.

ASSESSED POTENTIAL OF APPLIED PROTECTION MEASURES TO REDUCE VULNERABILITY TO BUSHFIRE HAZARD THREATS [1]	
Element at Risk	Persons on Access/Egress Routes in Vehicles
Access/Egress Route ID	Private driveway and Gull Road
ASSESSMENT OF PROTECTION MEASURES APPLIED TO THE DERIVATION OF VULNERABILITY LEVELS	
REDUCTION IN THE INHERENT VULNERABILITY LEVEL [2]	REDUCTION IN THE RESIDUAL VULNERABILITY LEVEL [3]
None	Minimal

[1] Refer to Appendix 1 for explanatory and supporting information.

[2] Accounts for all currently implemented bushfire protection measures and those planned to be implemented.

[3] Additionally accounts for bushfire protection measures recommended to be implemented by the bushfire consultant.

Assessment Comments: The private driveway will be constructed to public road standards thereby minimally reducing the residual vulnerability level.

5.4.2.4 ASSESSED VULNERABILITY LEVEL (INHERENT AND RESIDUAL)

The preceding bushfire protection measure analysis has enabled the derivation of the indicative inherent and residual vulnerability levels. These vulnerability levels are indicative as they are derived through a qualitative assessment process. In combination with the corresponding assessed threat and exposure levels, they will be applied to deriving the indicative inherent and residual bushfire risk levels.

ASSESSED INDICATIVE VULNERABILITY LEVELS – POST APPLICATION OF BUSHFIRE PROTECTION MEASURES [1]				
ELEMENT AT RISK	Persons Located Onsite And Temporarily Offsite			
Access/Egress Route ID	Private driveway and Gull Road			
THE INHERENT VULNERABILITY LEVEL [2]				
Very Low ☐	Low ☐	Moderate ☐	High ☒	Extreme ☐
THE RESIDUAL VULNERABILITY LEVEL [3]				
Very Low ☐	Low ☐	Moderate ☐	High ☒	Extreme ☐

[1] Refer to Appendix 1 for explanatory and supporting information.

[2] Accounts for all currently implemented bushfire protection measures and those planned to be implemented.

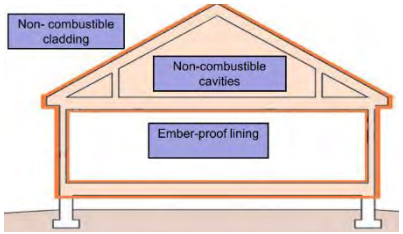
[3] Additionally accounts for bushfire protection measures recommended to be implemented by the bushfire consultant.

Assessment Comments: The private driveway will be constructed to public road standards thereby minimally reducing the residual vulnerability level. However, the Residual vulnerability level will remain at high due to the distance, 4km from the site to the nearest two-way access.

5.4.3 BUILDINGS AND STRUCTURES (NCC CLASSES 1-10)

5.4.3.1 PROTECTION MEASURES - IDENTIFICATION AND APPLICATION STATUS

PROTECTION MEASURES AVAILABLE TO REDUCE VULNERABILITY LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk	Buildings/Structures - NCC Classes 1-10					
THE PROTECTION MECHANISM – CONSTRUCTION DESIGN AND MATERIALS: Increase bushfire resilience through the application of beneficial design and construction, including using non-combustible materials and minimising the use of vulnerable materials, to the greatest extent possible. Practicality and cost will be key considerations in determining the viability of applying protection measures in differing scenarios, but this should be determined with due consideration of threat levels and the importance of the elements at risk. The constructed systems should utilise the following properties to the greatest extent possible: reliability (which requires their durability over time, low maintenance and being unlikely to change over time), robustness (which limits damage spread from minor sources, continues to protect when thermally loaded and protects vulnerable elements), resilience (which enables their return to a functional state following an overload) and redundancy (which ensures the fate of the subject building/structure is not reliant on the effective performance of a single element). Refer to the glossary for additional explanation. The mechanism is also applicable to constructed consequential fire fuels.						
9.1	Construct to AS 3959:2018 [4]: Apply the specified requirements to construction. These are intended to reduce the risk of building ignition from bushfire direct attack mechanisms. Note that the indirect attack mechanisms and the threats presented by consequential fire fuels are not specifically considered. *"The standard is primarily concerned with improving the ability of buildings … to better withstand attack from bushfire thus giving a measure of protection to the building occupants (until the fire front passes), as well as to the building itself".* The AS 3959 approach adopts a strategy that relies on the integrity of the building's exterior envelope (i.e., the cladding of roof/wall/eaves, floor supporting structures/flooring and all penetrations) to resist all bushfire exposure conditions and environmental actions thereby protecting all structural construction elements behind it, including allowable combustible materials. It provides protection by: • Using specified materials that provide ignition resistance (tolerance of radiant heat and flames). Higher BAL ratings impose increased construction requirements for these exterior envelope materials; • Specifying precise gap control (applicable to all bushfire attack levels) for the exterior envelope of the building to prevent ember entry); and • Attached and adjacent structures (within 6m) must also comply with the Standard.	High	Yes	No	Yes	Yes
Assessment Comments: The office/crib room (shelter in place building) building will be either constructed to AS 3959 or NASH standards. It is unlikely and impractical for the facility structure and associated infrastructure to comply with AS 3959 requirements, specifically ember attack requirements.						

PROTECTION MEASURES AVAILABLE TO REDUCE VULNERABILITY LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk	Buildings/Structures - NCC Classes 1-10					
Recommendation Details: Nominated shelter in place building to comply with NASH standard.						
9.2	Construct to NASH Standard [33]: Apply the specified requirements to construction. The Standard: *"Sets out acceptable construction requirements for residential and low-rise buildings in bushfire prone areas to reduce the risk of ignition from bushfire attack involving embers, radiant heat and direct flame impingement using non-combustible materials. Buildings constructed in accordance with this Standard are intended to provide a sheltering envelope during the passage of a bushfire flame front. They do not constitute 'last resort' private bushfire shelters as defined in the NCC. The Standard is based on achieving ignition resistance through non-combustible construction using conventional building materials and a level of redundancy to provide a high level of performance in extreme bushfire events and an increased probability that unattended buildings will survive such events."* Key attributes of the Standard include: • Materials used anywhere on the building envelope (see shaded part of diagram below), must be non-combustible except for a small amount allowed externally that includes flooring, window frames, doors and external decorative trim. The building envelope is comprised of a framed roof/ceiling system, an external wall system and a floor system;  • The same construction requirements apply for all BAL ratings up to BAL-40 (except for external doors and windows which apply AS 3959 requirements). An additional benefit of this is the built in resistance to the direct attack mechanisms of consequential fire when lower BAL ratings apply. • It does not rely on eliminating ember entry to the roof space, wall cavities and floor system as these are non-combustible construction. Embers only need to be kept from entering the internal living/operating spaces. • It is ember tolerant without unrealistic workmanship, supervision and maintenance requirements; • The combination of a non-combustible cladding and cavities is a robust solution that enables the building to be configured so that failure or damage to one element does not lead to the inevitable failure of the building or a breach of the habitable envelope; and	Very High	Yes	No	Partly	Yes

PROTECTION MEASURES AVAILABLE TO REDUCE VULNERABILITY LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk	Buildings/Structures - NCC Classes 1-10					
	• Attached and adjacent structures (within 6m) must also comply with the Standard.					
Assessment Comments: The office/crib room (shelter in place building) building will be either constructed to AS 3959 or NASH standards. It is unlikely and impractical for the facility structure and associated infrastructure to comply with AS 3959 requirements, specifically ember attack requirements. *Recommendation Details:* Nominated shelter in place building to comply with NASH standard.						
9.3	Construction Materials for External and Internal Cavity Building Elements: Except for internal living or operation spaces, to the degree necessary, utilise materials resistant to fire attack mechanisms of flame and radiant heat (preferably non-combustible) for all relevant building elements, including wall, roof, floor, supporting structures and framing systems.	Very High	Yes	No	Unknown	Yes
Assessment Comments: Not Required *Recommendation Details:* Where possible use non-combustible material.						
9.4	Construction Materials for Consequential Fire Fuels: For constructed large consequential fire fuels, use non-combustible materials to the fullest extent possible. Potential fuels include: • Landscaping items – fences, screens, retaining walls, gazebos, plastic water tanks etc; • Attached structures - decks, verandahs, stairs, carports, garages, pergolas, patios, etc; • Adjacent structures – other houses, sheds, garages, carports, etc. Post bushfire event assessments identify structure to structure fire as a common cause of overall building loss [9].	High	Yes	No	Unknown	Yes
Assessment Comments: Not Required *Recommendation Details:* Use of non-combustible materials is preferred/recommended.						
9.5	Construction Design / Materials Resistant To High Wind Damage: Apply construction measures to prevent the type of building damage from wind that will open or create gaps (from the wind itself or carried projectiles) and allow the entry of embers, radiant heat and flames. This type of damage is typically superficial damage. Building codes relating to wind (e.g., cyclones) do not necessarily address this superficial type of impact. Additional fixings for building envelope claddings and protection of the most vulnerable elements, such as glazing, from debris impact, are key considerations. Consider applying the principles of the NASH Standard [33] design solution to construction.	Medium	Yes	No	Unknown	Yes

PROTECTION MEASURES AVAILABLE TO REDUCE VULNERABILITY LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk	Buildings/Structures - NCC Classes 1-10					
	"Potential wind effects directly associated with bushfire events have been considered in this Standard. Wind actions may affect buildings subject to a bushfire attack in various ways including: • The intensity of flame front activity may produce locally high wind pressures on parts of the building; • In the post fire phase, some weakened components on the building envelope may be vulnerable to normal design pressures; and • Wind can drive embers into the building envelope." Most applicable when the physical requirements exist for the development of an extreme bushfire event within the surrounding landscape.					
Assessment Comments: Not Required *Recommendation Details:* Construct shelter in place building to NASH standard. NASH Standard has been designed for impact of wind.						
9.6	Construction of Gas Supply: All gas cylinders are installed and maintained in accordance with AS 1596 (for domestic house supply) as a guide. The requirement of the standard includes: • Safety release valve shall be directed away from the building and persons access/egress routes; • Metal piping and fittings shall be used on all piping inside the building's cavities and enclosable occupied spaces and the high pressure side of any gas regulators; and • Tethers securing cylinders are to be non-combustible. The objective is to reduce the risk of local fire against a building and reduce the risk of death or injury, from gas flaring or explosion. The rationale is gas cylinders which have either flared or ruptured are commonly found in post bushfire surveys [9]. The heat from the bushfire or consequential local fire has been sufficient to cause their pressure to reach critical levels beyond which their pressure release valve releases large quantities of LP gas. If these gas cylinders fall over, this pressure release valve may no longer function correctly, meaning that the gas cylinder may continue to increase in pressure with continued heating until the cylinder ruptures. The resulting explosion includes a pressure wave and large ball of flame which can threaten nearby life and buildings. Readily available guidance is provided by CSIRO Best Practice Bushfire Guide (https://research.csiro.au/bushfire/new-builds/water-electricity-gas/) and WA Dept. Mines, Industry, Regulation and Safety 'LP Gas cylinder safety in bushfire prone areas' (https://www.commerce.wa.gov.au/publications/lp-gas-cylinder-safety-bushfire-prone-areas).	Medium	N/A	N/A	N/A	N/A

PROTECTION MEASURES AVAILABLE TO REDUCE VULNERABILITY LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk	Buildings/Structures - NCC Classes 1-10					
Assessment Comments: There will be no gas cylinders on site. *Recommendation Details:* Not Applicable						
9.7	Construction of Electricity Supply: Cabling to be shielded (includes installing underground within subject property boundary) from applicable bushfire attack mechanisms. The objective is to assist with continuity of supply for essential site operations and/or electrically driven firefighting pumps. It also reduces the risk of electrocution to any persons onsite and reduces potentially additional sources of fire ignition. It is common in bushfires for power infrastructure to burn and collapse or be impacted by falling trees or branches while power lines are still live. Removing this risk may be appropriate for some sites.	Medium	Yes	N/A	N/A	Yes
Assessment Comments: *Recommendation Details:* Cabling to be underground wherever possible.						
9.8	Minimise Re-entrant Detail to Minimise Debris and Ember Accumulation: Avoid or limit the accumulation of unburnt debris and embers by minimising re-entrant details and/or adopting aerodynamic forms that will self-shed windblown debris and embers. For example: • Simple building/structure footprints that avoid re-entrant corners in access ways, at wall/floor, wall/ground, roof/wall junctions and around doors, vents, windows; and • Simple roof layouts that avoid valleys and minimise the number of ridges that need protection details (e.g. skillion roofs).	Medium	Yes	No	Partly	Yes
Assessment Comments: The facility and workshop is constructed for a specific industry use very likely cannot comply. *Recommendation Details:* The shelter in place building (office) to consider design features to minimise debris and ember accumulation.						
9.9	Minimise Debris and Ember Trapping Surfaces: Avoid or minimise the use of exposed combustible surfaces that can trap and accumulate debris and embers. These include: • Horizontal, or shallow angle surfaces e.g. exposed wall/roof framework, roofs, decking, verandahs, steps, windowsills; and • Vertical surfaces with rough textured cladding (e.g. sawn timber).	Medium	Yes	No	Partly	Yes

PROTECTION MEASURES AVAILABLE TO REDUCE VULNERABILITY LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk	Buildings/Structures - NCC Classes 1-10					
Assessment and Recommendation Details: The facility is constructed for a specific industry use therefore the trapping surfaces may be flat.						
9.10	Protect Roof Plumbing to Minimise Debris and Ember Accumulation: All roof plumbing (gutters, valleys) is protected from the accumulation of debris and embers that can result in direct fire attack mechanisms immediately adjacent to any combustible elements within the roof cavity.	Medium	Yes	No	No	Yes
Assessment Comments: Not Required *Recommendation Details:* Design of facility, workshop pluming and associated structures and equipment to consider reducing the risk off ignition. The office (shelter in place building) will be constructed using the protection measures.						
9.11	Minimise Construction Cavities to Minimise Debris and Ember Accumulation: Apply designs that lower the potential for accumulation of embers and debris within cavity spaces of buildings/structures. Examples include concrete floor slab on the ground and solid masonry walls.	Medium	Yes	No	No	Yes
Assessment Comments: Not Required *Recommendation Details:*						
9.12	Minimise External Openings to Limit Flame/Radiant Heat/Ember/Debris Entry: Limit potential sites for threat entry to through the external building envelope to internal spaces containing combustible materials (consequential fire fuels). Examples include reducing windows/doors on elevations facing the bushfire hazard and apply design to limit gaps and penetrations that will require screening.	Medium	Yes	No	Partly	Yes
Assessment Comments: for facility and workshop, Screens to be provided where practicable. *Recommendation Details:* For the facility, workshop and associated structures, protection measure to be applied where practicable. Office to comply with the protection measures.						
9.13	Screen and Seal Gaps and Penetrations: Apply fire rated sealants and/or install metal screening (corrosion resistant steel, bronze, aluminium <2mm aperture). All external construction and penetration gaps with apertures greater than 2mm will allow ember entry (and potentially debris) to internal cavities and combustible materials within (as consequential fire fuels).	Medium	Yes	No	Partly	Yes

PROTECTION MEASURES AVAILABLE TO REDUCE VULNERABILITY LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk	Buildings/Structures - NCC Classes 1-10					
	This includes gaps in roofs, walls, doors, windows and their surrounding trims – including those associated with penetrations, vents, weepholes, poor workmanship and material deterioration and movement over time (maintenance). Internal fire is difficult to see and extinguish.					
Assessment Comments: Not Required *Recommendation Details:* For the facility, workshop and associated structures, protection measure to be applied where practicable. Office to comply with the protection measures.						
9.14	Screen External Doors and Windows: Metal screens (corrosion resistant steel, bronze, aluminium <2mm aperture) installed over non-openable and/or openable parts of windows and doors to prevent ember entry to internal spaces containing combustible materials (consequential fire fuels) and reduce radiant heat load on vulnerable surfaces.	Medium	Yes	No	Partly	Yes
Assessment Comments: Not Required *Recommendation Details:* For the facility, workshop and associated structures, protection measure to be applied where practicable. Office to comply with the protection measures.						
9.15	Shutter External Doors and Windows: Fire rated shutters are installed to significantly increase bushfire resistance of the vulnerable building elements.	Medium	N/A	N/A	N/A	N/A
Assessment Comments: Not Required *Recommendation Details:* Not Applicable						
THE PROTECTION MECHANISM – AVAILABILITY OF A FIREFIGHTING RESPONSE CAPABILITY: Provide sufficient and reliable dedicated firefighting water supply and delivery capability as necessary for installed active and/or passive systems.						
9.16	Firefighting Water Supply: Have a dedicated static supply of firefighting water for the protection of buildings/structures before and after the passage of a bushfire front. Adequate water supply is critical for any firefighting operation, particularly where property protection is the intent. This is necessary when: • A water supply additional to a reticulated water supply is required to counter the loss of firefighting water as a protection measure, should the reticulated supply be interrupted; and • It is the only source of firefighting water.	High	Yes	No	Partly	Yes

PROTECTION MEASURES AVAILABLE TO REDUCE VULNERABILITY LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk	Buildings/Structures - NCC Classes 1-10					
	All tanks shall be non-combustible. Aside from losing water, failure of combustible tank can provide an additional heat or load to a vulnerable building element. Metal piping and fittings shall be used for any above ground components. The limitation to the effectiveness of the measure is the requirement for persons to be present and have the minimum required operational knowledge and/or access to appropriate information.					
Assessment Comments: Not Required *Recommendation Details:* Firefighting water tanks are to be non-combustible. Minimum 50,000lt are required and to be fitted with coupling as per BMP requirements.						
9.17	Firefighting Equipment Actively Operated: In addition to a dedicated water supply, appropriate mobile firefighting appliances are available quickly and/or fixed firefighting equipment is installed (pumps, hoses, sprinklers etc). Where equipment is installed, this will be resilient to bushfire impact, to the extent necessary, through the application of appropriate equipment materials and protection (shielding or separation from the hazard). The limitation to the effectiveness of the measure is the requirement for persons to be present and have the minimum required operational knowledge and/or access to appropriate information.	High	Yes	No	No	Yes
Assessment Comments: The equipment required as a minimum 2 x 500lt slip-on units (not trailer type) and staff trained in their operations. Manual operated sprinkler system for stored stockpiles of flammable material. *Recommendation Details:* • Sprinkler system required for all stockpiles of flammable materials. • Training required for system operations. • Operational plans required for sprinkler operations. • As a minimum, 2 x slip-on firefighting units (not trailer type) are required. • Staff training required in unit operations. • Training operation manual to be developed in response and equipment operations. PPE to be provided to trained staff.						
9.18	Fire Fighting Equipment Passively Operated: In addition to a dedicated water supply, appropriate water dispensing apparatus are installed (e.g. pumps, plumbing and sprinklers) that are automatically activated. These will be resilient to bushfire impact, to the extent necessary, through the application of appropriate equipment materials and protection (shielding or separation from the hazard).	High	Yes	No	No	Yes

PROTECTION MEASURES AVAILABLE TO REDUCE VULNERABILITY LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk	Buildings/Structures - NCC Classes 1-10					
Assessment Comments: DFES built environment will determine an internal automated sprinklers system will be required to be available to apply to stockpiles of combustible material. *Recommendation Details:* • Sprinkler system required for all stockpiles of flammable materials. • Training required for system operations. • Operational plans required for sprinkler operations.						
9.19	Fire Fighting Equipment Operability Maintained: Where water pumps, shutters or other active/passive protection measures rely on the continued supply of electricity, establish barriers (shielding) or separation from potential damaging factors (e.g. falling trees/branches, fire, or other impact sources). For example, bury transmission systems to the greatest extent possible.	High	Yes	No	Unknown	Yes
Assessment Comments: Not Required *Recommendation Details:* Develop operational manual and maintenance schedule.						
9.20	Access via Firebreaks Provided: Installation and maintenance of firebreaks to facilitate firefighting access / backburning (and also limiting surface fire progression).	Medium	Yes	Yes	Yes	No
Assessment Comments: Not Required *Recommendation Details:* The site will comply with the Firebreak Notice.						
THE PROTECTION MECHANISM – MANAGE AND MAINTAIN EFFECTIVENESS OF APPLIED PROTECTION MEASURES: To ensure the retention of the level of bushfire resilience that has been established through the implementation of appropriate bushfire protection measures, formal and enforceable responsibilities are created.						
9.21	Formal Documents Created to Guide and Enforce Management: Through relevant site operations document(s) and/or an enforceable agreement, regulation or standard, a mechanism is put in place to ensure that: • The required management and maintenance of applied bushfire protection measures is conducted on a regular basis – with the interval dependent on the necessary frequency that will maintain full effectiveness; • The relevant protection measures are known and understood; and • Responsibilities are created.	High	Yes	No	No	Yes

PROTECTION MEASURES AVAILABLE TO REDUCE VULNERABILITY LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk	Buildings/Structures - NCC Classes 1-10					

Assessment Comments: Not Required

Recommendation Details: Guidance documents to be developed for site operations and emergency management (maintenance of equipment & training)

[1] Protection Measure Effectiveness Rating: Refer to Appendix A1.2.4 for explanation and defining.

[2] Protection Measure Application Status:

- Possible: Protection measures that can potentially be applied to the proposed development/use.
- Fully or Partly Exists: A current state assessment of protection measures already implemented by existing components of the proposed development/use. The status of current implementation can also be fully or partly. These measures are accounted for in assessing 'inherent' risk levels (refer to Glossary).
- Currently Planned: Protection measures that:
  - Are incorporated into the site plans;
  - Exist in an approved Bushfire Management Plan (BMP) and/or Bushfire Emergency Plan (BEP) and are comprised of the applicable acceptable solutions (established by the 'Guidelines for planning in bushfire prone areas', DPLH as amended), alternative solutions and any additional recommended protection measures - for which a responsibility for their implementation has been created and approved; and/or
  - Exist in a yet to be submitted Bushfire Management Plan (BMP) and/or Bushfire Emergency Plan (BEP) and are comprised of the applicable acceptable solutions (established by the 'Guidelines for planning in bushfire prone areas', DPLH as amended), that can be met and for which a responsibility for their implementation can be created in the BMP.

  These planned measures are accounted for in assessing 'inherent' risk levels (refer to Glossary).
- Additionally Recommend: Protection measures that:
  - Exist in a yet to be submitted Bushfire Management Plan (BMP) and/or Bushfire Emergency Plan (BEP) and comprise alternative solutions and/or additional recommended protection measures (that can and should be implemented in the opinion of the bushfire consultant), and for which a responsibility for their implementation can be created in the BMP; and/or
  - Are developed in the process of producing this risk assessment and management report and for which a responsibility for their implementation can be created in the BMP.

  These additionally recommended measures, along with existing and planned measures, are accounted for in assessing 'residual' risk levels (refer to Glossary).

5.4.3.2 PROTECTION MEASURES - EFFECTIVENESS AND NUMBER APPLIED

For the stated element at risk, the numbers of both available and potentially applied bushfire protection measures are summarised and the effectiveness of each measure at reducing vulnerability levels is stated (refer to Appendix 1 for explanatory and supporting information).

This information is applied in the following section of this report to the derivation of the potential for applied bushfire protection measures to reduce the vulnerability of the relevant element at risk to bushfire hazard threats.

VULNERABILITY REDUCING PROTECTION MEASURE ANALYSIS							
Element at Risk	Buildings / Structures - NCC Classes 1-10						
The Protection Mechanism	Effectiveness Rating [1]	Numbers of Protection Measures					
		Total Available	Application Status [2]				
			Possible	Fully Exists	Partly Exists	Currently Planned	Additionally Recommen
Construction Design and Materials	Very High	2	2			2	2
	High	2	2	1		1	2
	Medium	9	9			5	9
	Not Relevant	2					
Availability of a Firefighting Response Capability	Very High						
	High	4	4				4
	Medium	1	1	1		1	0
	Not Relevant						
Manage and Maintain Effectiveness of Applied Protection Measures	Very High						
	High	1	1	0	0		1
	Moderate						
	Not Relevant						
Number Analysis	Very High	2	2			2	2
	High	7	7	1		1	7
	Medium	10	10	1		6	9
	Not Relevant	2					
	Totals	21	19	2		9	18

[1] Protection Measure Effectiveness Rating: Refer to Appendix A1.2.4 for explanation and defining.

[2] Protection Measure Application Status: Refer to table footnotes in the preceding Section.

5.4.3.3 PROTECTION MEASURES - VULNERABILITY REDUCING POTENTIAL

For the stated element at risk and identified bushfire hazard, the potential for applied bushfire protection measures to reduce inherent vulnerability levels is assessed as a function of:

- The number of bushfire protection measures that can be applied compared to the number available; and
- The weighting applied to each protection measure that indicates how effective it can be at reducing the vulnerability of elements at risk.

ASSESSED POTENTIAL OF APPLIED PROTECTION MEASURES TO REDUCE VULNERABILITY TO BUSHFIRE HAZARD THREATS [1]							
Element at Risk	Buildings and Structures – NCC Classes 1-10						
ASSESSMENT OF PROTECTION MEASURES APPLIED TO THE DERIVATION OF AN INHERENT VULNERABILITY LEVEL [3]							
Direct Attack Mechanisms [2]				Indirect Attack Mechanisms [2]			
Flame Contact	Radiant Heat	Embers / Burning Debris	High / Erratic Fire Driven Wind	Debris Production / Accumulation	Surface Fire	Tree Strike / Obstruction	Consequential (Local) Fire
Minimal	Significant	Moderate	Minimal	Moderate	Minimal	None	Significant
Moderate				Moderate			
ASSESSMENT OF PROTECTION MEASURES APPLIED TO THE DERIVATION OF A RESIDUAL VULNERABILITY LEVEL [4]							
Direct Attack Mechanisms [2]				Indirect Attack Mechanisms [2]			
Flame Contact	Radiant Heat	Embers / Burning Debris	High / Erratic Fire Driven Wind	Debris Production / Accumulation	Surface Fire	Tree Strike / Obstruction	Consequential (Local) Fire
Minimal	Minimal	Moderate	Minimal	Moderate	Minimal	None	Minimal
Significant				Significant			

[1] Refer to Appendix 1 for explanatory and supporting information.

[2] Refer to Appendix 2 for explanatory information.

[3] Accounts for all currently implemented bushfire protection measures and those planned to be implemented.

[4] Additionally accounts for bushfire protection measures recommended to be implemented by the bushfire consultant.

Assessment Comments: Inclusion of guidance plans, operational and emergency management plans and training will reduce vulnerability. The application of suppression systems and response equipment will reduce infrastructure vulnerability.

5.4.3.4 ASSESSED VULNERABILITY LEVEL (INHERENT AND RESIDUAL)

The preceding bushfire protection measure analysis has enabled the derivation of the indicative inherent and residual vulnerability levels. These vulnerability levels are indicative as they are derived through a qualitative assessment process. In combination with the corresponding assessed threat and exposure levels, they will be applied to deriving the indicative inherent and residual bushfire risk levels.

ASSESSED INDICATIVE VULNERABILITY LEVELS – POST APPLICATION OF BUSHFIRE PROTECTION MEASURES [1]							
ELEMENT AT RISK		Buildings/Structures - NCC Classes 1-10					
BUSHFIRE ATTACK MECHANISMS [2]		INHERENT VULNERABILITY LEVEL [3]					OVERALL
DIRECT	Flame Contact	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	High
DIRECT	Radiant Heat	Very Low ☐	Low ☐	Moderate ☐	High ☒	Extreme ☐	
DIRECT	Embers / Burning Debris	Very Low ☐	Low ☐	Moderate ☒	High ☐	Extreme ☐	
DIRECT	High/Erratic Fire Driven Wind	Very Low ☐	Low ☐	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Debris Production / Accumulation	Very Low ☐	Low ☐	Moderate ☒	High ☐	Extreme ☐	
INDIRECT	Surface Fire	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Tree Strike / Obstruction	Very Low ☒	Low ☐	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Consequential (Local) Fire	Very Low ☐	Low ☐	Moderate ☐	High ☒	Extreme ☐	
BUSHFIRE ATTACK MECHANISMS [2]		RESIDUAL VULNERABILITY LEVEL [4]					OVERALL
DIRECT	Flame Contact	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	Moderate
DIRECT	Radiant Heat	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	
DIRECT	Embers / Burning Debris	Very Low ☐	Low ☐	Moderate ☒	High ☐	Extreme ☐	
DIRECT	High/Erratic Fire Driven Wind	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Debris Production / Accumulation	Very Low ☐	Low ☐	Moderate ☒	High ☐	Extreme ☐	
INDIRECT	Surface Fire	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Tree Strike / Obstruction	Very Low ☒	Low ☐	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Consequential (Local) Fire	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	

[1] Refer to Appendix 1 for explanatory information.

[2] Refer to Appendix 2 for explanatory information.

[3] Accounts for all currently implemented bushfire protection measures and those planned to be implemented.

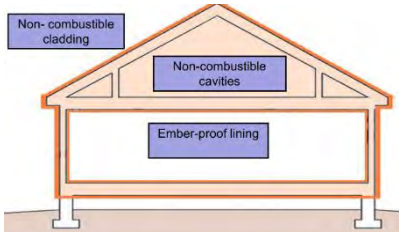
[4] Additionally accounts for bushfire protection measures recommended to be implemented by the bushfire consultant.

Assessment Comments: The recommended protection measures are effective in reducing the vulnerability levels. Inclusion of guidance plans, operational and emergency management plans and training will reduce vulnerability. The application of suppression systems and response equipment will reduce infrastructure vulnerability.

5.4.4 BUILT INFRASTRUCTURE ASSETS

5.4.4.1 PROTECTION MEASURES - IDENTIFICATION AND APPLICATION STATUS

PROTECTION MEASURES AVAILABLE TO REDUCE VULNERABILITY LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk	Built Infrastructure Assets					
THE PROTECTION MECHANISM – CONSTRUCTION DESIGN AND MATERIALS: Increase bushfire resilience through the application of beneficial design and construction, including using non-combustible materials and minimising the use of vulnerable materials, to the greatest extent possible. Practicality and cost will be key considerations in determining the viability of applying protection measures in differing scenarios, but this should be determined with due consideration of threat levels and the importance of the elements at risk. The constructed systems should utilise the following properties to the greatest extent possible: reliability (which requires their durability over time, low maintenance and being unlikely to change over time), robustness (which limits damage spread from minor sources, continue to protect when thermally loaded and protects vulnerable elements), resilience (which enables their return to a functional state following an overload) and redundancy (which ensures the fate of the subject building/structure is not reliant on the effective performance of a single element). Refer to the glossary for additional explanation. The principle is also applicable to constructed consequential fire fuels.						
10.1	Construct to AS 3959:2018 [4]: Use the principles and requirements established in the Standard, for buildings in general, and apply to the infrastructure assets where they have merit. These are intended to reduce the risk of building ignition from bushfire direct attack mechanisms. Note that the indirect attack mechanisms and the threats presented by consequential fire fuels are not specifically considered. Key attributes of the Standard that may have relevance to other built assets include: • The AS 3959 strategy that relies on the integrity of the building's exterior envelope (i.e., the cladding of roof/wall/eaves, floor supporting structures/flooring and all penetrations) to resist all bushfire exposure conditions and environmental actions thereby protecting all structural construction elements behind it, including allowable combustible materials. • Using specified materials that provide ignition resistance (tolerance of radiant heat and flames). Higher BAL ratings impose increased construction requirements for these exterior envelope materials; • Specifying precise gap control (applicable to all bushfire attack levels) for the exterior envelope of the building to prevent ember entry); and • Attached and adjacent structures (within 6m) must also comply with the Standard.	High	Yes	No	No	Yes
Assessment Comments: Not required *Recommendation Details:* Fit ember screens, gaps to be 2mm or less. The built infrastructure assets where applicable will implement the protection measures.						

PROTECTION MEASURES AVAILABLE TO REDUCE VULNERABILITY LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk	Built Infrastructure Assets					
10.2	Construct to NASH Standard [33]: Use the principles and requirements established in the Standard, for residential and low-rise buildings, and apply to the infrastructure assets where they have merit. Key attributes of the Standard that may have relevance to other built assets include: • Materials used anywhere on the building envelope (see shaded part of diagram below), must be non-combustible (except for a small number of smaller building elements). The building envelope is comprised of a framed roof/ceiling system, an external wall system and a floor system;  • The same construction requirements apply for all BAL ratings up to BAL-40 (except for external doors and windows which apply AS 3959 requirements). An additional benefit of this is the built in resistance to the direct attack mechanisms of consequential fire when lower BAL ratings apply. • It does not rely on eliminating ember entry to the roof space, wall cavities and floor system as these are non-combustible construction. Embers only need to be kept from entering the internal living/operating spaces. • It is ember tolerant without unrealistic workmanship, supervision and maintenance requirements; • The combination of a non-combustible cladding and cavities is a robust solution that enables the building to be configured so that failure or damage to one element does not lead to the inevitable failure of the building or a breach of the habitable envelope; and • Attached and adjacent structures (within 6m) must also comply with the Standard.	Very High	Yes	No	No	Yes
Assessment Comments: Constructing or utilising the NASH Standard will increase robustness and reduce vulnerability. NASH Standard materials are the preferred construction materials. *Recommendation Details:* The facilities built infrastructure assets where applicable will implement the protection measures.						
10.3	Construction Materials for External and Internal Cavity Building Elements: Except for internal living or operation spaces, to the degree necessary, utilise materials resistant to fire attack mechanisms of flame and radiant heat (preferably non-combustible) for all relevant building elements, including wall, roof, floor, supporting structures and framing systems.	Very High	Yes	No	Unknown	Yes

PROTECTION MEASURES AVAILABLE TO REDUCE VULNERABILITY LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk	Built Infrastructure Assets					
Assessment Comments: The protection measure may be relevant to some built infrastructure assets. *Recommendation Details:* Apply protection measures where applicable.						
10.4	Construction Materials for Consequential Fire Fuels: For constructed large consequential fire fuels, use non-combustible materials to the fullest extent possible. Potential fuels include attached structures, adjacent structures and surrounding landscaping items (fences, screens, retaining walls etc.).	High	Yes	No	Unknown	Yes
Assessment Comments: Not Required *Recommendation Details:* Protection measures to be implemented.						
10.5	Construction Design / Materials Resistant To High Wind Damage: Apply construction measures to prevent the type of building damage from wind that will open or create gaps (from the wind itself or carried projectiles) and allow the entry of embers, radiant heat and flames. This type of damage is typically superficial damage. Building codes relating to wind (e.g., cyclones) do not necessarily address this superficial type of impact. Additional fixings for building envelope claddings and protection of the most vulnerable elements, such as glazing, from debris impact, are key considerations. Consider applying the principles of the NASH Standard [33] design solution to construction. "Potential wind effects directly associated with bushfire events have been considered in this Standard. Wind actions may affect buildings subject to a bushfire attack in various ways including: • The intensity of flame front activity may produce locally high wind pressures on parts of the building; • In the post fire phase, some weakened components on the building envelope may be vulnerable to normal design pressures; and • Wind can drive embers into the building envelope." Most applicable when the physical requirements exist for the development of an extreme bushfire event within the surrounding landscape.	Medium	Yes	No	Partly	Yes
Assessment Comments: AS 3959 does not have structural requirements for wind that may be generated during a bushfire event, whereas the NASH Standard does. However, industrial built infrastructure are usually wind rated or constructed to withstand external exposures.						

PROTECTION MEASURES AVAILABLE TO REDUCE VULNERABILITY LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk	Built Infrastructure Assets					
Recommendation Details: The shelter in pace building is to be constructed to the NASH Standard.						
10.6	Construction of Gas Supply: All gas cylinders are installed and maintained in accordance with AS 1596 (for domestic house supply) as a guide. The requirement of the standard includes: • Safety release valve shall be directed away from the building and persons access/egress routes; • Metal piping and fittings shall be used on all piping inside the building's cavities and enclosable occupied spaces and the high pressure side of any gas regulators; and • Tethers securing cylinders are to be non-combustible. The objective is to reduce the risk of local fire against a building and reduce the risk of death or injury, from gas flaring or explosion. The rationale is gas cylinders which have either flared or ruptured are commonly found in post bushfire surveys [9]. The heat from the bushfire or consequential local fire has been sufficient to cause their pressure to reach critical levels beyond which their pressure release valve releases large quantities of LP gas. If these gas cylinders fall over, this pressure release valve may no longer function correctly, meaning that the gas cylinder may continue to increase in pressure with continued heating until the cylinder ruptures. The resulting explosion includes a pressure wave and large ball of flame which can threaten nearby life and buildings. Readily available guidance is provided by CSIRO Best Practice Bushfire Guide (https://research.csiro.au/bushfire/new-builds/water-electricity-gas/) and WA Dept. Mines, Industry, Regulation and Safety 'LP Gas cylinder safety in bushfire prone areas' (https://www.commerce.wa.gov.au/publications/lp-gas-cylinder-safety-bushfire-prone-areas).	Medium	N/A	N/A	N/A	N/A
Assessment Comments: No LP gas bottles will be on site. *Recommendation Details:* Not Applicable						
10.7	Construction of Electricity Supply: Cabling to be shielded (includes installing underground within subject property boundary) from applicable bushfire attack mechanisms. The objective is to assist with continuity of supply for essential site operations and/or electrically driven firefighting pumps. It also reduces the risk of electrocution to any persons onsite and reduces potentially additional sources of fire ignition. It is common in bushfires for power infrastructure to burn and collapse or be impacted by falling trees or branches while power lines are still live. Removing this risk may be appropriate for some sites.	Medium	Yes	No	Unknown	Yes

PROTECTION MEASURES AVAILABLE TO REDUCE VULNERABILITY LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk	Built Infrastructure Assets					
10.8	Minimise Re-entrant Detail to Minimise Debris and Ember Accumulation: Avoid or limit the accumulation of unburnt debris and embers by minimising re-entrant details and/or adopting aerodynamic forms that will self-shed windblown debris and embers. For example: • Simple building/structure footprints that avoid re-entrant corners in access ways, at wall/floor, wall/ground, roof/wall junctions and around doors, vents, windows; and • Simple roof layouts that avoid valleys and minimise the number of ridges that need protection details (e.g. skillion roofs).	Medium	Yes	No	Unknown	Yes
Assessment Comments: It is not practicable for all structures to comply with the protection measures. *Recommendation Details: Where practicable, apply the protection measures. Generators and pump room to be fitted with ember screening and all gaps to be 2mm or less.*						
10.9	Minimise Debris/Ember Trapping Surfaces: Avoid or minimise the use of exposed combustible surfaces that can trap and accumulate debris and embers. These include: • Horizontal, or shallow angle surfaces e.g. exposed wall/roof framework, roofs, decking, verandahs, steps, windowsills; and • Vertical surfaces with rough textured cladding (e.g. sawn timber).	Medium	Yes	No	No	Yes
Assessment Comments: Not Required *Recommendation Details:* To comply with the protection measures.						
10.10	Protect Roof Plumbing to Minimise Debris and Ember Accumulation: All roof plumbing (gutters, valleys) is protected from the accumulation of debris and embers that can result in direct fire attack mechanisms immediately adjacent to any combustible elements within the roof cavity.	Medium	Yes	No	Partly	Yes
Assessment Comments: It is not practicable for all structures to comply with the protection measures. *Recommendation Details:* Where practicable, apply the protection measures.						
10.11	Minimise Construction Cavities to Minimise Debris and Ember Accumulation: Apply designs that lower the potential for accumulation of embers and debris within cavity spaces of buildings/structures. Examples include concrete floor slab on the ground and solid masonry walls.	Medium	Yes	No	Partly	Yes

PROTECTION MEASURES AVAILABLE TO REDUCE VULNERABILITY LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk	Built Infrastructure Assets					
Assessment Comments: Not Required *Recommendation Details:* Seal subfloor space and apply ember screening to opening.						
10.12	Minimise External Openings to Limit Flame/Radiant Heat/Ember/Debris Entry: Limit potential sites for threat entry to through the external building envelope to internal spaces containing combustible materials (consequential fire fuels). Examples include reducing windows/doors on elevations facing the bushfire hazard and apply design to limit gaps and penetrations that will require screening.	Medium	Yes	No	Unknown	Yes
Assessment Comments: Not Required *Recommendation Details:* Comply with protection measures.						
10.13	Screen and Seal Gaps and Penetrations: Apply fire rated sealants and/or install metal screening (corrosion resistant steel, bronze, aluminium <2mm aperture). All external construction and penetration gaps with apertures greater than 2mm will allow ember entry (and potentially debris) to internal cavities and combustible materials within (as consequential fire fuels). This includes gaps in roofs, walls, doors, windows and their surrounding trims – including those associated with penetrations, vents, weepholes, poor workmanship and material deterioration and movement over time (maintenance). Internal fire is difficult to see and extinguish.	Medium	Yes	No	Unknown	Yes
Assessment Comments: Not Required *Recommendation Details:* Comply with protection measures						
10.14	Screen External Doors and Windows: Metal screens (corrosion resistant steel, bronze, aluminium <2mm aperture) installed over non-openable and/or openable parts of windows and doors to prevent ember entry to internal spaces containing combustible materials (consequential fire fuels) and reduce radiant heat load on vulnerable surfaces.	Medium	Yes	No	Unknown	Yes
Assessment Comments: Not Required *Recommendation Details:* Windows to be screened.						
10.15	Shutter External Doors and Windows: Fire rated shutters are installed to significantly increase bushfire resistance of the vulnerable building elements.	Medium	N/A	N/A	N/A	N/A

PROTECTION MEASURES AVAILABLE TO REDUCE VULNERABILITY LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk	Built Infrastructure Assets					
Assessment Comments: Not Required *Recommendation Details:* Not Applicable						
10.16	Construction Materials for Critical Non-Structural Elements: Utilise fire/radiant heat rated products (rated to the level determined necessary), for the construction of non-structural elements that are essential to the continued operation of the built asset, and which are potentially exposed to the attack mechanisms of both bushfire and consequential fire. These vulnerable elements include cabling and plumbing associated with power (delivery) inputs and outputs, data transmission, liquid/gas transport (fuel/water) etc.	High	Yes	No	No	Yes
Assessment Comments: Not Required *Recommendation Details:* The critical non-structural elements to be located in <10kWm2 area or shielded.						
THE PROTECTION MECHANISM – AVAILABILITY OF A FIREFIGHTING RESPONSE CAPABILITY: Provide sufficient and reliable dedicated firefighting water supply and delivery capability as necessary for installed active and/or passive systems.						
10.17	Firefighting Water Supply: Have a dedicated static supply of firefighting water for the protection of buildings/structures before and after the passage of a bushfire front. Adequate water supply is critical for any firefighting operation, particularly where property protection is the intent. This is necessary when: • A water supply additional to a reticulated water supply is required to counter the loss of firefighting water as a protection measure, should the reticulated supply be interrupted; and • It is the only source of firefighting water. All tanks shall be non-combustible. Aside from losing water, failure of combustible tank can provide an additional heat load to a vulnerable building element. Metal piping and fittings shall be used for any above ground components. The limitation to the effectiveness of the measure is the requirement for persons to be present and have the minimum required operational knowledge and/or access to appropriate information.	High	Yes	No	No	Yes
Assessment Comments: Not Required *Recommendation Details:* A 50,000 lt water tank to be installed and the protection measures applied.						
10.18	Firefighting Equipment Actively Operated: In addition to a dedicated water supply, appropriate mobile firefighting appliances are available quickly and/or fixed firefighting equipment is installed (pumps, hoses, sprinklers etc).	High	Yes	No	No	Yes

PROTECTION MEASURES AVAILABLE TO REDUCE VULNERABILITY LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk	Built Infrastructure Assets					
	Where equipment is installed, this will be resilient to bushfire impact, to the extent necessary, through the application of appropriate equipment materials and protection (shielding or separation from the hazard). The limitation to the effectiveness of the measure is the requirement for persons to be present and have the minimum required operational knowledge and/or access to appropriate information.					
Assessment Comments: Not Required *Recommendation Details:* Emergency response plans, Bushfire Emergency Plan and basic first response firefighting training, equipment maintenance and operation training and emergency response plans to be developed.						
10.19	Fire Fighting Equipment Passively Operated: In addition to a dedicated water supply, appropriate water dispensing apparatus are installed (e.g. pumps, plumbing and sprinklers) that are automatically activated. These will be resilient to bushfire impact, to the extent necessary, through the application of appropriate equipment materials and protection (shielding or separation from the hazard).	High	Yes	No	No	Yes
Assessment Comments: First responders to have knowledge of operating systems including sprinklers and layout of power cables. *Recommendation Details:* Staff training in the operation of the automatic (if fitted) and manual sprinkler systems for response to a fire event. Electrical schematics to be available for first responders.						
10.20	Fire Fighting Equipment Operability Maintained: Where water pumps, shutters or other active/passive protection measures rely on the continued supply of electricity, establish barriers (shielding) or separation from potential damaging factors (e.g. falling trees/branches, fire, or other impact sources). For example, bury transmission systems to the greatest extent possible.	High	Yes	No	No	Yes
Assessment Comments: Not Required *Recommendation Details:* Guidance documents to include the appropriate maintenance regime.						
10.21	Access via Firebreaks Provided: Installation and maintenance of firebreaks to facilitate firefighting access / backburning (and also limiting surface fire progression).	Medium	Yes	No	No	Yes
Assessment Comments: Not Required *Recommendation Details:* Guidance documents to include the appropriate maintenance regime and as a minimum comply with the Shire's Firebreak Notice.						

PROTECTION MEASURES AVAILABLE TO REDUCE VULNERABILITY LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk	Built Infrastructure Assets					
THE PROTECTION MECHANISM – MANAGE AND MAINTAIN EFFECTIVENESS OF APPLIED PROTECTION MEASURES: To ensure the retention of the level of bushfire resilience that has been established through the implementation of appropriate bushfire protection measures, formal and enforceable responsibilities are created.						
10.22	Formal Documents Created to Guide and Enforce Management: Through relevant site operations document(s) and/or an enforceable agreement, regulation or standard, a mechanism is put in place to ensure that: • The required management and maintenance of applied bushfire protection measures is conducted on a regular basis – with the interval dependent on the necessary frequency that will maintain full effectiveness; • The relevant protection measures are known and understood; and • Responsibilities are created.	High	Yes	No	No	Yes
Assessment Comments: Not Required *Recommendation Details:* The different documents will be able to satisfactorily perform this function to differing extents.						

[1] Protection Measure Effectiveness Rating: Refer to Appendix A1.2.4 for explanation and defining.

[2] Protection Measure Application Status:

- Possible: Protection measures that can potentially be applied to the proposed development/use.
- Fully or Partly Exists: A current state assessment of protection measures already implemented by existing components of the proposed development/use. The status of current implementation can also be fully or partly. These measures are accounted for in assessing 'inherent' risk levels (refer to Glossary).
- Currently Planned: Protection measures that:
  - Are incorporated into the site plans;
  - Exist in an approved Bushfire Management Plan (BMP) and/or Bushfire Emergency Plan (BEP) and are comprised of the applicable acceptable solutions (established by the 'Guidelines for planning in bushfire prone areas', DPLH as amended), alternative solutions and any additional recommended protection measures - for which a responsibility for their implementation has been created and approved; and/or
  - Exist in a yet to be submitted Bushfire Management Plan (BMP) and/or Bushfire Emergency Plan (BEP) and are comprised of the applicable acceptable solutions (established by the 'Guidelines for planning in bushfire prone areas', DPLH as amended), that can be met and for which a responsibility for their implementation can be created in the BMP.

  These planned measures are accounted for in assessing 'inherent' risk levels (refer to Glossary).
- Additionally Recommend: Protection measures that:

PROTECTION MEASURES AVAILABLE TO REDUCE VULNERABILITY LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk	Built Infrastructure Assets					
• Exist in a yet to be submitted Bushfire Management Plan (BMP) and/or Bushfire Emergency Plan (BEP) and comprise alternative solutions and/or additional recommended protection measures (that can and should be implemented in the opinion of the bushfire consultant), and for which a responsibility for their implementation can be created in the BMP; and/or • Are developed in the process of producing this risk assessment and management report and for which a responsibility for their implementation can be created in the BMP. These additionally recommended measures, along with existing and planned measures, are accounted for in assessing 'residual' risk levels (refer to Glossary).						

5.4.4.2 PROTECTION MEASURES - EFFECTIVENESS AND NUMBER APPLIED

For the stated element at risk, the numbers of both available and potentially applied bushfire protection measures are summarised and the effectiveness of each measure at reducing vulnerability levels is stated (refer to Appendix 1 for explanatory and supporting information).

This information is applied in the following section of this report to the derivation of the potential for applied bushfire protection measures to reduce the vulnerability of the relevant element at risk to bushfire hazard threats.

Mechanism	Rating [1]	Available	Possible	Fully Exists	Partly Exists	Currently Planned	Additionally Recommen
Construction Design and Materials	Very High	2	2				2
	High	3	3				3
	Medium	11	9			1	9
	Not Relevant		2			2	
Availability of a Firefighting Response Capability	Very High						
	High	4	4				4
	Medium	1	1				1
	Not Relevant						
Manage and Maintain Effectiveness of Applied Protection Measures	Very High						
	High	1	1				1
	Medium						
	Not Relevant						
Number Analysis	Very High	2	2				2
	High	8	8				8
	Moderate	12	10			1	10
	Not Relevant		2			2	
	Totals	22	22			3	20

[1] Protection Measure Effectiveness Rating: Refer to Appendix A1.2.4 for explanation and defining.

[2] Protection Measure Application Status: Refer to table footnotes in the preceding Section.

5.4.4.3 PROTECTION MEASURES - VULNERABILITY REDUCING POTENTIAL

For the stated element at risk and identified bushfire hazard, the potential for applied bushfire protection measures to reduce inherent vulnerability levels is assessed as a function of:

- The number of bushfire protection measures that can be applied compared to the number available; and
- The weighting applied to each protection measure that indicates how effective it can be at reducing the vulnerability of elements at risk.

ASSESSED POTENTIAL OF APPLIED PROTECTION MEASURES TO REDUCE VULNERABILITY TO BUSHFIRE HAZARD THREATS [1]							
Element at Risk	Built Infrastructure Assets						
ASSESSMENT OF PROTECTION MEASURES APPLIED TO THE DERIVATION OF AN INHERENT VULNERABILITY LEVEL [3]							
Direct Attack Mechanisms [2]				Indirect Attack Mechanisms [2]			
Flame Contact	Radiant Heat	Embers / Burning Debris	High / Erratic Fire Driven Wind	Debris Production / Accumulation	Surface Fire	Tree Strike / Obstruction	Consequential (Local) Fire
Moderate	Moderate	Moderate	Minimal	Moderate	Minimal	None	Moderate
Moderate				Moderate			
ASSESSMENT OF PROTECTION MEASURES APPLIED TO THE DERIVATION OF A RESIDUAL VULNERABILITY LEVEL [4]							
Direct Attack Mechanisms [2]				Indirect Attack Mechanisms [2]			
Flame Contact	Radiant Heat	Embers / Burning Debris	High / Erratic Fire Driven Wind	Debris Production / Accumulation	Surface Fire	Tree Strike / Obstruction	Consequential (Local) Fire
Minimal	Minimal	Moderate	Minimal	Minimal	Minimal	None	Minimal
Significant				Significant			

[1] Refer to Appendix 1 for explanatory and supporting information.

[2] Refer to Appendix 2 for explanatory information.

[3] Accounts for all currently implemented bushfire protection measures and those planned to be implemented.

[4] Additionally accounts for bushfire protection measures recommended to be implemented by the bushfire consultant.

Assessment Comments: Eliminating subfloor space, fitting ember screens, ensuring appropriate maintenance and appropriate first responder training will effectively reduce incidents and increase awareness.

5.4.4.4 ASSESSED VULNERABILITY LEVEL (INHERENT AND RESIDUAL)

The preceding bushfire protection measure analysis has enabled the derivation of the indicative inherent and residual vulnerability levels. These vulnerability levels are indicative as they are derived through a qualitative assessment process. In combination with the corresponding assessed threat and exposure levels, they will be applied to deriving the indicative inherent and residual bushfire risk levels.

ASSESSED INDICATIVE VULNERABILITY LEVELS – POST APPLICATION OF BUSHFIRE PROTECTION MEASURES [1]							
ELEMENT AT RISK		Built Infrastructure Assets					
BUSHFIRE ATTACK MECHANISMS [2]		INHERENT VULNERABILITY LEVEL [3]					OVERALL
DIRECT	Flame Contact	Very Low ☐	Low ☐	Moderate ☒	High ☐	Extreme ☐	Moderate
DIRECT	Radiant Heat	Very Low ☐	Low ☐	Moderate ☒	High ☐	Extreme ☐	
DIRECT	Embers / Burning Debris	Very Low ☐	Low ☐	Moderate ☒	High ☐	Extreme ☐	
DIRECT	High/Erratic Fire Driven Wind	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Debris Production / Accumulation	Very Low ☐	Low ☐	Moderate ☒	High ☐	Extreme ☐	
INDIRECT	Surface Fire	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Tree Strike / Obstruction	Very Low ☒	Low ☐	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Consequential (Local) Fire	Very Low ☐	Low ☐	Moderate ☒	High ☐	Extreme ☐	
BUSHFIRE ATTACK MECHANISMS [2]		RESIDUAL VULNERABILITY LEVEL [4]					OVERALL
DIRECT	Flame Contact	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	Low
DIRECT	Radiant Heat	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	
DIRECT	Embers / Burning Debris	Very Low ☐	Low ☐	Moderate ☒	High ☐	Extreme ☐	
DIRECT	High/Erratic Fire Driven Wind	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Debris Production / Accumulation	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Surface Fire	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Tree Strike / Obstruction	Very Low ☒	Low ☐	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Consequential (Local) Fire	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	

[1] Refer to Appendix 1 for explanatory information.

[2] Refer to Appendix 2 for explanatory information.

[3] Accounts for all currently implemented bushfire protection measures and those planned to be implemented.

[4] Additionally accounts for bushfire protection measures recommended to be implemented by the bushfire consultant.

Assessment Comments: Eliminating subfloor space, fitting ember screens, ensuring appropriate maintenance and appropriate first responder training will effectively reduce incidents and increase operational and situational awareness.

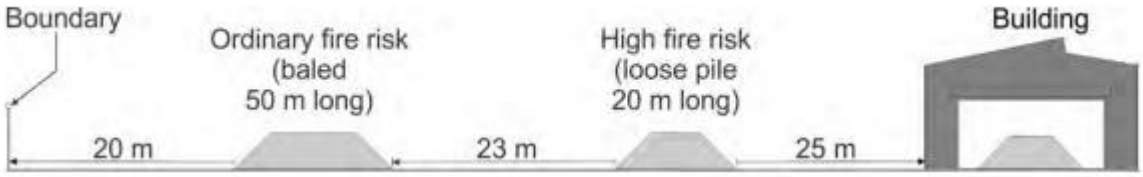
5.4.5 MATERIALS STORED OUTDOORS

5.4.5.1 PROTECTION MEASURES - IDENTIFICATION AND APPLICATION STATUS

PROTECTION MEASURES AVAILABLE TO REDUCE VULNERABILITY LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk	Materials Stored Outdoors					
THE PROTECTION MECHANISM – CONSTRUCTION DESIGN AND MATERIALS: Increase bushfire resilience through the application of beneficial design and construction, including using non-combustible materials and minimising the use of vulnerable materials, to the greatest extent possible. Practicality and cost will be key considerations in determining the viability of applying protection measures in differing scenarios, but this should be determined with due consideration of threat levels and the importance of the elements at risk. The constructed systems should utilise the following properties to the greatest extent possible: reliability (which requires their durability over time, low maintenance and being unlikely to change over time), robustness (which limits damage spread from minor sources, continue to protect when thermally loaded and protects vulnerable elements), resilience (which enables their return to a functional state following an overload) and redundancy (which ensures the fate of the subject building/structure is not reliant on the effective performance of a single element). Refer to the glossary for additional explanation. The principle is also applicable to constructed consequential fire fuels.						
11.1	Construction Materials for Consequential Fire Fuels: For constructed large consequential fire fuels, use non-combustible materials to the fullest extent possible. Potential fuels include adjacent structures and surrounding landscaping items (fences, screens, retaining walls etc.).	High	Yes	No	Unknown	Yes

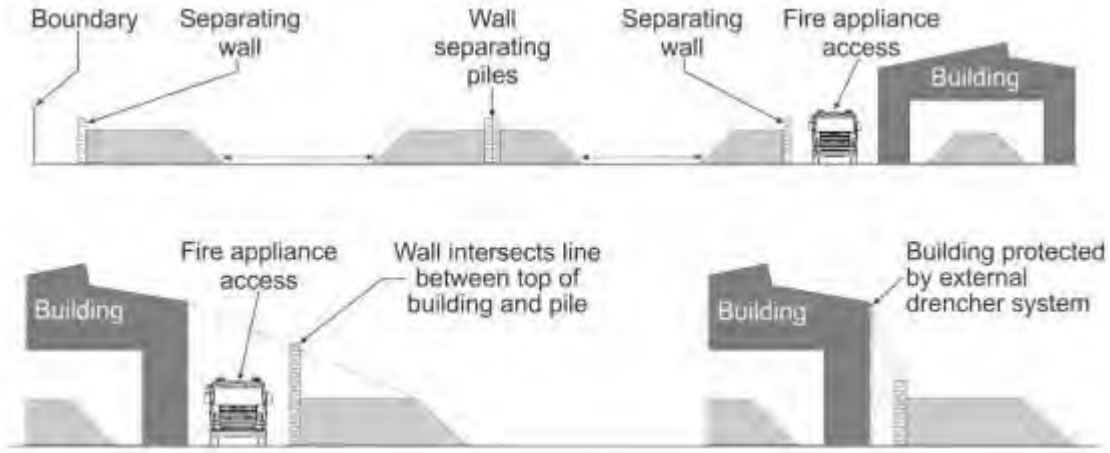
Assessment Comments: Not Required

Recommendation Details: Fences, screen and retaining walls to be non-combustible.



Examples of separation between stockpiles and fire source features (NSW FB)

PROTECTION MEASURES AVAILABLE TO REDUCE VULNERABILITY LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk	Materials Stored Outdoors					



The masonry wall to be located to provide fire appliance access and examples of reduced separation using wall or sprinkler system.

THE PROTECTION MECHANISM – AVAILABILITY OF A FIREFIGHTING RESPONSE CAPABILITY: Provide sufficient and reliable dedicated firefighting water supply and delivery capability as necessary for installed active and/or passive systems.

11.2	Firefighting Water Supply: Have a dedicated static supply of firefighting water for the protection of buildings/structures before and after the passage of a bushfire front. Adequate water supply is critical for any firefighting operation, particularly where property protection is the intent. This is necessary when: • A water supply additional to a reticulated water supply is required to counter the loss of firefighting water as a protection measure, should the reticulated supply be interrupted; and • It is the only source of firefighting water. All tanks shall be non-combustible. Aside from losing water, failure of combustible tank can provide an additional heat load to a vulnerable building element. Metal piping and fittings shall be used for any above ground components. The limitation to the effectiveness of the measure is the requirement for persons to be present and have the minimum required operational knowledge and/or access to appropriate information.	High	Yes	No	Partly	Yes

Assessment Comments: Not Required

PROTECTION MEASURES AVAILABLE TO REDUCE VULNERABILITY LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk	Materials Stored Outdoors					
Recommendation Details: A 50,000lt water supply for bushfire response is required. Comment: The tank may not be required if hydrants are installed.						
11.3	Firefighting Equipment Actively Operated: In addition to a dedicated water supply, appropriate mobile firefighting appliances are available quickly and/or fixed firefighting equipment is installed (pumps, hoses, sprinklers etc). Where equipment is installed, this will be resilient to bushfire impact, to the extent necessary, through the application of appropriate equipment materials and protection (shielding or separation from the hazard). The limitation to the effectiveness of the measure is the requirement for persons to be present and have the minimum required operational knowledge and/or access to appropriate information.	High	Yes	N/A	N/A	Yes
Assessment Comments: Not Required *Recommendation Details:* Appropriate training, response equipment and operational documents to be available.						
11.4	Fire Fighting Equipment Passively Operated: In addition to a dedicated water supply, appropriate water dispensing apparatus are installed (e.g. pumps, plumbing and sprinklers) that are automatically activated. These will be resilient to bushfire impact, to the extent necessary, through the application of appropriate equipment materials and protection (shielding or separation from the hazard).	High	Yes	No	No	Yes
Assessment Comments: Not Required *Recommendation Details:* Internal systems may be fitted, to be determined by DFES Built Environmental branch, the system may be automatically operated.						
11.5	Fire Fighting Equipment Operability Maintained: Where water pumps, shutters or other active/passive protection measures rely on the continued supply of electricity, establish barriers (shielding) or separation from potential damaging factors (e.g. falling trees/branches, fire, or other impact sources). For example, bury transmission systems to the greatest extent possible.	High	Yes	No	No	Yes
Assessment Comments: Not Required *Recommendation Details:* Guidance manual will include maintenance schedules of all equipment and machinery.						

PROTECTION MEASURES AVAILABLE TO REDUCE VULNERABILITY LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk	Materials Stored Outdoors					
11.6	Access via Firebreaks Provided: Installation and maintenance of firebreaks to facilitate firefighting access / backburning (and also limiting surface fire progression).	Medium	Yes	No	No	Yes
Assessment Comments: Not Required *Recommendation Details:* Firebreaks to be compliant with the Shire's Firebreak Notice.						
THE PROTECTION MECHANISM – MANAGE AND MAINTAIN EFFECTIVENESS OF APPLIED PROTECTION MEASURES: To ensure the retention of the level of bushfire resilience that has been established through the implementation of appropriate bushfire protection measures, formal and enforceable responsibilities are created.						
11.7	Formal Documents Created to Guide and Enforce Management: Through relevant site operations document(s) and/or an enforceable agreement, regulation or standard, a mechanism is put in place to ensure that: • The required management and maintenance of applied bushfire protection measures is conducted on a regular basis – with the interval dependent on the necessary frequency that will maintain full effectiveness; • The relevant protection measures are known and understood; and • Responsibilities are created.	High	Yes	No	No	Yes
Assessment Comments: Not Required *Recommendation Details:* Create documents to guide and enforce management and operations.						

[1] Protection Measure Effectiveness Rating: Refer to Appendix A1.2.4 for explanation and defining.

[2] Protection Measure Application Status:

- Possible: Protection measures that can potentially be applied to the proposed development/use.
- Fully or Partly Exists: A current state assessment of protection measures already implemented by existing components of the proposed development/use. The status of current implementation can also be fully or partly. These measures are accounted for in assessing 'inherent' risk levels (refer to Glossary).
- Currently Planned: Protection measures that:
  - Are incorporated into the site plans;
  - Exist in an approved Bushfire Management Plan (BMP) and/or Bushfire Emergency Plan (BEP) and are comprised of the applicable acceptable solutions (established by the 'Guidelines for planning in bushfire prone areas', DPLH as amended), alternative solutions and any additional recommended protection measures - for which a responsibility for their implementation has been created and approved; and/or

PROTECTION MEASURES AVAILABLE TO REDUCE VULNERABILITY LEVELS		Effectiveness Rating [1]	Application Status [2]			
			Possible	Exists	Planned	Additionally Recommend
Element at Risk	Materials Stored Outdoors					

- Exist in a yet to be submitted Bushfire Management Plan (BMP) and/or Bushfire Emergency Plan (BEP) and are comprised of the applicable acceptable solutions (established by the 'Guidelines for planning in bushfire prone areas', DPLH as amended), that can be met and for which a responsibility for their implementation can be created in the BMP.

These planned measures are accounted for in assessing 'inherent' risk levels (refer to Glossary).

- Additionally Recommend: Protection measures that:
  - Exist in a yet to be submitted Bushfire Management Plan (BMP) and/or Bushfire Emergency Plan (BEP) and comprise alternative solutions and/or additional recommended protection measures (that can and should be implemented in the opinion of the bushfire consultant), and for which a responsibility for their implementation can be created in the BMP; and/or
  - Are developed in the process of producing this risk assessment and management report and for which a responsibility for their implementation can be created in the BMP.

These additionally recommended measures, along with existing and planned measures, are accounted for in assessing 'residual' risk levels (refer to Glossary).

5.4.5.2 PROTECTION MEASURES - EFFECTIVENESS AND NUMBER APPLIED

For the stated element at risk, the numbers of both available and potentially applied bushfire protection measures are summarised and the effectiveness of each measure at reducing vulnerability levels is stated (refer to Appendix 1 for explanatory and supporting information).

This information is applied in the following section of this report to the derivation of the potential for applied bushfire protection measures to reduce the vulnerability of the relevant element at risk to bushfire hazard threats.

VULNERABILITY REDUCING PROTECTION MEASURE ANALYSIS							
Element at Risk	Materials Stored Outdoors						
The Protection Mechanism	Effectiveness Rating [1]	Numbers of Protection Measures					
		Total Available	Application Status [2]				
			Possible	Fully Exists	Partly Exists	Currently Planned	Additionally Recommen
Construction Design and Materials	Very High						
	High	1	1			1	1
	Medium						
	Not Relevant						
Availability of a Firefighting Response Capability	Very High						
	High	4	3			1	3
	Medium	1	1				1
	Not Relevant	1					1
Manage and Maintain Effectiveness of Applied Protection Measures	Very High						
	High	1	1				1
	Moderate						
	Not Relevant						
Number Analysis	Very High						
	High	6	5			2	5
	Medium	1	1				1
	Not Relevant	1					1
	Totals	8	6			2	7

[1] Protection Measure Effectiveness Rating: Refer to Appendix A1.2.4 for explanation and defining.

[2] Protection Measure Application Status: Refer to table footnotes in the preceding Section.

5.4.5.3 PROTECTION MEASURES - VULNERABILITY REDUCING POTENTIAL

For the stated element at risk and identified bushfire hazard, the potential for applied bushfire protection measures to reduce inherent vulnerability levels is assessed as a function of:

- The number of bushfire protection measures that can be applied compared to the number available; and
- The weighting applied to each protection measure that indicates how effective it can be at reducing the vulnerability of elements at risk.

ASSESSED POTENTIAL OF APPLIED PROTECTION MEASURES TO REDUCE VULNERABILITY TO BUSHFIRE HAZARD THREATS [1]							
Element at Risk	Materials Stored Outdoors						
ASSESSMENT OF PROTECTION MEASURES APPLIED TO THE DERIVATION OF AN INHERENT VULNERABILITY LEVEL [3]							
Direct Attack Mechanisms [2]				Indirect Attack Mechanisms [2]			
Flame Contact	Radiant Heat	Embers / Burning Debris	High / Erratic Fire Driven Wind	Debris Production / Accumulation	Surface Fire	Tree Strike / Obstruction	Consequential (Local) Fire
Moderate	Moderate	Moderate	Minimal	Moderate	Moderate	None	Moderate
Moderate				Moderate			
ASSESSMENT OF PROTECTION MEASURES APPLIED TO THE DERIVATION OF A RESIDUAL VULNERABILITY LEVEL [4]							
Direct Attack Mechanisms [2]				Indirect Attack Mechanisms [2]			
Flame Contact	Radiant Heat	Embers / Burning Debris	High / Erratic Fire Driven Wind	Debris Production / Accumulation	Surface Fire	Tree Strike / Obstruction	Consequential (Local) Fire
Minimal	Minimal	Moderate	Minimal	Moderate	Minimal	None	Minimal
Significant				Significant			

[1] Refer to Appendix 1 for explanatory and supporting information.

[2] Refer to Appendix 2 for explanatory information.

[3] Accounts for all currently implemented bushfire protection measures and those planned to be implemented.

[4] Additionally accounts for bushfire protection measures recommended to be implemented by the bushfire consultant.

Assessment Comments: The materials stored outside are combustible and vulnerable to ember attack, however with sprinkler systems, non-combustible retaining walls and pile separation, will reduce the risk of ignition and provide a safer place for responders.

5.4.5.4 ASSESSED VULNERABILITY LEVEL (INHERENT AND RESIDUAL)

The preceding bushfire protection measure analysis has enabled the derivation of the indicative inherent and residual vulnerability levels. These vulnerability levels are indicative as they are derived through a qualitative assessment process. In combination with the corresponding assessed threat and exposure levels, they will be applied to deriving the indicative inherent and residual bushfire risk levels.

ASSESSED INDICATIVE VULNERABILITY LEVELS – POST APPLICATION OF BUSHFIRE PROTECTION MEASURES [1]							
ELEMENT AT RISK		Materials Stored Outdoors					
BUSHFIRE ATTACK MECHANISMS [2]		INHERENT VULNERABILITY LEVEL [3]					OVERALL
DIRECT	Flame Contact	Very Low ☐	Low ☐	Moderate ☒	High ☐	Extreme ☐	Moderate
DIRECT	Radiant Heat	Very Low ☐	Low ☐	Moderate ☒	High ☐	Extreme ☐	
DIRECT	Embers / Burning Debris	Very Low ☐	Low ☐	Moderate ☒	High ☐	Extreme ☐	
DIRECT	High/Erratic Fire Driven Wind	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Debris Production / Accumulation	Very Low ☐	Low ☐	Moderate ☒	High ☐	Extreme ☐	
INDIRECT	Surface Fire	Very Low ☐	Low ☐	Moderate ☒	High ☐	Extreme ☐	
INDIRECT	Tree Strike / Obstruction	Very Low ☒	Low ☐	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Consequential (Local) Fire	Very Low ☐	Low ☐	Moderate ☒	High ☐	Extreme ☐	
BUSHFIRE ATTACK MECHANISMS [2]		RESIDUAL VULNERABILITY LEVEL [4]					OVERALL
DIRECT	Flame Contact	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	Low
DIRECT	Radiant Heat	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	
DIRECT	Embers / Burning Debris	Very Low ☐	Low ☐	Moderate ☒	High ☐	Extreme ☐	
DIRECT	High/Erratic Fire Driven Wind	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Debris Production / Accumulation	Very Low ☐	Low ☐	Moderate ☒	High ☐	Extreme ☐	
INDIRECT	Surface Fire	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Tree Strike / Obstruction	Very Low ☒	Low ☐	Moderate ☐	High ☐	Extreme ☐	
INDIRECT	Consequential (Local) Fire	Very Low ☐	Low ☒	Moderate ☐	High ☐	Extreme ☐	

[1] Refer to Appendix 1 for explanatory information.

[2] Refer to Appendix 2 for explanatory information.

[3] Accounts for all currently implemented bushfire protection measures and those planned to be implemented.

[4] Additionally accounts for bushfire protection measures recommended to be implemented by the bushfire consultant.

Assessment Comments: Ember attack and debris accumulation will not change, however sprinkler systems, non-combustible retaining walls and pile separation, will reduce the risk of ignition and provide a safer place for responders.

5.5 INFORMATIVE MECHANISMS – APPLICATION GUIDANCE FOR ALL BUSHFIRE PROTECTION MEASURES

5.5.1 BUSHFIRE HAZARD THREAT REDUCING MEASURES

BUSHFIRE HAZARD THREAT REDUCING PROTECTION MEASURES [1] **All Implemented ('Existing' & 'Planned') and 'Additionally Recommended' Protection Measures**			IDENTIFICATION OF **'ADDITIONALLY RECOMMENDED'** (EXTRA) MEASURES AND THEIR IMPLEMENTATION PRIORITY		APPLICATION GUIDANCE Identification of the Document(s) Recommended to Contain the Applicable Protection Measures							
			EXTRA MEASURE	PRIORITY RATING [2]	DOCUMENTS REQUIRED FOR PLANNING FUTURE DEVELOPMENT AND/OR RETROFIT		OPERATIONAL DOCUMENTS RELEVANT TO SITE USE BPP: remove non-applicable document headings and leave column blank					
The Protection Mechanism	Ref No	Brief Description [1]			Bushfire Manage. Plan (Planning)	Inform Design & Construct	Bushfire Manage. Plan (Guidance)	Site Operations Procedures	Annual Site Works Program	Prescribed Burning Guide	Site Emergency Plan/Guide	Bushfire Emergency Plan
Prevent bushfire ignition and/or severity by managing the fuels	1.1	Remove offsite bushfire fuel		N/A								
	1.2	Reduce offsite bushfire fuel – prescribed burning		N/A								
	1.3	Reduce offsite bushfire fuel - mechanical		N/A								
	1.4	Remove onsite bushfire fuel	✓	Highest	✓							
	1.5	Reduce onsite bushfire fuel - prescribed burning		N/A								
	1.6	Reduce onsite bushfire fuel - mechanical	✓	Highest	✓							
	1.7	Reduce road verge fuel		N/A								
	1.8	Enforce compliance with any applicable local government property management directives	✓	High	✓		✓		✓			

BUSHFIRE HAZARD THREAT REDUCING PROTECTION MEASURES [1] **All Implemented ('Existing' & 'Planned') and 'Additionally Recommended' Protection Measures**			IDENTIFICATION OF **'ADDITIONALLY RECOMMENDED'** (EXTRA) MEASURES AND THEIR IMPLEMENTATION PRIORITY		APPLICATION GUIDANCE Identification of the Document(s) Recommended to Contain the Applicable Protection Measures							
					DOCUMENTS REQUIRED FOR PLANNING FUTURE DEVELOPMENT AND/OR RETROFIT		OPERATIONAL DOCUMENTS RELEVANT TO SITE USE BPP: remove non-applicable document headings and leave column blank					
The Protection Mechanism	Ref No	Brief Description [1]	EXTRA MEASURE	PRIORITY RATING [2]	Bushfire Manage. Plan (Planning)	Inform Design & Construct	Bushfire Manage. Plan (Guidance)	Site Operations Procedures	Annual Site Works Program	Prescribed Burning Guide	Site Emergency Plan/Guide	Bushfire Emergency Plan
Prevent bushfire ignition by managing heat energy sources	1.9	Robust and effective site operational procedures	✓	High			✓	✓	✓		✓	✓
	1.10	Develop planning and management procedures for prescribed burning		N/A								
	1.11	Design and construct equipment to prevent airborne ignition	✓	Medium		✓						
	1.12	Actively enforce activity restrictions	✓	High			✓	✓			✓	✓
	1.13	Monitor and penalise illegal activity		N/A								
	1.14	Bushfire awareness and 'good practices' education		Medium			✓	✓			✓	✓
Prevent bushfire ignition by managing the interactions of heat energy	1.15	Barriers (shielding) between ignition sources and fuels	✓	High		✓						
	1.16	Equipment design and construction to reduce heat transfer	✓	Medium		✓						
	1.17	Separation distance between ignition sources and fuels	✓	Highest		✓						

BUSHFIRE HAZARD THREAT REDUCING PROTECTION MEASURES [1] **All Implemented ('Existing' & 'Planned') and 'Additionally Recommended' Protection Measures**			IDENTIFICATION OF **'ADDITIONALLY RECOMMENDED'** (EXTRA) MEASURES AND THEIR IMPLEMENTATION PRIORITY		APPLICATION GUIDANCE Identification of the Document(s) Recommended to Contain the Applicable Protection Measures							
					DOCUMENTS REQUIRED FOR PLANNING FUTURE DEVELOPMENT AND/OR RETROFIT		OPERATIONAL DOCUMENTS RELEVANT TO SITE USE BPP: remove non-applicable document headings and leave column blank					
The Protection Mechanism	Ref No	Brief Description [1]	EXTRA MEASURE	PRIORITY RATING [2]	Bushfire Manage. Plan (Planning)	Inform Design & Construct	Bushfire Manage. Plan (Guidance)	Site Operations Procedures	Annual Site Works Program	Prescribed Burning Guide	Site Emergency Plan/Guide	Bushfire Emergency Plan
sources and fuels												

[1] The full description of each bushfire protection measure, the detail of the assessment and any recommendation, is presented in Section 5.1.1.1
[2] Refer to Appendix A1.2.5 for implementation priority rating explanation.

5.5.2 EXPOSURE REDUCING MEASURES – PERSONS

PERSONS EXPOSURE REDUCING PROTECTION MEASURES [1] All Implemented **('Existing' & 'Planned') and 'Additionally Recommended' Protection Measures**			IDENTIFICATION OF **'ADDITIONALLY RECOMMENDED'** MEASURES AND THEIR IMPLEMENTATION PRIORITY		APPLICATION GUIDANCE Identification of the Document(s) Recommended to Contain the Applicable Protection Measures							
					PLANNING FUTURE DEVELOPMENT		OPERATIONAL – AS RELEVANT TO SITE USE					
The Protection Mechanism	Ref No	Brief Description [1]	EXTRA MEASURE	PRIORITY RATING [2]	Bushfire Manage. Plan (Planning)	Inform Design & Construct	Bushfire Manage. Plan (Guidance)	Site Operations Procedures	Annual Site Works Program	Prescribed Burning Guide	Site Emergency Plan/Guide	Bushfire Emergency Plan
Establish sufficient separation from relevant bushfire hazard threats	Persons Located Onsite and Temporarily Offsite											
	2.1	Stay away from the subject site		Medium	✓	✓	✓	✓			✓	
	2.4	Relocate (evacuate) to designated safer offsite location(s)	✓	High	✓	✓	✓	✓			✓	✓
	2.6	Safer pathways for onsite movement	✓	Highest		✓	✓					
	2.7	Pre-emptively relocate to designated safer offsite location(s)	✓	High	✓		✓	✓			✓	✓
	Persons on Access / Egress Routes in Vehicles											
	3.1	Locating route away from adjacent hazards	✓	Lowest	✓							
	3.2	Egress routes located to ensure driving away from hazard	✓	Medium	✓				✓			
	3.3	Greater road width	✓	Medium	✓				✓			
	3.4	Reduce and maintain road verge fuel to low threat state	✓	Medium	✓				✓			

PERSONS EXPOSURE REDUCING PROTECTION MEASURES [1] All Implemented **('Existing' & 'Planned') and 'Additionally Recommended' Protection Measures**			IDENTIFICATION OF **'ADDITIONALLY RECOMMENDED'** MEASURES AND THEIR IMPLEMENTATION PRIORITY		APPLICATION GUIDANCE Identification of the Document(s) Recommended to Contain the Applicable Protection Measures							
					PLANNING FUTURE DEVELOPMENT		OPERATIONAL – AS RELEVANT TO SITE USE					
The Protection Mechanism	Ref No	Brief Description [1]	EXTRA MEASURE	PRIORITY RATING [2]	Bushfire Manage. Plan (Planning)	Inform Design & Construct	Bushfire Manage. Plan (Guidance)	Site Operations Procedures	Annual Site Works Program	Prescribed Burning Guide	Site Emergency Plan/Guide	Bushfire Emergency Plan
Establish shielding from relevant bushfire hazard threats	Persons Located Onsite and Temporarily Offsite											
	2.10	On-site shelter building – not a 'vulnerable' use	✓	High	✓	✓						

[1] The full description of each bushfire protection measure, the detail of the assessment and any recommendation, is presented in Section 5.3.1.1 and Section 5.3.2.1.
[2] Refer to Appendix A1.2.5 for implementation priority rating explanation.

5.5.3 EXPOSURE REDUCING MEASURES – ALL STRUCTURES AND MATERIALS STORED OUTDOORS

ALL STRUCTURES & MATERIALS STORED OUTDOORS EXPOSURE REDUCING PROTECTION MEASURES [1] All Implemented **('Existing' & 'Planned') and 'Additionally Recommended' Protection Measures**			IDENTIFICATION OF **'ADDITIONALLY RECOMMENDED'** MEASURES AND THEIR IMPLEMENTATION PRIORITY		APPLICATION GUIDANCE Identification of the Document(s) Recommended to Contain the Applicable Protection Measures							
					PLANNING FUTURE DEVELOPMENT		OPERATIONAL – AS RELEVANT TO SITE USE					
The Protection Mechanism	Ref No	Brief Description [1]	EXTRA MEASURE	PRIORITY RATING [2]	Bushfire Manage. Plan (Planning)	Inform Design & Construct	Bushfire Manage. Plan (Guidance)	Site Operations Procedures	Annual Site Works Program	Prescribed Burning Guide	Site Emergency Plan/Guide	Bushfire Emergency Plan
Establish sufficient separation from relevant bushfire hazard threats	4.2 5.2 6.2 6.1	Design - use of non-vegetated areas and/or managed public open space	✓	Medium		✓						
	4.3 5.3 6.3 6.2	Landscaping - asset protection zone (APZ)	✓	Highest	✓		✓		✓			
	4.4 5.4	Landscaping - tree location	✓	High	✓		✓		✓			
	4.6 5.6 6.3	Separation from stored flammable products – fuels / other hazardous materials	✓	Highest	✓		✓	✓			✓	
	4.7 5.7 6.4	Separation from stored and constructed combustible items	✓	Highest			✓	✓			✓	
Establish shielding from relevant	4.8 5.8 6.5	Constructed barrier – shielding from bushfire		Medium		✓						

ALL STRUCTURES & MATERIALS STORED OUTDOORS EXPOSURE REDUCING PROTECTION MEASURES [1] All Implemented **('Existing' & 'Planned') and 'Additionally Recommended' Protection Measures**			IDENTIFICATION OF **'ADDITIONALLY RECOMMENDED'** MEASURES AND THEIR IMPLEMENTATION PRIORITY		APPLICATION GUIDANCE Identification of the Document(s) Recommended to Contain the Applicable Protection Measures							
					PLANNING FUTURE DEVELOPMENT		OPERATIONAL – AS RELEVANT TO SITE USE					
The Protection Mechanism	Ref No	Brief Description [1]	EXTRA MEASURE	PRIORITY RATING [2]	Bushfire Manage. Plan (Planning)	Inform Design & Construct	Bushfire Manage. Plan (Guidance)	Site Operations Procedures	Annual Site Works Program	Prescribed Burning Guide	Site Emergency Plan/Guide	Bushfire Emergency Plan
bushfire hazard threats	4.9 5.9 6.6	Constructed barrier – shielding from consequential fire	✓	Medium		✓						
	4.11 5.11 6.8	Planted vegetation barrier	✓	Medium	✓		✓		✓			
	4.12 5.12	Shield operation critical non-structural elements	✓	Highest		✓	✓				✓	

[1] The full description of each bushfire protection measure, the detail of the assessment and any recommendation, is presented in Sections 5.3.3.1. and Section 5.3.4.1 & 5.3.5.1

[2] Refer to Appendix A1.2.5 for implementation priority rating explanation.

5.5.4 VULNERABILITY REDUCING MEASURES – PERSONS

PERSONS VULNERABILITY REDUCING PROTECTION MEASURES [1] **All Implemented ('Existing' & 'Planned') and 'Additionally Recommended'** Protection Measures			IDENTIFICATION OF **'ADDITIONALLY RECOMMENDED'** MEASURES AND THEIR IMPLEMENTATION PRIORITY		APPLICATION GUIDANCE Identification of the Document(s) Recommended to Contain the Applicable Protection Measures							
					PLANNING FUTURE DEVELOPMENT		OPERATIONAL – AS RELEVANT TO SITE USE BPP: remove non-applicable document headings and leave column blank					
The Protection Mechanism	Ref No	Brief Description [1]	EXTRA MEASURE	PRIORITY RATING [2]	Bushfire Manage. Plan (Planning)	Inform Design & Construct	Bushfire Manage. Plan (Guidance)	Site Operations Procedures	Annual Site Works Program	Prescribed Burning Guide	Site Emergency Plan/Guide	Bushfire Emergency Plan
Transport and multiple evacuation destinations and routes available	Persons Located Onsite and Temporarily Offsite											
	7.1	Sufficient evacuation transport available		Lowest			✓				✓	✓
	7.2	Multiple safer offsite locations available		High			✓				✓	✓
Provision of bushfire emergency information and education	7.3	Develop a bushfire emergency plan		High			✓				✓	✓
	7.4	Relevant operational documents to contain the bushfire protection measures to be implemented	✓	High			✓				✓	✓
	7.5	Prominent display of bushfire emergency information		High			✓				✓	✓
	7.6	Direct to Persons Emergency Messaging System	✓	High			✓				✓	
	7.7	Egress pathway signage	✓	Medium			✓				✓	

PERSONS VULNERABILITY REDUCING PROTECTION MEASURES [1] **All Implemented ('Existing' & 'Planned') and 'Additionally Recommended'** Protection Measures			IDENTIFICATION OF **'ADDITIONALLY RECOMMENDED'** MEASURES AND THEIR IMPLEMENTATION PRIORITY		APPLICATION GUIDANCE Identification of the Document(s) Recommended to Contain the Applicable Protection Measures							
					PLANNING FUTURE DEVELOPMENT		OPERATIONAL – AS RELEVANT TO SITE USE BPP: remove non-applicable document headings and leave column blank					
The Protection Mechanism	Ref No	Brief Description [1]	EXTRA MEASURE	PRIORITY RATING [2]	Bushfire Manage. Plan (Planning)	Inform Design & Construct	Bushfire Manage. Plan (Guidance)	Site Operations Procedures	Annual Site Works Program	Prescribed Burning Guide	Site Emergency Plan/Guide	Bushfire Emergency Plan
	7.8	Personnel are trained to implement the bushfire emergency plan		Highest		✓	✓		✓		✓	✓
Onsite persons capable of managing a bushfire emergency are available	7.12	Onsite persons available to manage bushfire emergency procedures	✓	Highest			✓	✓			✓	
	7.13	Onsite persons can operate firefighting equipment	✓	Highest								
	7.14	External emergency response services available		Highest			✓				✓	✓
Lower risk road construction (design and materials)	Persons on Access / Egress Routes in Vehicles											
	8.1	Greater road width	✓	Medium		✓						
	8.4	Stable road surfaces		Medium	✓	✓	✓		✓			

PERSONS VULNERABILITY REDUCING PROTECTION MEASURES [1] **All Implemented ('Existing' & 'Planned') and 'Additionally Recommended'** Protection Measures			IDENTIFICATION OF **'ADDITIONALLY RECOMMENDED'** MEASURES AND THEIR IMPLEMENTATION PRIORITY		APPLICATION GUIDANCE Identification of the Document(s) Recommended to Contain the Applicable Protection Measures							
					PLANNING FUTURE DEVELOPMENT		OPERATIONAL – AS RELEVANT TO SITE USE BPP: remove non-applicable document headings and leave column blank					
The Protection Mechanism	Ref No	Brief Description [1]	EXTRA MEASURE	PRIORITY RATING [2]	Bushfire Manage. Plan (Planning)	Inform Design & Construct	Bushfire Manage. Plan (Guidance)	Site Operations Procedures	Annual Site Works Program	Prescribed Burning Guide	Site Emergency Plan/Guide	Bushfire Emergency Plan
Evacuees are self-sufficient and have local awareness and own transport	8.8	Self-sufficient persons with local awareness	✓	High			✓	✓			✓	
	8.9	Onsite persons have own transport	✓	Medium			✓	✓			✓	

[1] The full description of each bushfire protection measure, the detail of the assessment and any recommendation, is presented in Section 5.4.1.1 and Section 5.3.5.1
[2] Refer to Appendix A1.2.5 for implementation priority rating explanation.

5.5.5 VULNERABILITY REDUCING MEASURES – STRUCTURES

STRUCTURES VULNERABILITY REDUCING PROTECTION MEASURES [1] **All Implemented ('Existing' & 'Planned') and 'Additionally Recommended' Protection Measures**			IDENTIFICATION OF **'ADDITIONALLY RECOMMENDED'** MEASURES AND THEIR IMPLEMENTATION PRIORITY		APPLICATION GUIDANCE Identification of the Document(s) Recommended to Contain the Applicable Protection Measures							
					PLANNING FUTURE DEVELOPMENT		OPERATIONAL – AS RELEVANT TO SITE USE BPP: remove non-applicable document headings and leave column blank					
The Protection Mechanism	Ref No	Brief Description [1]	EXTRA MEASURE	PRIORITY RATING [2]	Bushfire Manage. Plan (Planning)	Inform Design & Construct	Bushfire Manage. Plan (Guidance)	Site Operations Procedures	Annual Site Works Program	Prescribed Burning Guide	Site Emergency Plan/Guide	Bushfire Emergency Plan
Construction design and materials	9.1 10.1	Construct to AS 3959:2018		Medium		✓						
	9.2 10.2	Construct to NASH Standard	✓	Highest		✓						
	9.3 10.3	Construction materials for external and internal cavity building elements	✓	Medium		✓						
	9.4 12.4 14.4 15.1	Construction materials for consequential fire fuels	✓	Medium			✓	✓			✓	✓
	9.5 10.5	Construction design/materials resistant to high wind damage	✓	High		✓						
	9.7 10.7	Construction of electricity supply	✓	High		✓						
	9.8 10.8	Minimise re-entrant detail to minimise debris and ember accumulation	✓	Lowest		✓						
	9.9 10.9	Minimise debris and ember trapping surfaces	✓	Lowest		✓						

STRUCTURES VULNERABILITY REDUCING PROTECTION MEASURES [1] **All Implemented ('Existing' & 'Planned') and 'Additionally Recommended' Protection Measures**			IDENTIFICATION OF **'ADDITIONALLY RECOMMENDED'** MEASURES AND THEIR IMPLEMENTATION PRIORITY		APPLICATION GUIDANCE Identification of the Document(s) Recommended to Contain the Applicable Protection Measures							
					PLANNING FUTURE DEVELOPMENT		OPERATIONAL – AS RELEVANT TO SITE USE BPP: remove non-applicable document headings and leave column blank					
The Protection Mechanism	Ref No	Brief Description [1]	EXTRA MEASURE	PRIORITY RATING [2]	Bushfire Manage. Plan (Planning)	Inform Design & Construct	Bushfire Manage. Plan (Guidance)	Site Operations Procedures	Annual Site Works Program	Prescribed Burning Guide	Site Emergency Plan/Guide	Bushfire Emergency Plan
	9.10 10.10	Protect roof plumbing to minimise debris and ember accumulation	✓	Medium		✓						
	9.11 10.11	Minimise construction cavities to minimise debris and ember accumulation		Highest		✓						
	9.12 10.12	Minimise external openings to limit flame / radiant heat / ember / debris entry	✓	High		✓						
	9.13 10.13	Screen and seal gaps and penetrations	✓	High		✓						
	9.14 10.14	Screen external doors and windows	✓	High		✓						
	10.16	Construction materials for critical non-structural elements	✓	Highest		✓						
Availability of a firefighting response capability	9.16 10.17	Firefighting water supply		Highest	✓	✓	✓	✓			✓	
	9.17 10.18	Firefighting equipment actively operated	✓	Highest			✓	✓			✓	
	9.18 10.19	Firefighting equipment passively operated	✓	Highest								

STRUCTURES VULNERABILITY REDUCING PROTECTION MEASURES [1] **All Implemented ('Existing' & 'Planned') and 'Additionally Recommended' Protection Measures**			IDENTIFICATION OF **'ADDITIONALLY RECOMMENDED'** MEASURES AND THEIR IMPLEMENTATION PRIORITY		APPLICATION GUIDANCE Identification of the Document(s) Recommended to Contain the Applicable Protection Measures							
					PLANNING FUTURE DEVELOPMENT		OPERATIONAL – AS RELEVANT TO SITE USE BPP: remove non-applicable document headings and leave column blank					
The Protection Mechanism	Ref No	Brief Description [1]	EXTRA MEASURE	PRIORITY RATING [2]	Bushfire Manage. Plan (Planning)	Inform Design & Construct	Bushfire Manage. Plan (Guidance)	Site Operations Procedures	Annual Site Works Program	Prescribed Burning Guide	Site Emergency Plan/Guide	Bushfire Emergency Plan
	9.19 10.20	Firefighting equipment operability maintained	✓	Highest		✓	✓	✓			✓	
	9.20 10.21	Access via firebreaks provided		Medium	✓		✓		✓			
Manage and maintain effectiveness of applied protection measures	9.21 10.22	Formal documents created to guide and enforce management	✓	High			✓	✓	✓		✓	

[1] The full description of each bushfire protection measure, the detail of the assessment and any recommendation, is presented in Sections 5.4.3.1 & 5.4.3.4
[2] Refer to Appendix A1.2.5 for implementation priority rating explanation.

5.5.6 VULNERABILITY REDUCING MEASURES – NON-BUILDING ACCOMMODATION & MATERIALS STORED OUTDOORS

NON-BUILDING ACCOMMODATION & MATERIALS STORED OUTDOORS VULNERABILITY REDUCING PROTECTION MEASURES [1] **All Implemented ('Existing' & 'Planned') and 'Additionally Recommended' Protection Measures**			IDENTIFICATION OF **'ADDITIONALLY RECOMMENDED'** MEASURES AND THEIR IMPLEMENTATION PRIORITY		APPLICATION GUIDANCE Identification of the Document(s) Recommended to Contain the Applicable Protection Measures							
					PLANNING FUTURE DEVELOPMENT		OPERATIONAL – AS RELEVANT TO SITE USE BPP: remove non-applicable document headings and leave column blank					
The Protection Mechanism	Ref No	Brief Description [1]	EXTRA MEASURE	PRIORITY RATING [2]	Bushfire Manage. Plan (Planning)	Inform Design & Construct	Bushfire Manage. Plan (Guidance)	Site Operations Procedures	Annual Site Works Program	Prescribed Burning Guide	Site Emergency Plan/Guide	Bushfire Emergency Plan
Construction design and materials	11.1	Construction materials for consequential fire fuels	✓	High		✓						
Availability of a firefighting response capability	11.2	Firefighting water supply		Highest	✓	✓	✓	✓			✓	
	11.3	Firefighting equipment actively operated	✓	High			✓	✓			✓	
	11.4	Firefighting equipment passively operated	✓	Highest		✓	✓	✓			✓	
	11.5	Firefighting equipment operability maintained	✓	Highest								
	11.6	Access via firebreaks provided	✓	Medium			✓	✓			✓	
Manage and maintain effectiveness of applied protection measures	11.7	Formal documents created to guide and enforce management	✓	Highest			✓	✓	✓		✓	

[1] The full description of each bushfire protection measure, the detail of the assessment and any recommendation, is presented in Section 5.4.5.1 and Section 5.4.5.2
[2] Refer to Appendix A1.2.5 for implementation priority rating explanation.

APPENDIX 1: THE APPLIED RISK ASSESSMENT PROCESS

A1.1 THE RISK ASSESSMENT FRAMEWORK

To conduct the risk assessment, Bushfire Prone Planning (BPP) has adapted the concept for 'Understanding Disaster Risk' as recognised by the United Nations Office for Disaster Risk Reduction [46] and presented in Figure A1.1. This concept is also applied by CSIRO within their Bushfire Best Practice Guide [48].

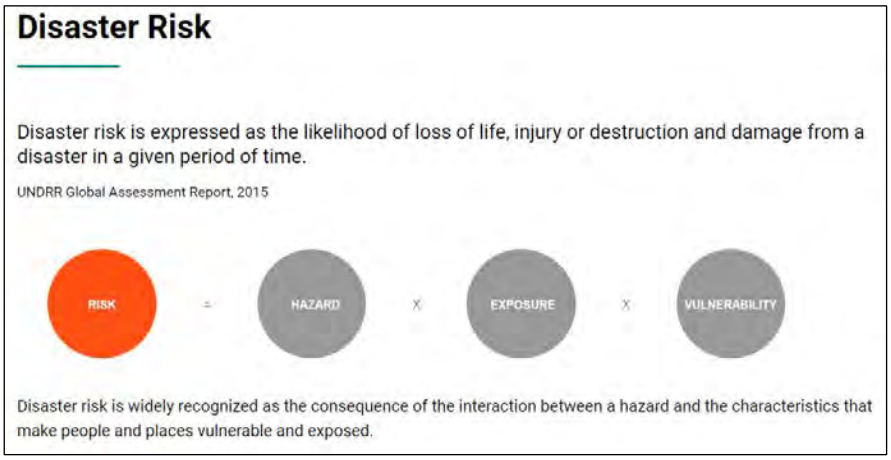


Figure A1.1: Concept for 'Understanding Disaster Risk' as recognised by the UN Office for Disaster Risk Reduction.

In applying this concept, bushfire risk can be considered a consequence of the interaction of bushfire hazard threats and the exposure and vulnerability of the elements at risk from those threats (i.e., the 'exposed elements' which can include various classes of persons and/or property).

The application of available bushfire protection measures will lower the level of risk associated with a bushfire by either (a) Reducing the number and/or level of hazard threats and/or (b) Reducing the level of exposure and/or vulnerability of the identified elements at risk.

Additional detail of the adaptation is presented in Figure A1.2 and Figure A1.3 (refer to the glossary for terminology information).

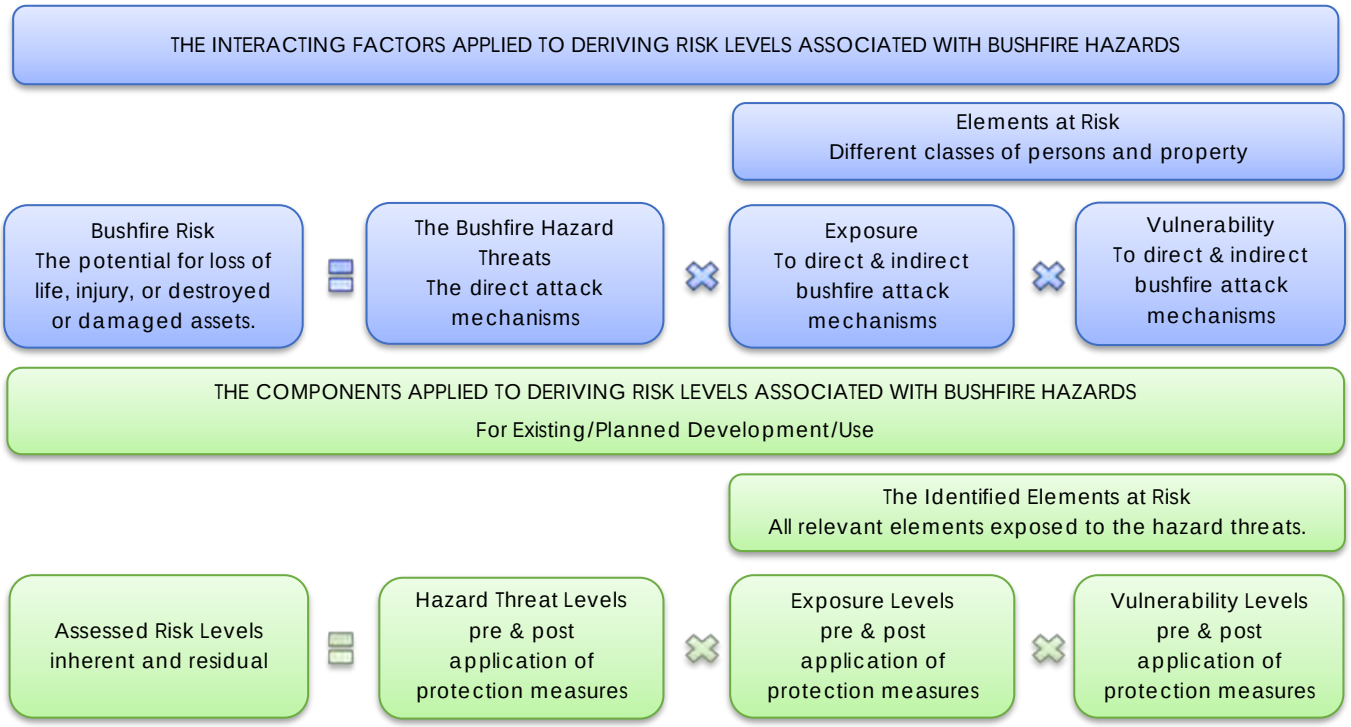


Figure A1.2: The framework of the applied bushfire risk assessment process.

Identify the Bushfire Hazard	Bushfire is a natural hazard and the common term for forest, scrub, shrub, and grass fire. It can exist in any vegetation (identified as the 'hazard') that establishes an ongoing source of readily combustible materials within and surrounding subject land, The bushfire hazard presents threats. These are the direct attack mechanisms (flame contact, radiant heat transfer, ember/burning debris attack, high/erratic fire driven wind) and indirect attack mechanisms (debris production/accumulation, surface fire, tree strike/obstruction, consequential fire). Identify and categorise surrounding vegetation based on a defined set of physical criteria. Each category has an associated 'Indicative Threat Level.
Assess Hazard Threat Levels	Assess the existence of relevant physical factors in the surrounding landscape that can significantly change bushfire behaviour, intensity and the levels of each bushfire hazard threat and consequently the overall 'Indicative Threat Level' for each identified category of vegetation. From this assessment, derive a 'Modified Indicative Threat Level' that is to apply as the 'base' threat level, prior to application of any bushfire protection measures. Conduct a qualitative protection measure analysis that considers how many of all available bushfire protection measures - that can reduce threat levels - are and can be applied. The effectiveness of each measure at reducing threat levels is considered as part of the analysis. Apply the outcome to the derivation of 'Indicative Inherent' and 'Indicative Residual" threat levels.
Identify the Elements at Risk	Identify all relevant site specific elements 'exposed' to the bushfire hazard. These can include persons in different settings, buildings, structures, temporary accommodation, infrastructure and other physical assets.
Assess Exposure Levels	Conduct a qualitative protection measure analysis that considers how many of all bushfire protection measures available to reduce exposure levels (of an element at risk to bushfire threats), are and can be applied. Consideration of the effectiveness of each measure at reducing exposure levels is part of the analysis. Apply the outcome to the derivation of 'Indicative Inherent' and 'Indicative Residual" exposure levels.
Assess Vulnerability Levels	Conduct a qualitative protection measure analysis that considers how many of all bushfire protection measures available to reduce vulnerability levels (of an element at risk to bushfire threats), are and can be applied. Consideration of the effectiveness of each measure at reducing vulnerability levels is part of the analysis. Apply the outcome to the derivation of 'Indicative Inherent' and 'Indicative Residual' vulnerability levels.
Derive the Bushfire Risk Levels	There are potential risks associated with a bushfire hazard and a bushfire event. These include the loss of life, injury or other health impacts, property damage, social and economic disruption or environmental degradation. Derive 'Indicative Inherent' and 'Indicative Residual' risk levels (for each element at risk) from the derived 'indicative' threat, exposure and vulnerability levels and with reference to the indicative risk matrix.
State the Risk Tolerability	Derive the tolerability rating by applying the risk tolerance scale. The tolerability scale is based on the 'As Low As Reasonably Practical' (ALARP) principle.

Figure A1.3: Detail of applied indicative bushfire risk assessment process.

A1.2 RISK ANALYSIS EXPLANATORY GUIDANCE

The risk analysis will derive risk levels as the outcome of the assessment. The risk level analysis can be conducted for either each element at risk separately and/or the proposed or existing development/use overall.

Different labels are applied to reported risk levels to indicate how they have been derived and what they refer to. These labels are:

1. The labels **'Indicative** Risk Level' and **'Determined** Risk Level' are used to identify what methodology has been applied in conducting the risk analysis. (Note: This Bushfire Risk Report does not derive 'determined' risk levels (but information is included to explain why); and
2. The labels **'Inherent Risk'** and **'Residual Risk'** are used to identify the point in time for which the risk level is being reported i.e., the existing state or a future state.

Additional detail is provided in the following sections and in the Glossary.

A1.2.1 INDICATIVE RISK LEVEL AND DERIVATION MATRIX

Deriving 'Indicative Risk Levels' requires conducting a qualitative assessment. This establishes a subjective understanding of the level of risk that potentially exists and is intended to inform and assist with making planning and operational decisions.

The indicative risk level is derived from a mostly qualitative assessment of the site (some components of the assessment are quantitative in nature), the existing or planned development/use, the assessment of observable physical facts and the knowledge and relevant experience of the bushfire practitioner. The outcome is the provision of an informed and justifiable opinion regarding the levels of risk associated with a bushfire event.

This is an applicable and valuable process when the quantitative information required to derive a 'determined' risk level (refer to next section) is either not available or is not possible to generate for practical or economic reasons.

JUSTIFICATION OF QUALITATIVE ANALYSIS APPROACH

Justification for deriving 'indicative' risk levels is based on the following assumptions:

1. There is a limited number of 'bushfire protection mechanisms' that can be applied to reducing hazard threats and the exposure and vulnerability of at risk elements.
2. There will be a range of individual bushfire protection measures associated with each 'protection mechanism'. The number of available protection measures for each 'protection mechanism' will vary dependent on the specifics of the site and its use, including scale, but effectively these will also have a practical limit.
3. Individual bushfire protection measures will vary in their standalone effectiveness at reducing hazard threat levels and reducing the exposure and vulnerability levels of elements at risk (refer to A1.2.4).
4. The greater the number of effective bushfire protection mechanisms and associated measures that are able to be applied, the lower the indicative risk level will be.

DERIVATION OF THE INDICATIVE RISK LEVEL

For a given site/development/use, an indication of the level of risk associated with a bushfire event and its tolerability is derived by:

1. Assessing the 'indicative' hazard threat levels and the 'indicative' exposure and vulnerability levels of elements at risk by:
    a) Assessing the potential levels of threat presented by the direct and indirect bushfire attack mechanisms of the identified bushfire hazard;
    b) Assessing how many bushfire protection mechanisms and their associated protection measures are applicable and can be applied, compared to the total available; and
    c) Applying an effectiveness weighting to each protection measure.
2. Derive the indicative risk level by applying the risk matrix presented in Table A1.1;

3. Establish the tolerability of the risk by applying the 'As Low as Reasonably Practicable' (ALARP) principle and associated risk tolerance scale (refer to s A1.2.5).

Table A1.1: Risk matrix for deriving indicative risk levels from the assessed relative levels of hazard threats, and the exposure and vulnerability of elements at risk.

INDICATIVE RISK LEVEL MATRIX						
Indicative Threat Level (a)	Indicative Exposure Level (b)	Indicative Vulnerability Level (c)				
		Very Low (1)	Low (2)	Moderate (3)	High (4)	Extreme (5)
Very Low (1)	Very Low (1)	VL1	VL2	VL3	L4	L5
	Low (2)	VL2	VL3	L4	L5	L6
	Moderate (3)	VL3	L4	L5	L6	M7
	High (4)	L4	L5	L6	M7	M8
	Extreme (5)	L5	L6	M7	M8	H9
Low (2)	Very Low (1)	VL2	VL3	L4	L5	6
	Low (2)	VL3	L4	L5	L6	M7
	Moderate (3)	L4	L5	L6	M7	M8
	High (4)	L5	L6	M7	M8	H9
	Extreme (5)	L6	M7	M8	H9	H10
Moderate (3)	Very Low (1)	VL3	L4	L5	L6	M7
	Low (2)	L4	L5	L6	M7	M8
	Moderate (3)	L5	L6	M7	M8	H9
	High (4)	L6	M7	M8	H9	H10
	Extreme (5)	M7	M8	H9	H10	H11
High (4)	Very Low (1)	L4	L5	L6	M7	M8
	Low (2)	L5	L6	M7	M8	H9
	Moderate (3)	L6	M7	M8	H9	H10
	High (4)	M7	M8	H9	H10	H11
	Extreme (5)	M8	H9	H10	H11	E12
Extreme (5)	Very Low (1)	L5	L6	M7	M8	H9
	Low (2)	L6	M7	8M	H9	H10
	Moderate (3)	M7	M8	H9	H10	H11
	High (4)	M8	H9	H10	H11	E12
	Extreme (5)	H9	H10	H11	E12	E13

Indicative risk level key: VL = very low, L = low, M = moderate, H = high, E = extreme.
The qualitative relative levels are assigned a numerical value.
The indicative risk value is calculated as = (a + b + c) – 2 and range from 1 (lowest) to 13 (greatest).
The indicative risk levels are derived from an assigned a numerical range: very low = 1-3, low = 4-6, moderate = 7-8, high = 9-11, extreme = 12-13.

A1.2.2 DETERMINED RISK LEVEL

IMPORTANT: THIS BUSHFIRE RISK REPORT DOES NOT DERIVE DETERMINED BUSHFIRE RISK LEVELS.

Deriving 'determined' risk levels requires conducting a quantitative assessment. This establishes an objective understanding of the level of risk that potentially exists and is intended to inform and assist with making planning and operational decisions.

The key difference from an 'indicative' risk level assessment is the requirement to apply a quantitative set of risk factor criteria against which hazard threat levels and the exposure and vulnerability levels of identified elements at risk to these threats can be objectively assessed.

These risk factor criteria would be developed and supported by a relevant government authority (exercising their responsibility), accepted by persons relying on the assessment and be available for the assessor to use. In addition, the corresponding risk level matrix and the risk tolerability scale are required.

It is necessary that:

1. The risk factor criteria reflect society's and/or community's expectations and preparedness/capacity to tolerate risk;
2. The information is standardised to the greatest extent possible so that it provides an accepted basis from which the determined risk level can be derived and be relied upon in making decisions;
3. The corresponding risk level matrix and the risk tolerability scale are developed to derive a risk level and tolerance level from the derived threat, exposure and vulnerability levels; and
4. Responsibility for development of the reference information is not left to individual assessors who have varied expertise, qualification and no approved responsibility to provide such information. Such an approach would not result in consistent and reliable assessment outcomes.

Limitations: Where the required reference information (that is researched, effective, functional and acceptable) has not been established and provided by the responsible authorities, determined risk levels cannot be derived.

RISK FACTOR CRITERIA

The required risk factor criteria would need to establish:

- What factors are to define the different 'determined' levels of hazard threats;
- What factors are to define the different 'determined' levels of exposure of elements at risk; and
- What factors are to define the different 'determined' levels of vulnerability of elements at risk.

RISK LEVEL MATRIX

The matrix would need to establish how the 'determined' levels of threat, exposure and vulnerability are to be applied in deriving the 'determined' risk level. Different sets of matrices to account for different development types, uses and scales would likely be required.

Different development types, uses and scales are potentially capable of tolerating different levels of risk and still be considered by the relevant authority (who are reflecting the understood society/community position), to remain acceptable or at least tolerable.

RISK TOLERANCE SCALE

After the 'determined' risk level has been derived after an assessment applying the risk factor criteria and the risk level matrix, a methodology is required to classify the risk level as either unacceptable, tolerable or acceptable.

A1.2.3 INHERENT AND RESIDUAL RISK

In this Bushfire Risk Report, inherent risk is considered to be current situation risk after accounting for bushfire protection measures that are either already in place (for existing development/use) and/or are currently planned to be incorporated into the proposed development/use.

Inherent risk levels are derived before the application of any additional protection measures that have been identified and recommended by the bushfire consultant, and which subsequently determines the residual risk. If there are none, the residual risk is the same as the inherent risk. Refer to the Glossary for additional supporting information.

A1.2.4 PROTECTION MEASURE EFFECTIVENESS RATINGS

DERIVING AN EFFECTIVENESS RATING

As part of the qualitative risk assessment process, an effectiveness rating, established by the application of this table, is applied to each bushfire protection measure. The rating weights each bushfire protection measure's ability to reduce a hazard's threat levels or reduce the exposure and/or vulnerability levels of the elements at risk.

The greater the effectiveness the greater the contribution of a protection measure to the reduction in levels of risks associated with a bushfire event. It is also an important factor applied to the determination of the bushfire protection measure's implementation priority.

The effectiveness ratings incorporate the qualities of:

1. Independent/Dependent: A qualitative assessment of the extent to which a protection measure can reduce 'indicative' threat, exposure and vulnerability levels as a standalone measure as opposed to only providing an additive reduction by being a part of a package of protection measures; and
2. Risk Reduction Potential: A qualitative assessment of a protection measure's capacity to reduce the levels of risks associated with a bushfire event as a standalone risk measure.

The rating methodology assumes the greater the independence and risk reduction potential of a bushfire protection measure, the greater its effectiveness.

DERIVING EFFECTIVENESS RATINGS FOR BUSHFIRE PROTECTION MEASURES	
Rating	Protection Measure Characteristics and Capability
Very High	Very significant risk reduction as an independent (standalone) measure. Impact on risk reduction is immediate and persistent in all scenarios. A priority measure to be implemented wherever possible.
High	Material risk reduction as an independent (standalone) measure;
Medium	Alone the measure will have limited impact on risk reduction. It is dependent on providing additive value when combined with other protection measures to create a 'package' of bushfire protection measures.
Not Relevant	The measure is not relevant to the type of development/use. This is different to not being able to be applied – it is just not relevant to any configuration of the subject development/use.

A1.2.5 PROTECTION MEASURE IMPLEMENTATION PRIORITY RATINGS

The effectiveness of a bushfire protection measure at reducing 'relative' threat, exposure and vulnerability levels, is the primary determinant of the implementation priority rating (refer to Section A1.2.3 for effectiveness rating explanation).

However, the implementation priority rating, corresponding to each effectiveness rating, can be modified with appropriate consideration of factors that may constrain the implementation and ongoing management of the measure. A justifiable weighting for each of the factors may be incorporated into the assessment for differing scenarios, either by the consultant or applied later by the landowner/operator with their greater knowledge of specific factors.

The matrix is applied qualitatively to the determination of the implementation priority rating that will apply to a recommended bushfire protection measure in this Bushfire Risk Report.

DERIVING THE IMPLEMENTATION PRIORITY FOR BUSHFIRE PROTECTION MEASURES									
Derived Implementation Priority Rating	Primary Determinant Effectiveness Rating	Secondary Determinants - Constraints to Implementation and Management [less constraints = potentially higher implementation priority and vice versa]							
		Restrictions from Government / Regulations	Owner / Operator Acceptance	Community Acceptance	Control of Land Restrictions	Financial Cost / Affordability	Knowledge and Ability to Apply Protection Measure	Practicality and Ease of Implementation	Requirement for Ongoing Implementation and Management
Highest	Very High	No Constraints	Likely Alignment with Management Intent & Values	Likely Majority Accept	No Constraints	Likely Within Current Resource Capacity	Past / Current Application Experience	Well Within Existing Capabilities	None - Passive
High	High								
Medium	Medium	Significant Constraints	Likely Strong Conflict with Management Intent & Values	Likely Majority Do Not Accept	Significant Constraints	Unlikely to be Affordable	None – Extensive Education / Training Required	Not Practical	Necessary - Active
Lowest									

A1.2.6 RISK TOLERANCE SCALE

The application of a risk tolerance scale is necessary to:

1. Identify which exposed elements must be given priority for the development and application of bushfire protection measures; and
2. When planning approval is being sought, to identify if the residual risk levels can be considered as tolerable or acceptable and therefore potentially be approved for this factor.

THE APPLIED SCALE

The risk tolerance scale applied in this Bushfire Risk Report is presented in Table A1.2. It incorporates the application of the 'As Low as Reasonably Practicable' (ALARP) Principle. An overview of this principle and justification for its application is presented on the following pages.

Table A1.2: The applied risk tolerance scale

<table>
<tr><th colspan="4">THE APPLIED RISK TOLERANCE SCALE - INCORPORATING THE ALARP PRINCIPLE</th></tr>
<tr><th>Indicative / Determined Risk Level</th><th colspan="2">Tolerability Description and Action Required</th><th>Risk Tolerance Level[1]</th></tr>
<tr><td>Extreme</td><td colspan="2">The risks are unacceptable and require immediate implementation of risk management measures to eliminate or reduce risk to tolerable or acceptable levels.
Proposed development giving rise to risks in this region would not be approved unless there are exceptional reasons for the development to proceed.</td><td>Unacceptable</td></tr>
<tr><td rowspan="2">High</td><td rowspan="2">The risks are the most severe that can be tolerated but not unduly high. They require monitoring in the short term as risk management measures are likely to be needed in the short term given the intent should be to drive residual risk lower down the tolerable range where possible.</td><td rowspan="3">Tolerance Regions Subject to ALARP Principle</td><td>Intolerable
- if not ALARP-</td></tr>
<tr><td>Tolerable
- if ALARP -</td></tr>
<tr><td>Moderate</td><td>The risk is approaching an acceptable level. It can be tolerated and requires monitoring in the short to medium term. Need to consider potential changes over time in the risk and/or techniques for reducing/eliminating risk.
Risk management measures may be needed to reduce risk to more acceptable levels where possible – or accept the risk.</td><td>Tolerable
- if not ALARP -
Acceptable
- if ALARP -</td></tr>
<tr><td>Low
Very Low</td><td colspan="2">The risk is accepted as it is generally regarded as insignificant or adequately controlled by existing measures. No additional risk management measures will be required in the short to medium term other than monitoring.</td><td>Acceptable</td></tr>
<tr><td colspan="4">[1] Refer to the glossary for definitions of the tolerance levels.</td></tr>
</table>

THE ALARP PRINCIPLE

The 'As Low as Reasonably Practicable' (ALARP) Principle is based on the belief it is not possible to completely eliminate all risk involved, there will always be a certain level of risk remaining known as residual risk. The term is used to express the expected level of residual risk within a system, activity or, relevant to this document, within a proposed development/use, when good practice, judgement and duty of care are applied to decisions and operations.

The origins of the ALARP (As Low as Reasonably Practicable) principle are from United Kingdom case law and their regulatory framework. It is applied by their Health and Safety Executive (HSE) and is used by regulators and companies around the world as it provides a logical basis for managing risks.

The ALARP principle has been defined by the United Kingdom Health and Safety Executive (HSE-UK, 2001) to depict the concept that efforts to reduce risk should be continued until the incremental cost in doing so is grossly disproportionate to the value of the incremental risk reduction achieved (see figure). Incremental cost is defined in terms of time, effort, finance or other expenditure of resources – including loss of natural resources. Usually, each incremental reduction in risk will require a greater expenditure of resources.

This concept is depicted in Figure A3.1 where the triangle represents the decreasing risk and the diminishing proportional benefit as risk is reduced. There are also three regions shown in the figure into which general levels of residual risk can fall. The residual risk should fall either in the broadly acceptable region, or near the bottom of the tolerable region. This approach allows higher levels of safety to be provided where it is feasible.

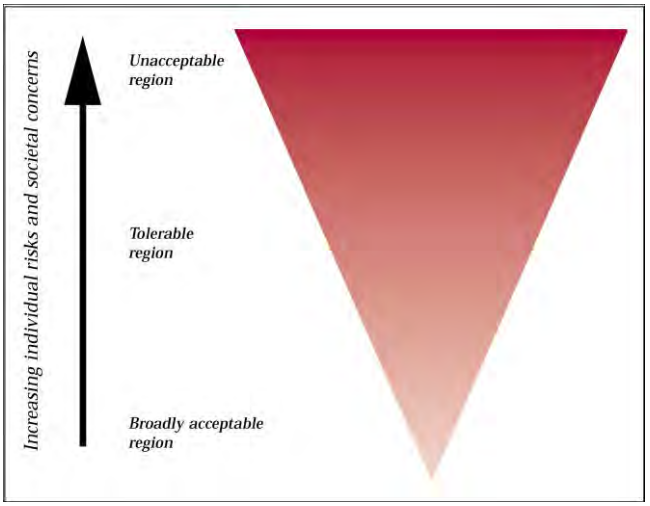


Figure A1.2: HSE framework for the tolerability of risk (source: HSE-UK, 2001)

Moving up the triangle from the region considered broadly acceptable, through a tolerable region (for which a greater range of risk can be considered), to an unacceptable region, represents increasing levels of 'risk' for a particular hazard or hazardous activity (determined through relevant risk analysis). Table A3.1 describes the risks that define each region.

Table A1.3: The risks associated with the risk tolerance regions (adapted from HSE-UK, 2001)

THE ALARP PRINCIPLE – DEFINING THE REGIONS OF RISK TOLERANCE	
Unacceptable Region	For practical purposes, a particular risk falling into this region is regarded as unacceptable whatever the level of benefits associated with the activity. Any activity, practice or use of land giving rise to risks falling in this region would, as a matter of principle, be not approved unless the activity or practice can be modified to reduce the degree of risk so that it falls in one of the regions below, or there are exceptional reasons for the activity, practice or use to be retained.
Tolerable Region	Risks in this region are typical of the risks from activities that people are prepared to tolerate in order to secure benefits, in the expectation that: • The nature and level of the risks are properly assessed, and the results used properly to determine control measures. The assessment of the risks needs to be based on the best available scientific evidence and, where evidence is lacking, on the best available scientific advice; • The residual risks are not unduly high and kept as low as reasonably practicable. This is the region to which the ALARP principle applies; and • The risks are periodically reviewed to ensure that they still meet the ALARP criteria, for example, by ascertaining whether further or new control measures need to be introduced to take into account changes over time, such as new knowledge about the risk or the availability of new techniques for reducing or eliminating risks. • In practice and where possible, the intent should be that residual risk continues to be driven down the tolerable range so that it falls either in the broadly acceptable region or is near the bottom of the tolerable region, in keeping with the duty to ensure health, safety and welfare so far as is reasonably practicable as per the ALARP principal.
Broadly Acceptable Region	Risks falling into this region are generally regarded as insignificant and adequately controlled. Regulators would not usually require further action to reduce risks unless reasonably practicable measures are available. The levels of risk characterising this region are comparable to those that people regard as insignificant or trivial in their daily lives. They are typical of the risk from activities that are inherently not very hazardous or from hazardous activities that can be, and are, readily controlled to produce very low risks.
Note: The risk tolerability framework is a conceptual model. The factors and processes that ultimately decide whether a risk is unacceptable, tolerable or broadly acceptable are dynamic in nature and are sometimes governed by the particular circumstances, time and environment in which the activity, practice or use occurs or is proposed. Standards change and public expectations vary between societies and change with time.	

APPLICATION OF THE ALARP PRINCIPLE IN AUSTRALIA

To contribute to justification for the use of the Principle in this bushfire risk report, it is noted that the following Australian guidelines also apply adaptations of the Principle:

- Australian Institute for Disaster Resilience, 2020; Land use Planning for Disaster Resilient Communities;
- WA Department of Mines, Industry Regulation and Safety, 2020; Petroleum safety and major hazard facility – guide. ALARP demonstration;
- NOPSEMA (Australia's offshore energy regulator), 2020; ALARP and risk assessment guidance notes;
- Department of Planning Lands and Heritage (DPLH), 2019; Coastal hazard risk management and adaptation planning guidelines;

- Planning Institute of Australia, 2015; National Land Use Planning Guidelines for Disaster Resilient Communities; and

- NERAG 2010, an earlier version of NERAG 2020, applied the ALARP Principle.

The following is taken from the 'National Land Use Planning Guidelines for Disaster Resilient Communities' (Planning Institute of Australia, 2015) and is also referred to in the document 'Land use Planning for Disaster Resilient Communities' (Australian Institute for Disaster Resilience, 2020).

> *Of relevance to planners in the NERAG is the ALARP principle and how it is used in evaluating risks. According to NERAG, the ALARP principle is applied to define boundaries between risks that are generally intolerable, tolerable or broadly acceptable. The ALARP principle will help to prioritise a risk hierarchy and determine which risks require action and which do not. Those that are broadly acceptable naturally require little, if any, action while risks that are at an intolerable level require attention to bring them to a tolerable level.*
>
> *According to NERAG, it is entirely appropriate and accepted practice that risks may be tolerated, provided that the risks are known and managed.*
>
> *The ALARP principle is particularly relevant to planners and other built environment professionals as it provides the means to categorise risks according to their severity, and to assign risk treatment options accordingly.*
>
> *It is important to note that the effect each hazard has on a community and its settlement is different, and therefore land use planning and building responses may not always be appropriate to treat the risk borne by a particular hazard. Equally, the effectiveness or strength of response provided by land use planning or building may not be sufficient to fully address the risk.*
>
> *In addition, it is likely that through a normal natural hazard management process a range of treatment measures will be proposed, tested and implemented to provide a comprehensive approach to risk treatment that may involve other measures working in concert with land use planning or building responses.*
>
> *The manner in which land use planning and building responses are deployed to treat specific instances of natural hazard risk will vary depending on location, information availability, community views, broader development intent for the settlement under analysis and the effect of complementary risk treatment measures.*
>
> *However, the ALARP principle provides a good reference for demonstrating the land use responses for the various ALARP risk categories. Generally speaking, in areas of intolerable risk the strongest land use planning and building responses should apply. Conversely, in areas of acceptable risk only minimal controls should apply, if at all.*
>
> *The most complex risk category for which to prescribe treatment from a land use and building perspective is those areas of tolerable risk. Such risks in existing settlements may not be sufficiently concerning to warrant severe use restrictions or relocation, however they will need treatment over time to ensure the risk does not increase. Treatment options in this instance may include limiting vulnerable uses in this area, restricting significant intensification of development, and promoting resilient urban design. Such areas of tolerable risk are also best avoided from a greenfield perspective to limit increases in future risk and costs associated with infrastructure failure in these locations that could otherwise been avoided.*

***

A1.2.7 ADDRESSING THE LIKELIHOOD OF A BUSHFIRE EVENT OCCURRING

USING THE QUALITATIVE RISK ASSESSMENT APPROACH (NOTE: APPLIED IN THIS BUSHFIRE RISK REPORT)

In using a subjective approach the pragmatic assumption that a bushfire will occur is made. It is assumed a bushfire can occur within any timeframe and could result in loss or life or injury, or unacceptable damage to property and or unacceptable disruption to services.

This approach acknowledges that the requirements for fire of fuel, ignition source and oxygen will always exist. That is:

- The fire fuels being considered will always be there unless physically removed permanently;
- A potential ignition source will always exist through lightning and/or human activities; and
- The potential for adverse fire weather conditions to exist at some point within each year will always be present.

Additionally, the subjective assessment of the site specific indicative threat levels of the direct and indirect bushfire attack mechanisms associated with the bushfire hazard, by default and indirectly, effectively incorporate a likelihood component.

Also, where the costs of implementing the required bushfire protection measures to lower indicative risk levels is not excessive, it makes sense not to try to avoid these costs by considering that risk is reduced because likelihood is lower.

USING THE QUANTITATIVE RISK ASSESSMENT APPROACH (NOTE: NOT APPLIED IN THIS BUSHFIRE RISK REPORT)

A quantitative approach will necessarily be based on the historical record of past bushfire events and determining the mathematical probability of a future event. This approach is problematic to achieving increased bushfire resilience at all stages of existing or proposed development/use for these reasons:

- Historical data may not be available or have enough data sets to be accurate;
- Historical data does not account for future changes in climate that may result in a different occurrence period. Consequently, further assumptions need to be made;
- Siting, design and construction of development to resist bushfire threats is easier, more practical (and likely economical), to incorporate at initial planning stages rather than the retro-establishment of protection measures when the considered likelihood of events increases over time for various reasons or tolerance of risk decreases;
- Time spent conducting historical research, performing statistical calculations and modifying risk levels, apart from being costly, is likely better spent assessing potential threat, exposure and vulnerability levels and developing appropriate protection measures; and
- The likelihood of occurrence cannot modify the levels of hazard threats, exposure or vulnerability. It can only be applied to reduce the overall risk level. That is, it would be applied as a modifying factor via the established risk level matrix and not the established risk factor criteria. The validity of incorporating such a factor may be indicated when, despite the existence of vegetation that can burn, there are other mitigating physical conditions that exist at the specific site that make the likelihood of ignition and severity of bushfire behaviour very low. How this is applied would need to be established by the authority establishing the relevant risk level matrix.

***

APPENDIX 2: ASSESSING BUSHFIRE HAZARD THREATS

DEFINING THE BUSHFIRE HAZARD AND ITS THREATS

THE BUSHFIRE

For this assessment, a bushfire is considered to be the unplanned burning of a fire in vegetation of any type and structure. It is applied as a generic term to refer to forest fires, scrub/shrub fires and grass fires, which have differences of behaviour within and between the fire types, dependant on a range of variables. Key fire behaviours include rate of spread, flame height, intensity and spotting (i.e., ignition ahead of the fire front by embers/burning debris).

Grassfire: Note that grass fires are significantly different, and this is recognised in the assessment. Grass fire behaviour results in a much shorter duration fire, the embers produced being mostly consumed within the flame front and radiant heat flux dropping more quickly with distance from the fuel load - as indicated in the application of AS 3959:2018 methodology where 'Grassland' achieves a BAL-LOW rating at half the separation distance of all other classified vegetation. These differences are acknowledged in other jurisdictions:

> *The risk posed by grass fires is different to that of fires in other vegetation types. Grass fires burn at a higher intensity and spread more rapidly with a shorter residence time. Embers produced by grass fires are smaller and fewer in number than those produced from forest fires. In recognition of the characteristics of grassland fire behaviour, the NSW RFS has developed a simplified set of Deeming Provisions for residential infill development (Planning for Bushfire Protection, RFS NSW, 2019).*
>
> *While pastures, crops and native grasslands often experience fast moving fires, their intensity is usually insufficient to justify a land use planning response (Justin Leonard et al (2014): A new methodology for State-wide mapping of bushfire prone areas in Queensland, CSIRO, Australia)*

THE BUSHFIRE HAZARD

A bushfire hazard is the natural process/phenomenon of a bushfire event that gives rise to the associated risks of loss of life or injury or destroyed or damaged assets, which results in personal loss and economic loss.

The term bushfire hazard is necessarily applied to both the relevant vegetation as the source of the hazard and the bushfire event itself. This approach is aligned with the definition applied by the United Nations Office for Disaster Risk Reduction.

LAND USE PLANNING AND THE BUSHFIRE HAZARD THREATS TO BE ASSESSED

The bushfire hazard is a potential source of direct and indirect bushfire attack mechanisms (refer to A2.3 for additional information), that present threats to persons and property and give rise to the associated risks of loss of life or injury or destroyed or damaged assets.

Direct Attack Mechanisms: Of most relevance to land use planning are the bushfire threat levels generated by the direct attack mechanisms of:

- Flame contact;
- Radiant heat transfer; and
- Ember/burning debris attack.

Consequently, these are the bushfire hazard threats that are to be considered when assessing the potential bushfire hazard threat levels. Due consideration of winds generated by fire/terrain interactions, is applied when the physical requirements exist for development of landscape scale fire and extreme bushfire events.

Indirect Attack Mechanisms: The indirect attack mechanisms are considered within a risk assessment section of a Bushfire Risk Report when this is required, as the threat levels from these mechanisms is determined by the degree to which available bushfire protection measures are or will be implemented in mitigating risk.

FACTORS INFLUENCING BUSHFIRE BEHAVIOUR

There are three primary factors that influence the intensity, speed and spread of a bushfire. Any increase in these behaviours will result in greater threat levels, to exposed elements, from the bushfire attack mechanisms.

1. VEGETATION AND OTHER FUELS

Key characteristics that will influence fire behaviour include:

- Fuel size and shape – anything less than 6mm diameter/thickness is considered a fine fuel and will ignite and burn quickly. Larger/heavier fuels take longer to ignite but burn for longer, so the threat exists for longer;
- Fuel load – the quantity of available fuel (t/ha) will influence the size of the fire. In particular it is the fine fuel load that determines the intensity of the bushfire and the flame sizes. Vegetation type and period over which it can accumulate will determine fuel loads;
- Vegetation type – this influences the size, shape and quantity of available fuels. For bushfire purposes vegetation types include the classifications of forest, woodland, scrub, shrubland and grassland (with total fuel loads typically decreasing in that order);
- Fuel arrangement – will influence two factors of fire behaviour (1) the speed and intensity of burning and (2) how much of the total fuels are likely to be involved in the fire simultaneously. The first factor is a function of how densely packed or aerated the fuels are with the more available arrangement burning with greater intensity. The second factor is a function of the availability of 'ladder' fuels (i.e. near surface, elevated and bark fuels) to carry fire up the vegetation profile, and the continuity of fuels to carry the fuel across the land; and
- Fuel moisture content – drier fuels will ignite easily and burn quickly. The inherent moisture content of the vegetative fuels is a function of the vegetation type and arrangement and/or the positioning of the vegetation complex near readily available sources of moisture.

Greater quantities of finer, dryer, aerated and connected fuels will result in more severe behaviours and elevated bushfire threat levels. Large extents of vegetation (surrounding landscape scale) can have additional implications for the development of extreme bushfire events and the consequent increase in bushfire threat levels (refer to Appendix 3 for additional information).

2. WEATHER

Adverse fire weather that results in more severe behaviours and elevated threat levels includes strong winds, high temperatures, low relative humidity and extended periods of these factors.

Weather events at the surrounding landscape scale can have implications for the development of extreme bushfire events and consequent increase in bushfire threat levels (refer to Appendix 3 for additional information).

3. TOPOGRAPHY

The physical terrain can influence the severity of fire behaviour. At a local scale, it is the influence of ground slope on the rate a fire spreads, that is most relevant. Fire travels faster up slopes (rule of thumb is a doubling of speed for every 10 degrees increase in slope). Greater rates of spread increase fire intensity and the resultant threat levels.

At the surrounding landscape scale, the impact of topography can be significant and includes establishing the potential for development of certain dynamic fire behaviours that can lead to extreme bushfire events and elevated threat levels (refer to Appendix 3 for additional information).

BUSHFIRE THREATS - DIRECT ATTACK MECHANISMS
ORIGINATING FROM THE BUSHFIRE PRONE VEGETATION

FLAME CONTACT

When flames make contact with buildings/structures they can flow over, under and around – impacting surfaces not directly facing the bushfire. Flames can enter small gaps and crevices. This results in a significant risk that combustible parts of buildings/structures.

Flames will be longer when fine fuel loads are higher and will move faster up slopes and generally, slower down slopes.

Flame temperatures are highest in the lower parts of the flame and decrease towards the tip. The flame has two distinct regions - the lower solid body flame and the upper part that is a transitory flame (intermittently present). Both flame regions can damage structures.

Note: AS 3959:2018 *Construction of buildings in bushfire prone areas*, establishes both the construction requirements corresponding to each Bushfire Attack Level (BAL) and the methodology for determining a BAL. For a bushfire modelled using this methodology, the derived flame length only provides an estimate of the solid body flame length.

RADIANT HEAT TRANSFER

This heat is produced from combustion of a fuel source, radiates in all directions from the fire and can potentially be felt from hundreds of meters away.

The amount of heat that a fire can transfer to other objects, through radiation, is influenced by its flame size and flame temperature. These are a function of the characteristics of the fuels being burnt including fuel size, dryness, structure, arrangement and quantity. The bushfire is additionally influenced by weather and topography factors that can intensify fire behaviour (described at start of this section with additional detail provided in Appendix 3).

The radiant heat:

- Can ignite combustible materials such as timber (doors, cladding, external framework), some plastics (which if not ignited will melt and distort (cladding, pipes, gutters, tanks). This breaches the building's envelope allowing flames and embers to enter, increasing the likelihood of damage or destruction;
- Can dry and heat vegetation and other fuels (combustible materials such as timber) to a temperature at which they ignite or are more easily ignited by existing flames or embers; and
- Is an extremely significant threat to persons (occupants, firefighters) when they are not physically shielded. Protective clothing can provide only limited protection.

EMBER / BURNING DEBRIS ATTACK

Note: The importance of establishing protection measures to mitigate the potential impact of consequential fire ignited by the ember attack mechanism, cannot be overstated.

An ember is a small particle of burning material that is transported in the winds that that accompany a bushfire (larger particles can exist as firebrands from certain vegetation types). Typically these consist of plant materials such as bark, leaves and twigs that exist as part of the standing vegetation or have accumulated on the ground. Experimental scientific work has shown that that embers greater than 2mm are effective at igniting combustible materials.

Ember attack is the most common way for buildings/structures to ignite in a bushfire:

Scientific research indicates that at least 80% of building losses from past Australian bushfires can be attributed to ember/firebrand attack (mostly in isolation but also in combination with radiant heat), and the resultant consequential fires. (Leonard J.E. et.al; 2004 – Blanchi R. et.al. 2005 - Blanchi R. et.al. 2006).

Embers are the primary ignition source for consequential fire:

- They accumulate around and on vulnerable parts of structures such as low angle surfaces windows and wherever re-entrant corners exist (e.g., roofs, gutters, doors, windows etc);
- They enter gaps in structure envelopes to vulnerable materials within internal cavities and spaces (e.g., roof, sub-floor, living areas); and

- They ignite surface materials such as walls and decks and any accumulated vegetative debris.

Embers can attack structures for a significant length of time before and after the passage of the fire front, as well as during. This potential length of exposure is an important factor in the consideration of the level of threat embers present.

The importance of bark as an ember source:

(Sources: CSIRO Climate and Disaster Resilience Report 2020 and Overall Fuel Hazard Assessment Guide 4th edition July 2010, Victoria DSE and Cruz, MG (2021) The Vesta Mk 2 rate of fire spread model: a user's guide. CSIRO).

Bark is the primary source of embers and spotting in Australian eucalypt forests due to the key attributes of ease of ignition, extended burnout time and the favourable size to weight ratio and aerodynamic properties. Differences in these attributes strongly influence the spotting potential from different forest types – and therefore the potential hazard rating of the bark.

The type of tree bark will determine the size, shape and number of embers/firebrands which, along with the prevailing fire behaviour and weather conditions will dictate the spotting distances and density of ignitions.

Fine fibrous barks - including stringybarks (e.g. jarrah), have loosely attached fibrous flakes and can produce massive quantities of embers (prolific spotting) for shorter (up to 0.75 km) and medium distances (up to 5 km).

Short distance spotting (including ember showers) are generally the result of embers and firebrands blown directly ahead of the fire with little or no lofting. Density tends to decrease with distance from the fire front.

Medium distance spotting results from embers and firebrands that are lofted briefly in a convection column or blown from an elevated position (e.g., from treetops on ridges). With sufficient density and coalescing spot fires, this can rapidly increase the size of a fire (deep flaming) leading to dynamic fire behaviours and extreme fire events.

Ribbon/candle type barks - have longer burnout time, extended flight paths and are more likely to be responsible for longer distance spotting > 5 km (with up to 30 km having been authenticated). This results from significant lofting of large firebrands (e.g. curled hollow tubes of bark that can burn for 40 minutes) in well-developed convection columns. These develop as separate, independent fires. Very long distance spotting requires Intense fire, maintenance of a strong convection column (to lift firebrands aloft) and strong winds aloft (to transport the firebrands).

Other bark types - that include coarsely fibrous (e.g. marri) / slab or smooth / platy and papery barks - produce lower quantities of embers and shorter distance spotting. Their highest bark hazard ratings that are lower than fine fibrous or ribbon barks.

HIGH / ERRATIC FIRE DRIVEN WIND ATTACK

High winds resulting from bushfire / vegetation / terrain / fire weather interactions, can directly damage the external envelope of a building or structure by:

- Positive and negative pressure dislodging building parts; and/or;
- Causing solid materials (e.g., branches or parts of other structures) to break loose and be transported to impact and damage the building's envelope. This provides openings for other bushfire attack mechanisms to enter and ignite internal cavities.

Strong winds are common during serious bushfire events as they are a necessary requirement for bushfires to develop higher intensities and greater severity levels.

Increased wind speeds can be the result of:

1. General weather patterns that will present as strong prevailing winds; and
2. The more complex interactions of prevailing winds along with vegetation types and structures, terrain factors and fire weather factors - that can lead to the development of dynamic fire behaviours resulting in intensification of fire behaviour and generation of local and erratic high winds.

   For highest risk scenarios, the bushfire can couple with the atmosphere as a pyro-convective event resulting in extreme bushfire events and gusty, severe windspeeds (refer to Appendix 3 for more detail).

It is the potential for the interactions and outcomes of the latter that will be considered as a direct bushfire attack mechanism for the relevant bushfire hazard threat level assessment in this report.

BUSHFIRE THREATS - INDIRECT ATTACK MECHANISMS

PRIMARILY ORIGINATING FROM WITHIN AN ASSET PROTECTION ZONE (APZ)

For the following indirect bushfire attack mechanisms to impact relevant exposed elements, certain requirements need to exist within an APZ (i.e., the area immediately surrounding a subject building/structure).

Where these requirements exist, they increase the exposure of the subject building/structure to the indirect bushfire attack mechanisms.

In this Report, it is the exposure component of the risk assessment that will assess the potential impact from the bushfire threat indirect attack mechanisms.

DEBRIS PRODUCTION AND ACCUMULATION

The relevant debris are combustible fine fuels that can accumulate, by falling and/or being windblown to be close to or against buildings, surrounding structures and other heavy fuels.

This makes the ignition of these structures/heavy fuels more likely through flame contact and radiant heat generated by the accumulated debris that has been ignited by embers and/or surface fire attack (i.e. a consequential fire).

This debris can accumulate over long time periods (years) in locations such as:

- On horizontal or close to horizontal surfaces and rough timber surfaces;
- Within re-entrant corners and roof gutters/valleys;
- Against vertical surfaces; and
- Within internal spaces /cavities and under sub-floors when gaps are present.

The threat level of this attack mechanism will be determined by:

- The presence of vegetation types that produce significant quantities of combustible debris and produce this in the driest and hottest part of the year; and
- The extent of the vegetation producing this threat.

The level of exposure of the telecommunications infrastructure is dependent on the proximity of this threat generating vegetation.

SURFACE FIRE

These are low intensity fires with short flames that burn along the ground and are not considered to be part of the 'bushfire' in identified bushfire prone vegetation. They are typically patchy and erratic in their direction, consuming low-lying vegetation, ground litter, mulch and other debris and are short lived (<40 seconds) when burning in the absence of heavier fuels.

Surface fires are considered to be those that can occur on the land immediately surrounding buildings, associated structures and other heavy consequential fire fuels. Surface fires bring the threats of direct flame contact, higher radiant heat and embers closer to the relevant elements at risk than the bushfire itself can.

To reduce the exposure of relevant elements at risk to this indirect bushfire threat, the area of land typically recognised as an APZ, should be maintained in a minimal fuel / low threat state.

TREE STRIKE/OBSTRUCTION

Branches or trees, subject to strong winds and/or tree burnout, can:

- Damage the envelope of a structure creating openings for direct attack mechanisms of bushfire (or consequential fire) to ignite internal cavities or living space; and/or
- Fall and obstruct access to or egress from, a structure or site being impacted by bushfire.

To reduce the exposure of relevant elements at risk to this indirect bushfire threat, consideration of the locations and susceptibility of trees needs to form part of the assessment of exposure and site management.

CONSEQUENTIAL FIRE

Note: The importance of establishing protection measures to mitigate the potential impact of consequential fire cannot be overstated.

Consequential fire Is the burning of vulnerable (combustible/flammable) materials, items and structures that exist within the area surrounding the subject building or structure – the surrounding vulnerable elements. These vulnerable surrounding elements can also include other buildings in proximity.

The burning of these surrounding vulnerable elements can result in the subject building/ structure being exposed to the direct fire attack mechanisms (threats) of flame, radiant heat, embers and surface fire from a close distance.

These consequential fire threats are separate from and additional to the threats generated by the bushfire front itself - which can be and often is, a considerable distance away.

Consequential Fire Fine fuels:

- Dead plant material such as leaves grass, bark and twigs thinner than 6mm (or live material less than 3mm thick that can be consumed in a fire involving dead material); and
- Originate from the indirect bushfire attack mechanism of 'debris accumulation' and potentially from other areas of landscaped vegetation.

Consequential Fire Heavy and Large Heavy Fuels:

- Stored combustible / flammable items:
    - Building materials, packaging materials, firewood, sporting/playground equipment, outdoor furniture, matting, rubbish bins etc;
    - Large quantities of dead vegetation materials stored as part of site use;
    - Liquids and gases; and
    - Vehicles, caravans and boats, etc.
- Constructed combustible items:
    - Surrounding landscaping items - fences/screens, retaining walls, gazebos, plastic water tanks etc;
    - Attached structures - decks, verandahs, stairs, carports, garages, pergolas, patios, etc;
    - Adjacent structures - houses, sheds, garages, carports, etc. Structure to structure fire is a common cause of overall building loss in post bushfire event assessments [9].

The assessment of the potential risk impact of the existence, types and proximity of consequential fire fuels to subject buildings/structures, is conducted by assessing the exposure level of

The level of risk associated with the potential contribution of consequential fire to overall risk levels, is derived by assessing the exposure of relevant elements at risk to consequential fire fuels – which considers the existence, type and proximity of these fuels.

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APPENDIX 3: DYNAMIC FIRE BEHAVIOURS AND EXTREME BUSHFIRE EVENTS

The content of this appendix is an overview of information that supports the assessment approach of section 5.2 of this report. It considers the risk implications arising from what is being learnt from the latest research work within the bushfire science of dynamic fire propagation and extreme fire development.

Any potential for extreme fire events to develop in the surrounding landscape surrounding the subject site, will result in increased in bushfire hazard threat levels to exposed elements and must be accounted for in the risk assessment.

The selected compilation of information is taken from various sources including peer reviewed research papers [references 1-3, 12, 15, 21, 27, 28, 41, 42].

RECENT BUSHFIRE RESEARCH

Traditionally, bushfire modelling conducted to determine rates of spread, intensity, flame lengths, radiant heat etc and provide measurements of threat levels, has been based on the quasi-steady fire state (i.e. a fire propagating under constant and uniform fuel, weather and topography – after it has finished its growth phase).

More recent research has provided important insights into the dynamic nature of fire spread in the landscape and identified local drivers of bushfire risk and highlighted the role of environmental factors that are significant for large and extreme fire development.

These environmental factors include aspects of the vertical structure of the atmosphere, meso-scale fire weather processes (e.g., sea breezes, cold fronts, squall lines, convective complexes), interactions between the fire and the atmosphere, and the modification of fire weather and fire behaviour due to the local topography.

From this work, a number of processes that can contribute significantly to the level of risk posed by a bushfire have been identified. These include:

- Extreme fire weather processes;
- Dynamic fire propagation; and
- Violent pyroconvection and pyrogenic winds.

Of particular relevance to this risk assessment are the topographic aspects of the surrounding landscape surrounding the subject site and the potential it might present for dynamic fire propagation, development of extreme fire events and therefore increased bushfire hazard threat levels and consequent risk.

DYNAMIC FIRE BEHAVIOURS

Dynamic fire behaviours (DFBs) result from interactions between the physical factors of fuel, terrain, fire weather conditions, atmosphere and different parts of the bushfire itself. They are physical phenomenon that involve rapid changes of fire behaviour and occur under specific conditions.

Certain DFBs occur at various scales and time frames (e.g. spotting), others only at large scales (e.g., conflagrations and pyroconvective events) and others at small scales and short time spans (e.g. junction fires, fire whirls). The following fire behaviours are considered DFBs:

Spotting

The production of embers/firebrands, carried by the wind/convective currents that ignite spot fires ahead of the bushfire front. Under extreme conditions, with the necessary fuels, mass spotting events can occur. Dependent on fuel types, winds and convective currents, embers can be consumed by the fire front itself or travel tens of kilometres. Spot fire occurrence can be so prevalent that spotting becomes the dominant propagation mechanism – with the fire spreading as a cascade of spot fires forming a 'pseudo' front.

Fire Whirl / Tornado

Various sized (<1m - >150m) spinning vortices of ascending hot air and gases that carry smoke, debris, and flame. The intensity of larger whirls compares to tornados. Can induce fire spread contrary to prevailing wind and ignite spot fires away from the fire front.

Junction Fire

Is associated with merging fire fronts that produces very high rates of spread and have the potential to generate fire whirls / tornadoes.

Crown Fire

Types of tree crown fires have been categorised according to their degree of dependence on the surface fire phase - passive, active, independent - with the last two being considered dynamic fire behaviour.

Active crown fire is "a fire in which a solid flame develops in the crowns of trees, but the surface and crown phases advance as a linked unit dependent on each other."

Independent crown fires "advance in the tree crowns alone, not requiring any energy from the surface fire to sustain combustion or movement."

For a crown fire to start, a surface fire of sufficient intensity is first necessary. The distance between the heat source at the ground surface and the canopy-fuel layer will determine how much of the surface fire's energy is dissipated before reaching the fuels at the base of the canopy. The higher the canopy base, the lower the chance of crowning.

The existence of trees themselves, separated from surface fuels, can offer a degree of protection by absorbing radiant heat, trapping embers and shielding from winds. Necessary considerations include:

- Eliminating understorey fuels;
- Species Issue: Understanding the extent to which the trees will contribute to fuels (leaves/bark/twigs etc) that accumulate on the ground and when moved (wind) become involved in consequential fire away from the tree during the fire season. This needs to be considered against the maintenance capability (regular removal of material) of the responsible entity; and
- Species / Positioning Issue: Requirements include not being highly flammable, no loose stringy bark, less able to trap embers, not being prone to branches breaking in high winds potentially causing structural damage to buildings (allowing ember entry) and keeping crowns separated as an additional measure of safety and allow wind to permeate rather than be totally blocked.

Eruptive Fire

Behaviour where the head fire accelerates rapidly on sufficiently steep terrain with sufficiently strong wind – as a result of fire plume attachment to the surface, bathing it in flames ahead of the front (pre-heating).

Fire Channelling / VLS (vorticity-driven lateral spread)

Behaviour where rapid lateral fire spread, in generated vortices, occurs across a sufficiently steep leeward slope in a direction approximately transverse to the prevailing winds. This results in the rapid increase in width of the fire front. VLS are highly effective at producing mass spotting events.

Conflagrations

These are large, intense, destructive fires. They have a moving front as distinguished from a fire storm (blow up / pyroconvective fire). With sufficient vegetation extent, fuel loads and the development of dynamic fire behaviours, the large amounts of heat and moisture released can cause its plume to rise into the atmosphere and develop large cumulus or cumulonimbus flammagenitus cloud (pyrocumulus or pyrocumulonimbus). Where the extent of vertical development is limited (e.g. a stable atmosphere, or insufficient flaming zone), the fire is likely to remain a surface based event.

Downbursts

These are strong wind downdrafts associated with convective columns of heated air (and associated cloud forms). The consequent falling columns of cooled air induce an outburst of strong winds on or near the ground that radially spread causing fire spread in directions contrary to the prevailing wind.

Pyroconvective Event

A pyro-convective event is an extreme manifestation of a conflagration that develops in an unstable atmosphere and can transition into a towering pyrocumulus or a pyrocumulonimbus (pyroCb's) that can extend to the upper troposphere or lower stratosphere. With the fire/atmosphere coupling, it has evolved beyond a purely surface based fire into dynamic fire propagation rather than quasi-steady propagation. In the violent pyroconvective system:

- As a fire's plume reaches higher into the atmosphere, larger scale mixing can cause drier and higher-momentum upper air to be transferred back to the surface, thereby further exacerbating the potential for more intense fire behaviour, including fire spread contrary to the prevailing wind direction;
- Pyrogenic winds can cause considerable damage to structures, directly or indirectly, increasing their vulnerability to bushfire attack mechanisms; and

- The pyroCb's carry dense ember loads, fire and other burning debris and generate lightning, all with very little rain or hail that would typically occur with an ordinary thunderstorm.

DRIVERS OF DEEP FLAMING

Deep flaming is the fire condition when the active flaming zone is unusually large and flame-front intensity is simultaneously great, resulting in large quasi-instantaneous energy release.

Deep flaming can be produced by numbers of mechanisms on varying terrain (flat, undulating of rugged) when a large enough area of sufficiently heavy fuels is present. These mechanisms include:

- Very strong winds – so the head fire advances more rapidly than the back of the flaming zone;
- Change in wind direction – so the long flank of a fire is transformed into a fast running head fire;
- Eruptive fire behaviour – where steep slopes can cause a fire to accelerate rapidly;
- Vorticity-driven lateral spread (wind channelling) – where strong winds and steep terrain interact to rapidly drive a fire laterally, accompanied by downwind mass spotting and consequent coalescing of spot fires forming large areas of flame (can include the DFB of 'junction fire').

Research has identified strong links between:

- Eruptive fire behaviour, VLS and the occurrence of deep flaming; and
- The development of deep flaming and extreme bushfire events.

EXTREME BUSHFIRE EVENTS

Extreme bushfire events create disproportionate risks to human and environmental. Their development is affected by dynamic feedback processes that result in unpredictable behaviour, and the worsening of rates of spread and intensities - even when environmental conditions are consistent.

The term 'extreme bushfire' is applied in the recent bushfire science literature in two ways:

1. Where it refers to large, intense bushfires in which one or more DFBs are simultaneously involved; and
2. Where it more specifically refers to a fire that exhibits deep or widespread flaming in an atmospheric environment conducive to the development of violent pyroconvection, often manifesting as towering pyrocumulus (pyroCu) or pyrocumulonimbus (pyroCb) storm(s) – also referred to as blow-up fire event(s).

   A distinguishing feature of these types of fires is that they involve a coupling of the fire with an unstable atmosphere to a much greater vertical extent, well above the mixed layer, which modifies or maintains the fire's propagation (e.g. through mass spotting, blustering winds and lightning);

Relevance to Risk Assessment: Given that this risk assessment is concerned with identifying the potential for the landscape surrounding the subject site to increase bushfire risk, the following common aspects of the two above descriptions are relevant:

- An extreme fire is a large intense fire, so it requires a sufficient area and sufficient fuels in which to develop; and
- An extreme fire of scale requires the formation of deep flaming to develop.

Consequently, the risk assessment is primarily focused on the extent and fuel types/loads of bushfire prone vegetation and the existence of terrain (topography) properties necessary for the relevant dynamic fire behaviours - rather than the potential for adverse fire weather / atmospheric conditions - whose likely occurrence can be assumed as possible.

Note also that the second description requires an unstable atmosphere - to enable deep/violent pyroconvection and subsequent significant cloud formation and latent heat release. This is not essential for the first. Consequently, this identifies a potential difference between the two defined extreme bushfire events to be considered when assessing risk:

- Large, intense bushfires can occur without deep convective column development. These fires remain as surface fires (essentially wind-driven fires), with a greater predictability of behaviour; and
- Large, intense bushfire that couple with an unstable atmosphere are no longer surface based. They are associated with a higher level of energy, chaos, and nonlinearity due to the enhanced (fire-induced)

interaction between the boundary layer and the free troposphere, which may introduce factors that act to maintain or enhance widespread flaming. The fire behaviour is much more unpredictable.

PHYSICAL REQUIREMENTS OF TERRAIN, FUEL LOAD (AND WINDSPEED) FOR DEEP FLAMING

The dynamic fire behaviours of eruptive fire and VLS with associated mass spotting, along with potential for topographically modified winds to develop, are strongly linked with the development of deep flaming, which is a prerequisite for extreme bushfire events.

There are certain environmental thresholds that are required to be met for these dynamic fire behaviours to occur. These are described below and form part of the assessment of the bushfire hazard in Section 5.3.

Eruptive Fire Behaviour

Eruptive fires are characterised by a rapid acceleration of the head fire rate of spread (exponential increases in rate of spread have been observed). It results in a rapid deepening of the flaming zone (larger area of active flame), from which heat is released into the atmosphere.

Eruptive fire results from the interaction between the slope of the terrain and the fire's plume. In the absence of wind, plume attachment can be expected on terrain that is inclined at roughly 24° or more and the effects of wind could cause plume attachment on slopes inclined at angles of 24° or lower. Consequently, the primary topographic requirement for eruptive fire is sufficiently steep terrain and sufficiently strong wind.

"This mode of fire propagation is completely contrary to that expected under the quasi- steady fire spread paradigm … eruptive fire behaviour poses a serious threat to the successful containment of a bushfire and provides a mechanism that can substantially elevate the risk posed by a bushfire in areas that are prone to its occurrence".

Rugged terrain (areas with local topographic relief >300m), is particularly prone to eruptive fire (and dynamic fire behaviours in general).

Fire Channelling (Vorticity-Driven Lateral Spread)

Fire channelling (VLS) exists when a fire exhibits rapid spread in a direction transverse to the synoptic winds as well as in the usual downwind direction. It is characterised by intense lateral and downwind spotting and production of extensive flaming zones.

VLS is highly effective at producing mass spotting events. A link between deep flaming events caused by VLS and the formation of pyroCb has been demonstrated. Under extreme conditions, spot fire occurrence can be so prevalent that spotting becomes the dominant propagation mechanism.

VLS can only be expected to occur on parts of the landscape, and under certain fire weather conditions. VLS occurrence depends critically on the following:

- Leeward slopes greater than 20-25° are required;
- Wind direction must be within 30-40° of the topographic aspect;
- Wind speed in excess of about 20 km h-1 are required;
- Generally VLS is only observed in heavy forest fuel types with load in excess of 15-20 t ha; and
- Fuel moisture content – dense spotting and downwind extension of the flaming zone are far more likely when fuel moisture contents are around 5% or less.

Topographically Modified Surface Winds - Downslope Winds

In WA the scarp winds are the well-known local occurrence of downslope winds. Similar meteorological phenomena (typically as foehn winds) occur in the lee of mountain ranges in many parts of the world, particularly on ranges with gentle windward and steep leeward slopes.

Scarp winds are nocturnal, strong and gusty winds that develop near the base of the scarp through summer months. The local mechanism is for a synoptic easterly flow, causing air to rise to the top of the scarp from further inland, at which point it is cooler and denser than the surrounding airmass. This produces an unstable situation and consequently the air flows down the scarp as a turbulent density current.

There are implications for enhanced fire activity for a fire located in a region of downslope winds, as they provide a clear mechanism for rapid, irregular direction of fire spread as well as turbulent transport of firebrands and plume development. If a 'hydraulic jump' is also present, the strong vertical motion in the jump region is a mechanism for lofting and dispersal of firebrands further ahead of the bushfire front.

APPENDIX 4: EXPLAINING BUSHFIRE ATTACK LEVEL (BAL)

Bushfire attack levels are determined using the methodology established by AS 3959:2018 Construction of buildings in bushfire prone areas. The Standard defines a bushfire attack level (BAL) as a "means of measuring the severity of a building's exposure to ember attack, radiant heat and direct flame contact, using increments of radiant heat expressed in kW/m^2."

Each BAL rating represents a set range of radiant heat flux (see table below). The amount of radiant heat and flame lengths generated by a bushfire is dependent on many factors that are modelled using the Standard's fire behaviour and flame length models. Key factors include vegetation type, terrain and a range of fire weather factors. The variation that can exist in these factors will result in varying separation distances, away from bushfire prone vegetation, corresponding to a given BAL rating. These distances can be presented as data in a table or illustrated by mapping – the 'BAL Contour Map'

The different BAL ratings effectively incorporate the threat levels of flame contact, radiant heat transfer and ember/firebrand attack:

- The highest ratings of BAL-FZ and BAL-40 indicate direct or likely exposure to the flame contact threat;
- Each BAL rating represents a defined range (in kW/m^2), of the radiant heat transfer threat, with the threat level increasing from BAL-LOW to BAL-FZ; and
- Each higher BAL rating assumes an increased exposure to the ember/burning debris attack threat. This is based on the practical acknowledgement that the closer the element at risk is to the source of ember production the greater the likely exposure level. In practice, this strong correlation does not exist for all bushfire event scenarios. However, AS 3959 is only intending to apply the same construction response to ember/firebrand attack for each BAL rating above BAL-LOW as consequential fire from any source other than from within the subject structure itself is not being considered by the Standard.

Bushfire Attack Level	Explanation [Source AS3959:2018]
BAL – LOW	There is insufficient risk to warrant specific construction requirements but there is still some risk. *Important Note: For AS3959:2018 purposes, BAL-LOW will exist at 100m from classified vegetation (50m for Grassland).* *However, embers/firebrands from certain vegetation types can ignite spot fires ahead of the fire front for significant distances – short range spotting up to 740m, medium range spotting up to 5km and long range spotting has been authenticated up to 30km.*
BAL – 12.5	There is a risk of ember attack. Construction elements are expected to be exposed to heat flux not greater than 12.5 kW/m^2
BAL – 19	There is a risk of ember attack and burning debris ignited by windborne embers and a likelihood of exposure to radiant heat. The construction elements are expected to be exposed to a heat flux not greater than 19 kW/m^2.
BAL – 29	There is an increased risk of ember attack and burning debris ignited by windborne embers and a likelihood of exposure to an increased level of radiant heat. The construction elements are expected to be exposed to a heat flux not greater than 29 kW/m^2.
BAL – 40	There is a much increased risk of ember attack and burning debris ignited by windborne embers, a likelihood of exposure to a high level of radiant heat and some likelihood of direct exposure to flames from the fire front. The construction elements are expected to be exposed to a heat flux not greater than 40kW/m^2.
BAL – FZ (Flame Zone)	There is an extremely high risk of ember attack and burning debris ignited by windborne embers, and a likelihood of exposure to an extreme level of radiant heat and direct exposure to flames from the fire front. The construction elements are expected to be exposed to a heat flux greater than 40 kW/m^2.

APPENDIX 5: THE SURROUNDING LANDSCAPE - VEGETATION CATEGORY AND HAZARD DETERMINATION CRITERIA

DETERMINATION OF VEGETATION CATEGORIES AND THE BASE BUSHFIRE HAZARD SCENARIO

The following criteria are applied to the categorisation of vegetation on the surrounding landscape and the establishment of the base bushfire hazard scenario, for the purpose of deriving indicative bushfire threat levels. These threat levels are subsequently applied in the determination of risk levels associated with a bushfire event.

Vegetation Categories

These are established to enable a comprehensive assessment of the type and severity of the bushfire attack mechanisms (i.e., the bushfire threats), potentially generated by bushfire prone vegetation on surrounding land. This enables variations in vegetation composition and structure to be more appropriately accounted for in the determination of the levels of risk associated with a local bushfire event.

The variations in indicative threat level ranges assigned to each vegetation category in the table below are the result of these differences.

The 'Categories' are necessarily different to the vegetation 'Classifications' applied in the BAL determination methodology of AS 3959:2018. The building Standard primarily considers the flame contact and radiant heat attack mechanisms and does not fully address ember/firebrand attack or other threats.

The Base Bushfire Hazard Scenario and Indicative Threat Levels

The assumptions that make up the base bushfire hazard scenario are applied to deriving the midpoint of each indicative threat level range for each category of vegetation. Variations from the base scenario will potentially modify the indicative threat level (i.e., increase or decrease it within the relevant range). The assessment of the subject site for the existence of threat modifying physical factors, is presented in Section 5.1.4 of this report.

The applied components of the Base Bushfire Hazard Scenario is:

- The extent of bushfire prone vegetation is sufficiently large such that a fully developed fire can be supported. Parameters applied to the design fire of AS 3959:2018 BAL determination methodology are applied. Specifically, a head fire width of at least 100 metres is physically possible and sufficient fire run length exists to allow a quasi-steady rate of spread (after the initial growth phase) to be attained and a head fire width of 100 metres to develop from a single point of ignition. Typically, but not in every scenario, this will equate to areas of vegetation greater than 3ha and within which fire runs directly at an element at risk will be greater than 50 -100 metres in length;
- The fire fuels are continuous, and the terrain is flat to undulating with no slopes greater than ten degrees; and
- It is assumed to be possible for the most adverse fire weather to occur at the subject locality.

SURROUNDING LANDSCAPE VEGETATION MAPPING - CATEGORY DETERMINATION CRITERIA					
Category Code	Category Description				
	Total Fuel Loads	Most Relevant Fuel [1]	Spotting Range [2]	Spotting Density [2]	Indicative Threat Level (Property) [3 & 4]
Tree-1	Moderate to High	Fine, fibrous, long strand bark	Short to Medium	Very High	Moderate to Extreme
	Trees and Bark Hazard: Tree dominated vegetation including tall species. At least 10% of the trees present have fine, longer strand fibrous barks (stringybarks). "These barks are easily dislodged from the trunk, allowing simultaneously for vertical fire propagation into the overstorey and profuse short to medium range spot fire ignitions." Spotting Threat: The fine, longer strand fibrous barks (stringybarks) have the potential to produce the highest short range (up to 500-750 metres) spotting density (quantity) and can spot out to medium ranges (up to 5 km) under conducive fuel, terrain and fire weather conditions. Potential spotting (ember / firebrand attack) threat levels range from moderate to extreme. Fuel Loads: Surface and near surface fuel loads (t/ha) range from moderate to very high (note: the worst potential fuel load for the location is applied, regardless of time since last burnt). Example Eucalyptus Species: Includes jarrah, messmate stringybark and brown/red stringybark. Marri can be included in this category due to the potential high density spotting but will be limited to the shorter spotting range.				
Tree-2	Moderate to Very High	Ribbon, candle bark	Short to Long	Moderate	Moderate to Extreme
	Trees and Bark Hazard: Tree dominated vegetation including tall species. Less than 10% of trees present will have fine, longer strand fibrous barks (stringybarks). The predominant trees are smooth bark species where the bark sheds in long ribbons (ribbon/candle barks), and often hangs on the branches. "These bark types provide aerodynamically efficient, firebrand material that can remain alight for long periods and be transported over considerable distances." Spotting Threat: These bark types have the longest distance spotting potential (greater than 5 km) due to the long burnout time of the firebrands. However, the potential ember/firebrand density (quantity) will be lower than for fine, longer strand fibrous barks. Potential spotting (ember / firebrand attack) threat levels range from moderate to very high. Fuel Loads: Surface and near surface fuel loads (t/ha) range from moderate to very high (note: the worst potential fuel load for the location is applied, regardless of time since last burnt). Example Eucalyptus Species: Includes manna gum, blue gum, alpine ash and woollybutt, mallee species. Karri can be included in this category on the basis that while spotting distance is unlikely to be long range (as the bark is shed in short ribbons/small polygonal flakes), the potential for extreme fuel loads is relevant to the categorisation.				

SURROUNDING LANDSCAPE VEGETATION MAPPING - CATEGORY DETERMINATION CRITERIA					
Category Code	Category Description				
	Total Fuel Loads	Most Relevant Fuel [1]	Spotting Range [2]	Spotting Density [2]	Indicative Threat Level (Property) [3]
Tree/Shrub	Moderate to High	Smooth, platy, papery, coarsely fibrous bark and/or Shrub fuels	Short	Low to Moderate	Moderate to High
	This category can have the most variation in vegetation types that are present. It can consist of predominantly trees with the stated bark types or be predominately shrub type vegetation or any combination. Can include areas of grass. Trees and Bark Hazard: Trees can be of any height. Bark types are more varied and have the characteristics of being tightly held onto the trunk, producing short strands, or producing chunks or small flakes which fall to the ground. These bark types are described as smooth, platy, papery and coarsely fibrous. Shrub Fuels: Scrub, shrub, heath type fuels of vertically oriented, well aerated, with live and dead vegetation extending from the surface to the top of the vegetation complex and up to 6 metres high. Spotting Threat: Trees with the stated bark types can produce limited quantities of embers and shorter spotting distances (up to 500-750 metres). Shrub fuels can produce moderate to high quantities of smaller and shorter burn duration embers, resulting in mostly short distance spotting. Fuel Loads: Surface, near surface and elevated fuel loads (t/ha) range from moderate to high (note: the worst potential fuel load for the location is applied, regardless of time since last burnt).				
Shrub	Low to High	Shrub fuels	Short	Low	Low to Moderate
	Shrub Fuels: Scrub, shrub, heath type fuels of smaller sized, vertically oriented, well aerated fuels, with continuous live and dead vegetation extending from the surface to the top of the vegetation complex and up to 2 metres high. Can include areas of grass. Spotting Threat: Shrub fuels can produce limited quantities of small and short burn duration embers resulting in low density short distance spotting (up to 500-750 metres). Fuel Loads: Surface, near surface and elevated fuel loads (t/ha) range from moderate to high (note: the worst potential fuel load for the location is applied, regardless of time since last burnt).				
Grass	Low to Moderate	Fine grass fuels	Very Short	Low	Low to Moderate
	Fuel Types: Will be varied and includes the following groups that each have similar structural characteristics - tropical grasslands, tussock grasslands, hummock grasslands, and improved pastures / crop lands comprised of species that cure. These fuels are typically much finer than other vegetation types with a low bulk density. Where trees are present, they make up no more than 10% of canopy cover and will have no influence on fire behaviour. Fuel Loads: Are much lower than other types of vegetation complexes. For example, default total fuel loads applied in AS 3959:2018 BAL determination methodology for Grassland range from 43% to 85% less than other vegetation classifications. Fire Behaviour: Combustion rates are faster in grasslands than forest fuels due to the finer materials and more aerated structure. This gives rise to the main cause of differences in fire behaviour between grassfires and fires in other fuel types - the residence time is much shorter. This is the period during which flames remain burning over one spot on the ground. Using pastures as an example, the residence time is in the order of 5 seconds in fine light pastures and 10-15 seconds in heavy pastures. This results in grassfires spreading more quickly, reacting very quickly to changes in wind direction and speed and being a shorter duration threat to a specific exposed element. Spotting Threat: Embers produced by grass fires are smaller and fewer in number than those produced from forest fires and burn for shorter durations. Typically, spotting in grassfires occurs over				

	very short distances and are generally not noticed as they are quickly overrun by the main fire. Potential spotting (ember / firebrand attack) threat levels are low.	
No/Low Threat		No Threat to Low
	Areas of land will satisfy this category when the following factors apply: • Low threat vegetation characteristics including low flammability, high moisture content (including non-curing crops) and minimal fuel load. Low threat examples established in AS 3959:2018 include: managed grassland, mangroves/saline wetlands, maintained lawns, golf courses, public reserves/parklands, sporting fields, vineyards, orchards, banana plantations, market gardens, commercial nurseries, nature strips and windbreaks; and • Areas permanently cleared of vegetation, including natural features such as rocky outcrops and manmade infrastructure.	

Note 1: The fuel type/s that are most relevant for the categorisation of area of vegetation are stated. This has particular relevance where certain bark types and quantity are a significant component of total fuel loads, resulting in higher threat levels for the ember/firebrand direct attack mechanism. Bark fuels are the primary source of fuel for the ember/firebrand attack threat (refer to Appendix 2 for additional information).

Note 2: Understanding and assessing the threat level generated by the ember/firebrand direct attack mechanism (spotting) is important to the management of risks associated with any bushfire hazard. With respect to categorising surrounding landscape vegetation, based on threat levels, the following points identify why the assessment of the spotting threat is important:

- At distances beyond 100 metres from a subject land the direct attack mechanisms of flame contact and radiant heat transfer cannot significantly and directly impact the building elements at risk within that site;
- However, embers/firebrands can impact subject land through the ignition of consequential fire (as an indirect attack mechanism of bushfire), in fuels and structures surrounding, upon and within the relevant elements at risk (e.g., habitable buildings). Consequential fires bring the direct attack mechanisms of flame and radiant heat much closer than the bushfire itself can. Assessments of past bushfire events indicate that ember attack and consequential fire be the cause of 80% or greater of property losses; and
- Spotting can significantly influence the increase scale of the bushfire event and its consequent intensity, both within the surrounding landscape and within the 100 metres surrounding a subject land. From *Cruz M.G. et al (2015): A Guide to Rate of Fire Spread Models for Australian Vegetation. CSIRO, AFAC*). "Spotting is an important, at times dominant, fire propagation process in high intensity fires in eucalypt forests. The type of tree bark will determine the size, shape, and number of firebrands, which the prevailing weather conditions will dictate the spotting distances and density of ignitions." Refer to Appendix 2 for additional information.

Note 3: The stated indicative threat levels identify the threat level range that is associated with the stated vegetation category as it applies to constructed property, as opposed to persons in the open or travelling access routes in vehicles, which will be separately assessed.

Subsequent assessment of bushfire hazard and terrain factors within the surrounding landscape that can increase or decrease the indicative threat levels, will then complete the surrounding landscape assessment for the subject land.

A6.1 LOCATION OF SUBJECT LAND RELATIVE TO DESIGNATED AREAS OF BUSHFIRE PRONE LAND

Relevant State/Territory authorities have determined what is to be considered bushfire prone vegetation and how areas of land will be identified as presenting bushfire risk, by their designation on maps.

The mapping then functions as a trigger, for development and uses within the designated areas of land, to apply one or more of the following, as applicable to the jurisdiction:

- Legislated bushfire planning provisions/controls;
- Legislated bushfire building provisions/controls; and/or
- Legislated fire controls.

The location of the subject site relative to the relevant mapping is presented in Figure A5.1.

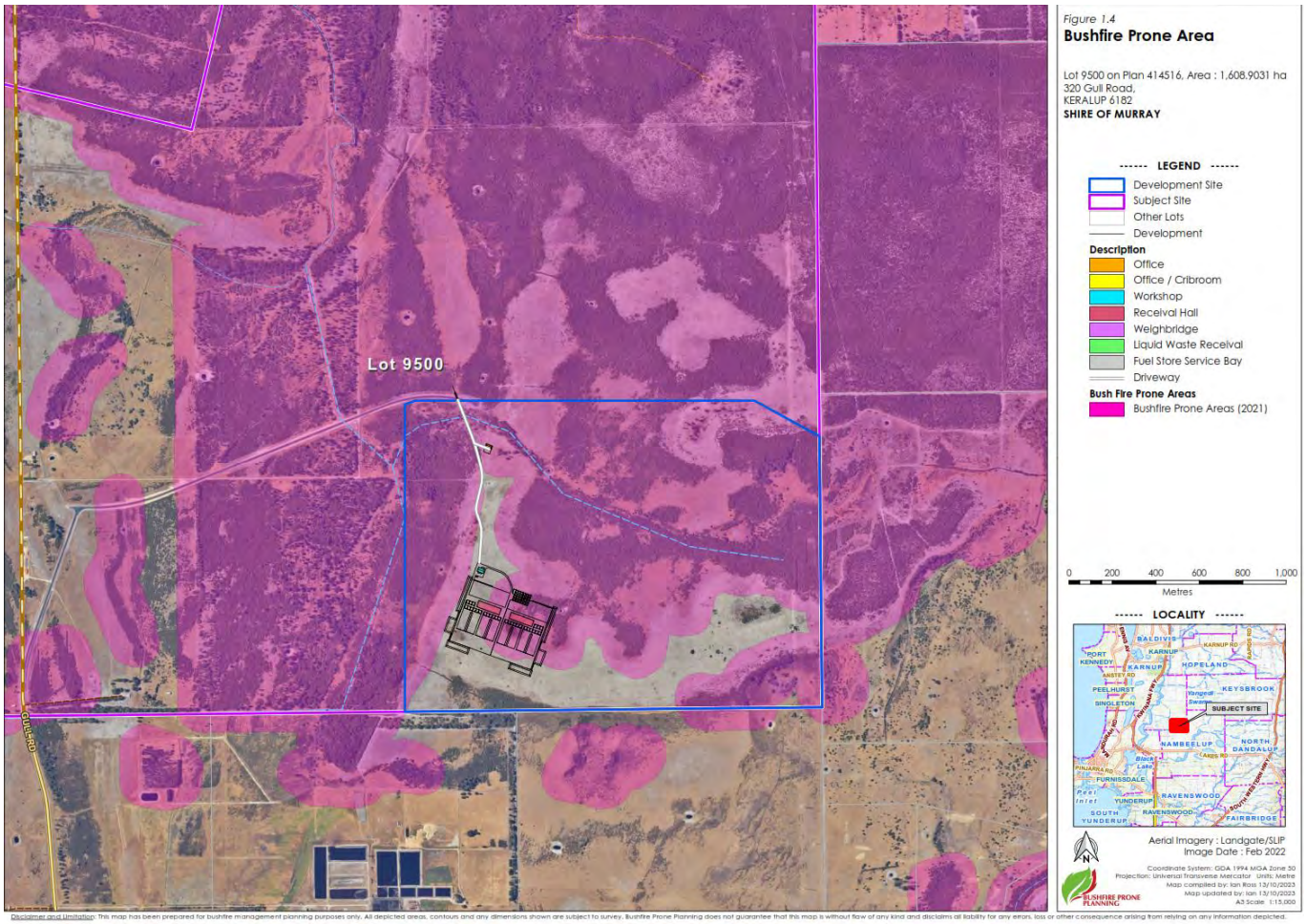

Figure A6.1: Subject site is within a Bushfire Prone Area

A6.2 SURROUNDING LANDSCAPE - VEGETATION CATEGORISATION – PHOTO EVIDENCE

PHOTO EVIDENCE - CATEGORISED VEGETATION	
Categorisation in accordance with the criteria established in Appendix 5	Tree-1 & Tree Scrub
Additional Justification:	Not Required.

Tree 1	Tree/shrub
	
FIGURE 5.1 PHOTO ID: 5	Tree
	
Grass	

A6.3 SURROUNDING LANDSCAPE – BARK HAZARD – PHOTO EVIDENCE

PHOTO EVIDENCE – BARK HAZARD	
Vegetation Location: All Areas Categorised as Tree-1	
	
Jarrah	Marri
	
Paperbark	Kunzia

A6.4 SUBJECT LAND + 150M EXTENT – VEGETATION CLASSIFICATION (SUPPORTING DATA)

INFORMATION TO ASSIST INTERPRETATION

Vegetation Types and Classification

In accordance with AS 3959:2018 clauses 2.2.3 and C2.2.3.1, all vegetation types within 100 metres of the 'site' (defined as "the part of the allotment of land on which a building stands or is to be erected"), are identified and classified. Any vegetation more than 100 metres from the site that has influenced the classification of vegetation within 100 metres of the site, is identified and noted. The maximum excess distance is established by AS 3959: 2018 cl 2.2.3.2 and is an additional 100 metres.

Additional classification resources include:

- The Visual Guide for Bushfire Risk Assessment in WA (WA Department of Planning February 2016); and
- Relevant FPA Australia practice notes.
- PBP 2019 Appendix 1 – vegetation formation information (Keith framework).
- Keith D.A. and Simpson C.C. (2010) Vegetation Formations of NSW (v3.0), Appendix 2. An identification key to the vegetation formations of NSW (from Keith 2004)

Modified Vegetation

The vegetation types have been assessed as they will be in their natural mature states, rather than what might be observed on the day. Vegetation destroyed or damaged by a bushfire or other natural disaster has been assessed on its expected re-generated mature state. Modified areas of vegetation can be excluded from classification if they consist of low threat vegetation or vegetation managed in a minimal fuel condition, satisfying AS 3959:2018 s2.2.3.2(f), and there is sufficient justification to reasonable expect that this modified state will exist in perpetuity.

The Influence of Ground Slope

Where significant variation in effective slope exists under a consistent vegetation type, these will be delineated as separate vegetation areas to account for the difference in potential bushfire behaviour, in accordance with AS 3959:2018 clauses 2.2.5 and C2.2.5.

THE INFLUENCE OF VEGETATION GREATER THAN 100 METRES FROM THE SUBJECT SITE	
Vegetation area(s) within 100m of the site whose classification has been influenced by the existence of bushfire prone vegetation from 100m – 200m from the site:	No.
Assessment Statement:	No vegetation types exist close enough, or to a sufficient extent, within the relevant area to influence classification of vegetation within 100 metres of the subject site.

A6.4.1 VEGETATION CLASSIFICATION PHOTOS AND JUSTIFICATION

VEGETATION AREA 1				
Classification	D. SCRUB			
Types Identified	Open scrub D-14			
Effective Slope	Measured	Flat 0 degrees	Applied Range (Method 1)	Upslope or flat 0 degrees
Dominant & Sub-Dominant Layers (species as relevant)	Mixed shrubs and scrub species growing up to 3 metres in height across undulating terrain.			
Understorey:	Pastural Grasses and sedges with scattered seasonal herbs.			
Additional Justification:	Not Required.			
Post Development Assumptions:	Vegetation is classified as worst-case scenario. Classified vegetation located within the asset protection zone will be managed to a low threat state by subject site landowner. Note: Any offsite vegetation cannot be managed or removed by the subject site landowner			

PHOTO ID: 1

PHOTO ID: 2

PHOTO ID: 3

PHOTO ID: 4

VEGETATION AREA 2						
Classification	A. FOREST					
Types Identified	Open forest A-03					
Exclusion Clause	N/A					
Effective Slope	Measured	flat 0 degrees	Applied Range (Method 1)	Upslope or flat 0 degrees		
Foliage Cover (all layers)	30-70%	Shrub/Heath Height	1-2m	Tree Height	Over 30m	
Dominant & Sub-Dominant Layers (species as relevant)	Mixed eucalyptus and corymbia species found in low-lying wet areas and creeklines.					
Understorey:	Mixed native shrubs and pastural grasses.					
Additional Justification:	Not Required.					
Post Development Assumptions:	Vegetation is classified as worst-case scenario. Classified vegetation located within the asset protection zone will be managed to a low threat state by subject site landowner Note: Any offsite vegetation cannot be managed or removed by the subject site landowner					

PHOTO ID: 7

PHOTO ID: 8

PHOTO ID: 9

PHOTO ID: 10

Figure 3.1

Classified Vegetation & Topography

Lot 9500 on Plan 414516, Area : 1,608.9031 ha
320 Gull Road,
KERALUP 6182
SHIRE OF MURRAY

AREA : 1
Class (D) Scrub
Effective slope: 0°

AREA : 2
Class (A) Forest
Effective slope: 0°

AREA : 3
Class (G) Grassland
Effective slope: 0°

Excluded

Lot 9500

------ LEGEND ------

- Development Site
- Subject Site
- Other Lots
- Development
- Photo & Direction

Description

- Office
- Office / Cribroom
- Workshop
- Receival Hall
- Weighbridge
- Liquid Waste Receival
- Fuel Store Service Bay
- Driveway

150m Vegetation Assessment Area

- 150m from Subject Site

Classified Vegetation

- Class (A) Forest
- Class (D) Scrub
- Class (G) Grassland
- Exclusion 2.2.3.2

0 100 200 300 400 500
Metres

------ LOCALITY ------

Aerial Imagery : Landgate/SLIP
Image Date : Feb 2022

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator Units: Metre
Map compiled by: Ian Ross 13/10/2023
Map updated by: Ian 13/10/2023
A3 Scale 1:7,500

BUSHFIRE PRONE PLANNING

Map Document Path / Name: K:\Projects\Jobs 2022\220666 - 320 Gull Road Keralup (BMP)\Mapping\MXD\220666_Fig3-1_VEG_320 Gull Road Keralup.mxd

A6.6 RADIANT HEAT MODELLING – CALCULATION INPUT / OUTPUT DATA

Table A6.6.2: The applicable 'Landowner' APZ Dimensions when indicative BAL ratings have been established by the BMP.

THE CALCULATED VEGETATION SEPARATION DISTANCES CORRESPONDING TO THE STATED LEVEL OF RADIANT HEAT TRANSFER [1]									
The Bushfire Hazards Vegetation Classification (AS 3959:2018)		Separation Distances Corresponding to Stated Level of Radiant Heat (metres)							
		Bushfire Attack Level						Maximum Radiant Heat Flux	
	Class	BAL-FZ	BAL-40	BAL-29	BAL-19	BAL12.5	BAL-LOW	10 kW/m^2	2 kW/m^2
	(A) Forest	<16	16-<21	21-<31	31-<42	42-<100	>100	63.2	Select.
	(D) Scrub	<10	10-<13	13-<19	19-<27	27-<100	>100	44.1	Select.
	(G) Grass	<6	6-<8	8-<12	12-<17	17-<50		29.5	
The summary 'printouts' of calculation input and output values for each area of classified vegetation are presented on the following pages. Note: 10kWm2 calculated using 1200k.									

SUMMARY CALCULATOR INPUT AND OUTPUT VALUES FOR EACH AREA OF CLASSIFIED VEGETATION

Minimum Distance Calculator - AS3959-2018 (Method 2)			
Inputs		Outputs	
Fire Danger Index	80	Rate of spread	2.4 km/h
Vegetation classification	Forest	Flame length	19.8 m
Understorey fuel load	25 t/ha	Flame angle	63 °, 68 °, 73 °, 75 °, 77 ° & 82 °
Total fuel load	35 t/ha	Elevation of receiver	8.82 m, 9.17 m, 9.460000000000001 m, 9.56 m, 9.640000000000001 m & 9.800000000000001 m
Vegetation height	n/a	Fire intensity	43,400 kW/m
Effective slope	0 °	Transmissivity	0.843, 0.822, 0.796, 0.775, 0.764 & 0.712
Site slope	0 °	Viewfactor	0.4235, 0.3149, 0.2132, 0.144, 0.1168 & 0.0313
Flame width	100 m	Minimum distance to < 40 kW/m²	22.9 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	29.9 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	41.2 m
Flame temperature	1,200 K	Minimum distance to < 12.5 kW/m²	54.9 m
		Minimum distance to < 10 kW/m²	63.2 m

Minimum Distance Calculator - AS3959-2018 (Method 2)			
Inputs		Outputs	
Fire Danger Index	80	Rate of spread	4.16 km/h
Vegetation classification	Scrub	Flame length	11.62 m
Understorey fuel load	25 t/ha	Flame angle	65 °, 71 °, 76 °, 79 °, 80 ° & 84 °
Total fuel load	25 t/ha	Elevation of receiver	5.26 m, 5.49 m, 5.64 m, 5.7 m, 5.72 m & 5.78 m
Vegetation height	m	Fire intensity	53,815 kW/m
Effective slope	0 °	Transmissivity	0.865, 0.848, 0.824, 0.8, 0.788 & 0.732
Site slope	0 °	Viewfactor	0.413, 0.3045, 0.2058, 0.1396, 0.1134 & 0.0304
Flame width	100 m	Minimum distance to < 40 kW/m²	13.9 m
Windspeed	45 km/h	Minimum distance to < 29 kW/m²	18.7 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	27 m
Flame temperature	1,200 K	Minimum distance to < 12.5 kW/m²	37.5 m
		Minimum distance to < 10 kW/m²	44.1 m

Minimum Distance Calculator - AS3959-2018 (Method 2)			
Inputs		Outputs	
Grassland Fire Danger Index	110	Rate of spread	14.3 km/h
Vegetation classification	Grassland	Flame length	6.87 m
Understorey fuel load	4.5 t/ha	Flame angle	66 °, 72 °, 78 °, 81 °, 82 ° & 86 °
Total fuel load	4.5 t/ha	Elevation of receiver	3.13 m, 3.26 m, 3.36 m, 3.39 m, 3.4 m & 3.42 m
Vegetation height	n/a	Fire intensity	33,247 kW/m
Effective slope	0 °	Transmissivity	0.881, 0.869, 0.85, 0.828, 0.8159999999999999 & 0.75
Site slope	0 °	Viewfactor	0.4037, 0.2976, 0.1994, 0.1344, 0.1096 & 0.0297
Flame width	100 m	Minimum distance to < 40 kW/m²	8.4 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	11.4 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	16.9 m
Flame temperature	1,200 K	Minimum distance to < 12.5 kW/m²	24.6 m
		Minimum distance to < 10 kW/m²	29.5 m

GLOSSARY

APPLIED TERMINOLOGY	
Consequence	The outcome of an event or situation expressed qualitatively or quantitatively, being a loss, injury, disadvantage or gain. In the emergency risk management context, consequences are generally described as the effects on persons, society, the environment and the economy. *(Source: DPLH 2019)* An impact on the natural, economic, built or social environments as a result of the hazard. The consequences are influenced by the vulnerability of elements at risk, by the exposure of elements at risk to the hazard, and by the characteristics of the hazard. *(Source: PIA, 2015).* The outcome of an event that affects objectives. Can be a range of consequences; can be certain or uncertain; can have positive or negative effects; can be expressed qualitatively or quantitatively; can escalate through knock-on effects. *(Source: ISO Guide 73:2009)*
Controls	A measure that maintains and/or modifies risk. Controls include, but are not limited to, any process, policy, device, practice, or other conditions and/or actions which maintain and/or modify risk. *(Source: AIDR Knowledge Hub; Glossary)* A control is any measure or action that modifies or regulates risk. Controls include any policy, procedure, practice, process, technology, technique, method, or device that modifies or regulates risk. Risk treatments become controls, or modify existing controls, once they are implemented. *(Source: Praxiom)* *Note: 'Protection Measures' and 'Risk Treatments' will be alternative terms used in this risk assessment report.*
Decision Maker	The Minister for Planning, State Administrative Tribunal, Western Australian Planning Commission, Development Assessment Panel, any other State decision-making authorities, and/or the relevant local government and their delegates that make decisions regarding the application of this Policy. *(Source: SPP 3.7)* For proposed development or use that is not subject to planning approval, the relevant decision makers are those tasked with the development and management of a development or use. Typically this might be an existing development/use for which an improved bushfire performance is being sought.
Elements At Risk	The population, buildings and civil engineering works economic activities, public services and infrastructure, etc. exposed to hazards. (Australian Institute for Disaster Resilience, 2019)
Exposure	Refers to the people and things in the path of potential hazards. *(Source: AIDR* LUPDRC*, 2020)* The elements within a given area that have been, or could be, subject to the impact of a particular hazard. Bushfire exposure can refer to property that may be endangered by a fire burning in another structure or by a bushfire. *(Source: AIDR Knowledge Hub; Glossary)* The situation of people, infrastructure, housing, production capacities and other tangible human assets located in hazard prone areas. Measures of exposure can include the number of people or types of assets in an area. These can be combined with the specific vulnerability and capacity of the exposed elements to any particular hazard to estimate the quantitative risks associated with that hazard in the area of interest. *(Source: UNDRR, 2017)*

Hazard	A process, phenomenon or human activity that may cause loss of life, injury or other health impacts, property damage, social and economic disruption or environmental degradation. Hazards may be natural, anthropogenic or socionatural in origin. • Natural hazards are predominantly associated with natural processes and phenomena (note: disasters often follow natural hazards, but there is no such thing a natural disaster); • Anthropogenic hazards are human-induced – being induced entirely or predominantly by human activities and choices; • Socionatural hazards are associated with a combination of natural and anthropogenic factors, including environmental degradation and climate change. Hazards may be single, sequential or combined in their origin and effects. Each hazard is characterized by its location, intensity or magnitude, frequency and probability. *(Source: UNDRR Terminology 2017)* A source of potential harm or a situation with a potential to cause loss. A potential or existing condition that may cause harm to people, or damage to property or the environment. A source of risk. *(Source: AIDR Knowledge Hub; Glossary)*
Hazardous Event	The manifestation of a hazard in a particular place during a particular period of time. [Severe hazardous events can lead to a disaster as a result of the combination of hazard occurrence and other risk factors.] (Source: *United Nations Office for Disaster Risk Reduction, 2017)*
Hazard Identification	The process of recognising that a hazard exists and defining its characteristics. *(Australian Institute for Disaster Resilience, 2019)*
Hazard - Bushfire	A fuel complex, defined by amount, type condition, arrangement, and location, that determines the degree of hazard. *(Source: AIDR Knowledge Hub; Glossary)* The term 'bushfire hazard' in this assessment report is intended to refer to both bushfire prone vegetation and the associated potential bushfire event itself. The term 'bushfire' is being applied as the common term for forest, scrub, shrub, and grass fire events.
Hazard - Urban Fire	1. Susceptibility of a material to burn. 2. The presence of combustible materials. 3. A process or activity posing a fire risk if not adequately controlled. *(Source: AIDR Knowledge Hub; Glossary)*
Hazardous Material	A substance or material which has been determined by an appropriate authority to be capable of posing an unreasonable risk to health, safety and property. *(Source: AIDR Knowledge Hub; Glossary)*
Impact	Describes as a quantitative or qualitative measure, the relative potential ability of a threat to adversely affect an exposed element or of a protection measure to reduce threat, exposure or vulnerability levels and consequently, risk levels.
Likelihood	Chance of something happening. The likelihood level reflects the probability of both the emergency event and the estimated consequences occurring as a result of the event. *(Source: AIDR NERAG, 2020)* In risk management terminology, the word 'likelihood' is used to refer to the chance of something happening, whether defined, measured or determined objectively or subjectively, qualitatively or quantitatively, and described using general terms or mathematically - such as a probability or a frequency over a given time period. *(Source: ISO Guide 73:2009)*

	The chance of an event occurring. Likelihood may be represented as a statistical probability (such as Annual Exceedance Probability), or where this is not possible, it can be represented qualitatively using such measures as 'likely', 'possible', and 'rare'. *(Source: PIA, 2015).*
Mitigation	The lessening or minimizing of the adverse impacts of a hazardous event. The adverse impacts of hazards, in particular natural hazards, often cannot be prevented fully, but their scale or severity can be substantially lessened by various strategies and actions. Mitigation measures include engineering techniques and hazard-resistant construction as well as improved environmental and social policies and public awareness. *(Source: UNDRR, 2017)*
Reliability	Refers to the expected reliability of a designed solution (protection measure). Over time it will be a function of: • Its Initial likely reliability; • Its durability which may or may not be a function of maintenance; • The level of maintenance required; • The likelihood of solution being modified over time; and • The influence of other adjoining/adjacent structures or stored materials that may be installed after the initial construction. (Adapted from Kelly M. et al; *Structural Design Options for Residential Buildings in Bushfire Areas,* Australasian Structural Engineering Conference November 2016)
Resilience	The ability of a system, community or society exposed to hazards to resist, absorb, accommodate, adapt to, transform and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions through risk management. (*United Nations Office for Disaster Risk Reduction, 2017)* Is that property of a building, system, or community that facilitates its return to a functional state following an overload. In the context of bushfire damage, resilience will be maximised when: • There is a high probability of an attacked building remaining fit for purpose; and • There is a low time and cost to make badly damaged buildings fit for purpose. (Adapted from Kelly M. et al; *Structural Design Options for Residential Buildings in Bushfire Areas,* Australasian Structural Engineering Conference November 2016)
Robustness	Refers to that property of structural systems that seeks to achieve proportionality of damage to the severity of an overloading event. It will be maximised when bushfire design solutions: • Have few 'weak links' that allow progressive spread of damage from minor sources; • Consist of materials and assemblies that retain physical properties when thermally loaded beyond their design capacity; and • Include protection of inherently vulnerable and brittle elements. Such as openings to internal parts of structures (including doors and windows) and essential services that maintain required functioning (e.g. cabling and plumbing). (Adapted from Kelly M. et al; *Structural Design Options for Residential Buildings in Bushfire Areas,* Australasian Structural Engineering Conference November 2016) As a design principle it means that the design and materials are not easily damaged or compromised, and do not require manual operation or intervention to work (Source: State Government of Queensland, CSIRO, 2020)

Redundancy	Refers to design that ensures the fate of the subject building/structure is not reliant on the effective performance of a single element. (State Government of Queensland, CSIRO, 2020) An example is a roof system that does not rely solely on the roof cladding to resist bushfire threats. It has additional layers of resistance including non-combustible roof/ceiling framing, insulation and ceiling lining, and the sealing/screening of gaps into internal operating spaces.
Risk	Disaster risk is the potential loss of life, injury, or destroyed or damaged assets which could occur to a system, society or a community in a specific period of time, determined probabilistically as a function of hazard, exposure, vulnerability and capacity. *(Source: UNDRR, 2017)* Disaster risk is a product of a hazard (a sudden event or shock), exposure (the people and things in the path of potential hazards), vulnerability (the potential for those people and things to be adversely impacted by a hazard) and the capacity (the ability for those people and assets and systems to survive and adapt). *(Source: AIDR LUPDRC, 2020)* Risk is the chance of something happening that will have an impact upon objectives. It is measured in terms of consequences and likelihood. In emergency management it is a concept used to describe the likelihood of harmful consequences arising from the interaction of hazards, communities and the environment. *(Source: PIA, 2015)*
Risk Management	Disaster risk management is the application of disaster risk reduction policies and strategies to prevent new disaster risk, reduce existing disaster risk and manage residual risk, contributing to the strengthening of resilience and reduction of disaster losses. *(Source: UNDRR, 2017)* Coordinated activities of an organisation or a government to direct and control risk. The risk management process includes the activities of: • Communication and consultation; • Establishing the context; • Risk Assessment (risk identification, risk analysis, risk evaluation); • Risk Treatment; and • Monitoring and Review. *(Source: AIDR NERAG, 2020)* Risk management vs. risk mitigation: Though risk management and risk mitigation are often used interchangeably, the two terms refer to slightly different things. Risk mitigation involves limiting the effect that risks can have (i.e. making less severe). It is a single component of the larger risk management process. Risk management refers to the overall practice of assessing and addressing the relevant risk. (*an explanation of the use of these terms as applied by Bushfire Prone Planning*)
Risk Identification	Process of finding, recognising and describing sources of risks, their causes and their potential consequences. *(Source: ISO Guide 73:2009)* It is a process used to find, recognise, and describe the risks that could affect the achievement of objectives. *(Source: Praxiom)*
Risk Source	An element which, alone or in combination, has the intrinsic potential to give rise to risk. *(Source: ISO Guide 73:2009)*
Risk Assessment	Disaster risk assessment is a qualitative or quantitative approach to determine the nature and extent of disaster risk by analysing potential hazards and evaluating existing conditions of exposure and vulnerability that together could harm people property, services and livelihoods and the environment on which they depend. Assessments include the identification of hazards; a review of the technical characteristics of hazards such as their location, intensity, frequency, and probability; the analysis of exposure and

	vulnerability, including the physical, social, health, environmental and economic dimensions; and the evaluation of the effectiveness of prevailing and alternative coping capacities with respect to likely risk scenarios. *(Source: UNDRR, 2017)* The overall process of risk identification, risk analysis and risk evaluation. *(Source: ISO Guide 73:2009)*
Risk Analysis	The process to comprehend the nature of risk and determine the level of risk. Provides the basis for risk evaluation and decisions about risk treatment. *(Source: ISO Guide 73:2009)* Is a process that is used to understand the nature, sources, and causes of the risks that you have identified and to estimate the level of risk. It is also used to study impacts and consequences and to examine the controls that currently exist. How detailed your risk analysis ought to be will depend upon the risk, the purpose of the analysis, the information you have, and the resources available. *(Source: Praxiom)* In this risk assessment report, risk analysis is the part of the risk assessment process that assesses the hazard threat levels, identifies the protection measures (and their effectiveness) that can be applied and derives the levels of exposure and vulnerability of the identified elements at risk, based on the ability to apply protection measures. From this information indicative risk levels can be derived. Where relevant sets of risk factor criteria and a risk level matrix have been established by the relevant authorities, a determined risk level can be derived. The required risk level analysis can be conducted for either each exposed element separately and/or the proposed or existing development/use overall.
Risk Evaluation	The process used to determine risk management priorities by evaluating and comparing the level of risk against predetermined standards, target risk levels or other criteria. *(Source: PIA, 2015)* In this risk assessment report, it is the process of classifying the acceptability of the levels of risk, derived from the risk analysis, by reference to an established risk tolerance scale. The relevant tolerance scale will be that derived from the application of the 'as low as reasonably practicable' principle – 'ALARP' (refer to Appendix 1 for further information). This process can only be conducted when determined risk levels have been derived.
Risk Factor Criteria	In this risk assessment report, the risk factor criteria establish the parameters that will define the different hazard threat levels, the different levels of exposure of elements at risk and the different levels of vulnerability of elements at risk. Different sets of risk factor criteria can exist corresponding to different development types, uses and scale. They are applied as part of the risk analysis. These criteria are established by the relevant authorities as they must reflect societies preparedness to tolerate risk and be determined by those authorities exercising their responsibilities.
Risk Level Matrix	In this risk assessment report, the risk level matrix establishes how the assessed levels of hazard threats, exposure and vulnerability are to be analysed in deriving a determined risk level. It is applied as part of the risk analysis. The matrix is established by the relevant authorities as they must reflect societies preparedness to tolerate risk and be determined by those authorities exercising their responsibilities.
Risk Tolerance Scale	In this risk assessment report the applied risk tolerance scale defines the acceptability of determined risk levels based on the 'as low as reasonably practical' principle (ALARP). The risk tolerance scale can be applied within the risk assessment report when the required risk factor criteria and risk level matrix are available.

Risk - Inherent	In this risk assessment report, inherent risk is considered to be current risk after accounting for existing and any 'planned' protection measures (controls / risk treatments) but before the application of any additional protection measures that have been identified and recommended by the bushfire consultant – and which subsequently determines the residual risk (this approach is supported by the relevant information sourced from the two references below). 'Planned' protection measures are those that are incorporated into the site development plans and those that exist in an approved Bushfire Management Plan (BMP) and/or Bushfire Emergency Plan (BEP) and for which a responsibility for their implementation has been created. If a BMP or BEP is yet to be developed or is being developed concurrently, the additional protection measures it contains (including any that are part of relevant 'acceptable solutions' established by the 'Guidelines for planning in bushfire prone areas', DPLH as amended), are considered to be additionally recommended protection measures. 1. *Source: www.fairinstitute.org* *"Confusion exists between Inherent Risk and Residual Risk … Here are the standard definitions of the two concepts:* • *Inherent risk represents the amount of risk that exists in the absence of controls.* • *Residual risk is the amount of risk that remains after controls are accounted for.* *Sounds straightforward. But these two terms seem to fall apart when put into practice. Applying the above definitions to the clients' scenario uncovered the fact that the 'inherent' risk being described was not a 'no controls' environment, but rather, one that only excluded some controls.* *The flaw with inherent risk is that in most cases, when used in practice, it does not explicitly consider which controls are being included or excluded. A truly inherent risk state, in our example, would assume no employee background checks or interviews are conducted and that no locks exist on any doors. This could lead to almost any risk scenario being evaluated as inherently high. Treating inherent risk therefore can be quite arbitrary. According to Jack Jones, author of Measuring and Managing Information Risk: A FAIR Approach and creator of the FAIR model, much more realistic and useful definitions would be:* • *Inherent risk is current risk level given the existing set of controls rather than the hypothetical notion of an absence of any controls; and* • *Residual risk would then be whatever risk level remain after additional controls are applied."* 2. *Source: Wikipedia:* *Inherent risk, in risk management is:* • *an assessed level of raw or untreated risk; that is, the natural level of risk inherent in a process or activity without doing anything to reduce the likelihood or mitigate the severity of a mishap, or the amount of risk before the application of the risk reduction effects of controls; or* • *Another definition is that inherent risk is the current risk level given the existing set of controls, which may be incomplete or less than ideal, rather than an absence of any controls.*
Risk - Residual	In this risk assessment report, residual risk is that which remains after the application of protection measures that are additional to those that already exist or are 'planned' and that establish the inherent risk (see Risk – Inherent in glossary) It is the disaster risk that remains in unmanaged form, even when effective disaster risk reduction measures are in place, and for which emergency response and recovery

	capacities must be maintained. The presence of residual risk implies a continuing need to develop and support effective capacities for emergency services, preparedness, response and recovery, together with socioeconomic policies such as safety nets and risk transfer mechanisms, as part of a holistic approach. *(Source: UNDRR, 2017)* It is the risk left over after you've implemented a risk treatment option. It's the risk remaining after you've reduced the risk, removed the source of the risk, modified the consequences, changed the probabilities, transferred the risk, or retained the risk. *(Source: Praxiom)* It is the risk remaining after any risk treatment has been applied to reduce its potential likelihood and/or its potential consequences. Residual risk can also be any risk that is chosen to be retained rather than treated *(Source: AIDR* LUPDRC*, 2020)* Residual risk can contain unidentified risk. Residual risk can also be known as retained risk. *(Source: ISO Guide 73:2009)*
Risk Level - Determined	Magnitude of a risk or a combination of risks. In this risk assessment report, as an outcome of the risk analysis, a determined risk level is derived from: 1. The determination of threat, exposure and vulnerability levels by reference to an established set of risk factor criteria that corresponds to each risk level (for each factor); and 2. The determination of the risk level by reference to an established risk level matrix that incorporates threat, exposure and vulnerability levels.
Risk Level - Indicative	Magnitude of a risk or a combination of risks. In this risk assessment report, as an outcome of the risk analysis, an indicative risk level is derived from analysis of the number of bushfire protection measures able to be implemented compared to the number of measures available, and the relative effectiveness of each at reducing threat, exposure and/or vulnerability levels. Overall, more applicable and applied measures is better and the measures with a higher effectiveness rating have greater weighting in the analysis.
Risk - Acceptable	Risks that do not need further treatment. The expression acceptable level of risk refers to the level at which it is decided that further restricting or otherwise altering the activity is not worthwhile e.g. additional effort will not result in significant reductions in risk levels. *(Source: DPLH, 2019)* That level of risk that is sufficiently low that society is comfortable with it. Society does not generally consider expenditure in further reducing such risks justifiable. *(Source: AIDR Knowledge Hub)* An acceptable risk is a risk that is sufficiently low to require no new treatments or actions to reduce the risk as communities can live with this level of risk without further action. *(Source: Queensland Government 2019: Natural hazards, risk and resilience – Bushfire: State Planning Policy – state interest guidance material)* Acceptable risk or tolerable risk is an important sub-term (of disaster risk). The extent to which a disaster risk is deemed acceptable or tolerable depends on existing social, economic, political, cultural, technical and environmental conditions. *(Source: UNDRR, 2017)* *Note: It is generally accepted that nothing can be absolutely free of risk, everything under some circumstance can cause harm. There are differing levels of risk and consequently levels of safety. In practice, attaining zero risk is not possible. Nevertheless, after risk avoidance, reduction/mitigation, transfer or acceptance - the residual risk may be determined as acceptable, as judged by the participants in an activity and decision makers (who apply societies expectations). For certain land uses, the residual risk may exist at higher levels but still be judged by to be acceptable (or tolerable) on this basis.*

Risk - Tolerable	The willingness to live with a risk to secure benefits and achieve objectives, on the understanding that it is being properly controlled. 'Tolerability' does not mean 'acceptability'. Tolerating a risk does not mean that it is regarded as negligible, or something we may ignore, but rather as something that needs to be kept under review and reduced further. *(Source: DPLH, Guidelines v1.4)* Certain levels of risk may be tolerated, provided that the risks are known and managed. *(Source: AIDR LUPDRC, 2020)* A tolerable risk is a risk that is low enough to allow the exposure to a natural hazard to continue while at the same time high enough to require new treatments or actions to reduce risk. Communities can live with level of risk but as much as is reasonably practical should be done to further reduce the risk. *(Source: Queensland Government 2019: Natural hazards, risk and resilience – Bushfire: State Planning Policy – state interest guidance material)* Risk tolerance is defined as the organisations or stakeholder's readiness to bear the risk, after risk treatment, in order to achieve its objectives. Risk tolerance can be influenced by legal or regulatory requirements. *(Source: ISO Guide 73:2009)* A level of risk that defines the ALARP region, as risks that should be driven to the broadly acceptable region. *(Source: PIA, 2015)*
Risk - Intolerable	A level of risk that is so high that require risk treatment measures whatever their cost, or the elimination of the risk. *(Source: PIA, 2015)* Risk that is unacceptable in any circumstances or at any level. *(Source: DPLH, 2019)*
Risk Treatment	Risk treatment options available as part of the risk management process are generally categorised as follows: • Risk Avoidance: Measures taken to avoid risks from natural hazards. Can include avoiding development in hazardous areas, relocating people or assets away from hazardous areas, or developing buffer zones to the hazard; • Risk reduction/mitigation: Measures undertaken to reduce the risks from natural hazards. Includes building control and development controls; • Risk Transfer: Measures taken to transfer the risk from natural hazards from one party to another; and • Risk Acceptance: The acceptance of risk from a natural hazard. Any realised losses will be borne by those parties exposed to the hazard. This is not specifically a treatment option as no action is taken, but it is an option for addressing risk. *(Source: AIDR LUPDRC, 2020)*
Retrofitting	Reinforcement or upgrading of existing structures to become more resistant and resilient to the damaging effects of hazards. Retrofitting requires consideration of the design and function of the structure, the stresses that the structure may be subject to from particular hazards or hazard scenarios and the practicality and costs of different retrofitting options. *(Source: UNDRR, 2017)*
Structural and Non-Structural Measures	Structural measures are any physical construction to reduce or avoid possible impacts of hazards, or the application of engineering techniques or technology to achieve hazard resistance and resilience in structures or systems. Non-structural measures are measures not involving physical construction which use knowledge, practice or agreement to reduce disaster risks and impacts, in particular through policies and laws, public awareness raising, training and education.

	Common non-structural measures include building codes, land-use planning laws and their enforcement, research and assessment, information resources and public awareness programmes. *(Source: UNDRR, 2017)*
Threats	The mechanisms by which hazards can impact exposed elements.
Vulnerability	The conditions determined by physical, social, economic and environmental factors or processes which increase the susceptibility of an individual, a community, assets or systems to the impacts of hazards. (*United Nations Office for Disaster Risk Reduction, 2017)* The characteristic or property of a community, system or object that makes it susceptible to the damaging effects of a specific hazard. Can be defined according to the responses of people, houses and assets in mitigating the impacts of a hazard. Specifically, it refers to the extent to which a community, building, services or location is likely to be damaged or disrupted by the impacts of a hazard, such as a bushfire. Building vulnerability refers to weak points in a building caused by its design, construction, use of materials and management (including maintenance). These weak points are identified in the context that they are not able to withstand the level of hazard they are exposed to. Climate and weather may directly influence the buildings vulnerability through several processes including (i) moisture content of combustible elements around and within buildings (ii) gaps between materials that may shrink and expand due to changes in moisture content and temperature (iii) wind action causing damage or dislocation of elements. *(Source: State Government of Queensland, CSIRO, 2020; Bushfire Resilient Building Guidance for Queensland Homes)*
'Vulnerable' Persons	These are persons who are considered to be at-risk members of the community and may be more susceptible to the impacts of bushfire. These persons are likely to present relocation (including evacuation) challenges in the event of a bushfire. Attributes of this group of persons includes: • Less physically or mentally able to relocate themselves; and/or • Are unfamiliar with their surroundings; and/or • Large numbers of persons in a building(s) or in the open, on a single site, such that the numbers present practical challenges.

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Bushfire management plan/Statement addressing the Bushfire Protection Criteria coversheet

Site address: Lot 9500 320 Gull Road Keralup

Site visit: Yes ☑ No ☐

Date of site visit (if applicable): Day 15 Month 09 Year 2022

Report author or reviewer: Kathy Nastov

WA BPAD accreditation level (please circle):

Not accredited ☐ Level 1 BAL assessor ☐ Level 2 practitioner ☐ Level 3 practitioner ☑

If accredited please provide the following.

BPAD accreditation number: 27794 Accreditation expiry: Month August Year 2024

Bushfire management plan version number: 1.2

Bushfire management plan date: Day 15 Month December Year 2023

Client/business name: C-Wise

	Yes	No
Has the BAL been calculated by a method other than method 1 as outlined in AS3959 (tick no if AS3959 method 1 has been used to calculate the BAL)?		✔
Have any of the bushfire protection criteria elements been addressed through the use of a performance principle (tick no if only acceptable solutions have been used to address all of the bushfire protection criteria elements)?		✔

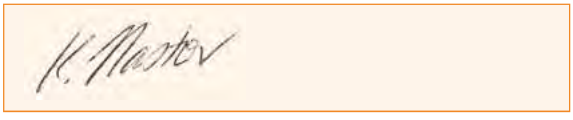
Is the proposal any of the following (see SPP 3.7 for definitions)?	Yes	No
Unavoidable development (in BAL-40 or BAL-FZ)		✔
Strategic planning proposal (including rezoning applications)		✔
High risk land-use	✔	
Vulnerable land-use	✔	

None of the above ☐

Note: Only if one (or more) of the above answers in the tables is yes should the decision maker (e.g. local government or the WAPC) refer the proposal to DFES for comment.

Why has it been given one of the above listed classifications (E.g. Considered vulnerable land-use as the development is for accommodation of the elderly, etc.)?

The information provided within this bushfire management plan to the best of my knowledge is true and correct:

Signature of report author or reviewer 

Date 15/12/2023

FOGO Facility Keralup

Bushfire Management Plan (BMP)

Produced to meet the relevant requirements of STATE PLANNING POLICY 3.7 Planning in Bushfire Prone Areas & Guidelines

320 Gull Road, Keralup

Shire of Murray

Development Application

15 December 2023

Job Reference No: 220666

BPP GROUP PTY LTD T/A BUSHFIRE PRONE PLANNING

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1.3	Additional recommendations	15 December 2023

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		1.2	1	☐	☒
		1.3	1	☐	☒

Limitations: The protection measures that will be implemented based on information presented in this Bushfire Management Plan are minimum requirements and they do not guarantee that buildings or infrastructure will not be damaged in a bushfire, persons injured, or fatalities occur either on the subject site or off the site while evacuating.

This is substantially due to the unpredictable nature and behaviour of fire and fire weather conditions. Additionally, the correct implementation of the required protection measures (including bushfire resistant construction) and any other required or recommended measures, will depend upon, among other things, the ongoing actions of the landowners and/or operators over which Bushfire Prone Planning has no control.

All surveys, forecasts, projections and recommendations made in this report associated with the proposed development are made in good faith based on information available to Bushfire Prone Planning at the time. All maps included herein are indicative in nature and are not to be used for accurate calculations.

Notwithstanding anything contained therein, Bushfire Prone Planning will not, except as the law may require, be liable for any loss or other consequences whether or not due to the negligence of their consultants, their servants or agents, arising out of the services provided by their consultants.

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EXECUTIVE SUMMARY

In July of 2022 Bushfire Prone Planning were commissioned by Talis Consulting (on behalf of C-Wise) to undertake a Bushfire Management Plan for the proposed FOGO Facility located at Lot 9500 320 Gull Road Keralup. A site visit was conducted in September 2022. During the assessment photos of the vegetation surrounding the development were photographed and then classified in accordance with AS3959:2018. The vegetation and their distances to the building determine the BAL (Bushfire Attack Level) rating which inform the developers what building materials to use. The development was also assessed against 5 elements of bushfire protection criteria in the Guidelines for Planning in Bushfire Prone Areas (Version 1.4). These are Location, Siting and Design, Vehicular Access Water and Vulnerable Land Use

The vegetation immediately surrounding the lot was found to be predominantly scrub and grassland. This will be managed to a low threat state in perpetuity. Nearby wetland vegetation has received a buffer and will be allowed to revegetate within it. The office near the weighbridge has been given an indicative BAL-29 rating. The workshop has been given an indicative rating of BAL-19. Note these are indicative ratings and lower BAL ratings (such as BAL12.5) can be achieved with the appropriate management of the surrounding vegetation. Lower BAL ratings can only be given during the compliance check prior to the construction of any buildings. A tension fabric roof cover can be installed on the plant, but it cannot be within 6m of a habitable building.

During this assessment it was found that the development would be non-compliant with Vehicular Access. Due to site constraints the nearest two-way access road is 4km from the lot boundary. This is longer than the maximum distance of 200m set by the Guidelines. An acceptable solution of an onsite shelter was proposed. The onsite shelter will be integrated into the crib room and office area. In the event of a bushfire where early evacuation is not possible the onsite shelter can be used to house up to 65 people. This building can only be subject to 10kW/m^2 and a larger asset protection zone will be installed around it. It will be constructed using NASH Standard to BAL-29. A 10kW/m^2 buffer around all buildings has been recommended by this report and the subsequent risk report.

The BMP also established the need for water tanks exclusive for firefighting to be installed on site. The proposed private driveways will be two-way and complaint with public road standards. They will need to be slashed to 3m as required on road verges.

Due to the land use being classed as "Vulnerable", it was also determined that a Bushfire Emergency Plan and a Bushfire Risk Management Plan be developed to be used in conjunction with this report.

SUMMARY STATEMENTS

THIS DOCUMENT – STATEMENT OF PURPOSE

The Bushfire Management Plan (BMP)

The BMP sets out the required package of bushfire protection measures to lessen the risks associated with a bushfire event. It establishes the responsibilities to implement and maintain these measures.

The BMP also identifies the potential for any negative impact on any environmental, biodiversity and conservation values that may result from the application of bushfire protection measures or that may limit their implementation.

Risks Associated with Bushfire Events

The relevant risks are the potential for loss of life, injury, or destroyed or damaged assets which results in personal loss and economic loss. For a given site, the level of that risk to persons and assets (the exposed elements) is a function of the potential threat levels generated by the bushfire hazard, and the level of exposure and vulnerability of the at risk elements to the threats.

Bushfire Protection Measures

The required package of protection measures is established by *State Planning Policy 3.7 Planning in Bushfire Prone Areas (SPP 3.7),* its associated *Guidelines* and any other relevant guidelines or position statements published by the Department of Planning, Lands and Heritage. These measures are limited to those considered by the WA planning authorities as necessary to be addressed for the purpose of land use planning. They do not encompass all available bushfire protection measures as many are not directly relevant to the planning approval stage. For example:

- Protection measures to reduce the vulnerability of buildings to bushfire threats is primarily dealt with at the building application stage. They are implemented through the process of applying the Building Code of Australia (Volumes 1 and 2 of the national Construction Code) in accordance with WA building legislation and the application of construction requirements based on a building's level of exposure - determined as a Bushfire Attack Level (BAL) rating); or
- Protection measures to reduce the threat levels of consequential fire (ignited by bushfire and involving combustible materials surrounding and within buildings) and measures to reduce the exposure and vulnerability of elements at risk exposed to consequential fire, are not specifically considered.

The package of required bushfire protection measures established by the Guidelines includes:

- The requirements of the bushfire protection criteria which consist of:
  - Element 1: Location (addresses threat levels).
  - Element 2: Siting and Design of Development (addresses exposure levels of buildings).
  - Element 3: Vehicular Access (addresses exposure and vulnerability levels of persons).
  - Element 4: Water (addresses vulnerability levels of buildings).
  - Element 5: Vulnerable Tourism Land Uses (addresses exposure and vulnerability as per Elements 1-4 but in use specific ways and with additional considerations of persons exposure and vulnerability).
- The requirement to develop Bushfire Emergency Plans / Information for 'vulnerable' land uses for persons to prepare, respond and recover from a bushfire event (this addresses vulnerability levels).
- The requirement to assess bushfire risk and incorporate relevant protection measures into the site emergency plans for 'high risk' land uses (this addresses threat, exposure and vulnerability levels).

Compliance of the Proposed Development or Use with SPP 3.7 Requirements

The BMP assesses the capacity of the proposed development or use to implement and maintain the required 'acceptable' solutions and any additionally recommended bushfire protection measures - or its capacity to satisfy the policy intent through the justified application of additional bushfire protection measures as supportable 'alternative' solutions.

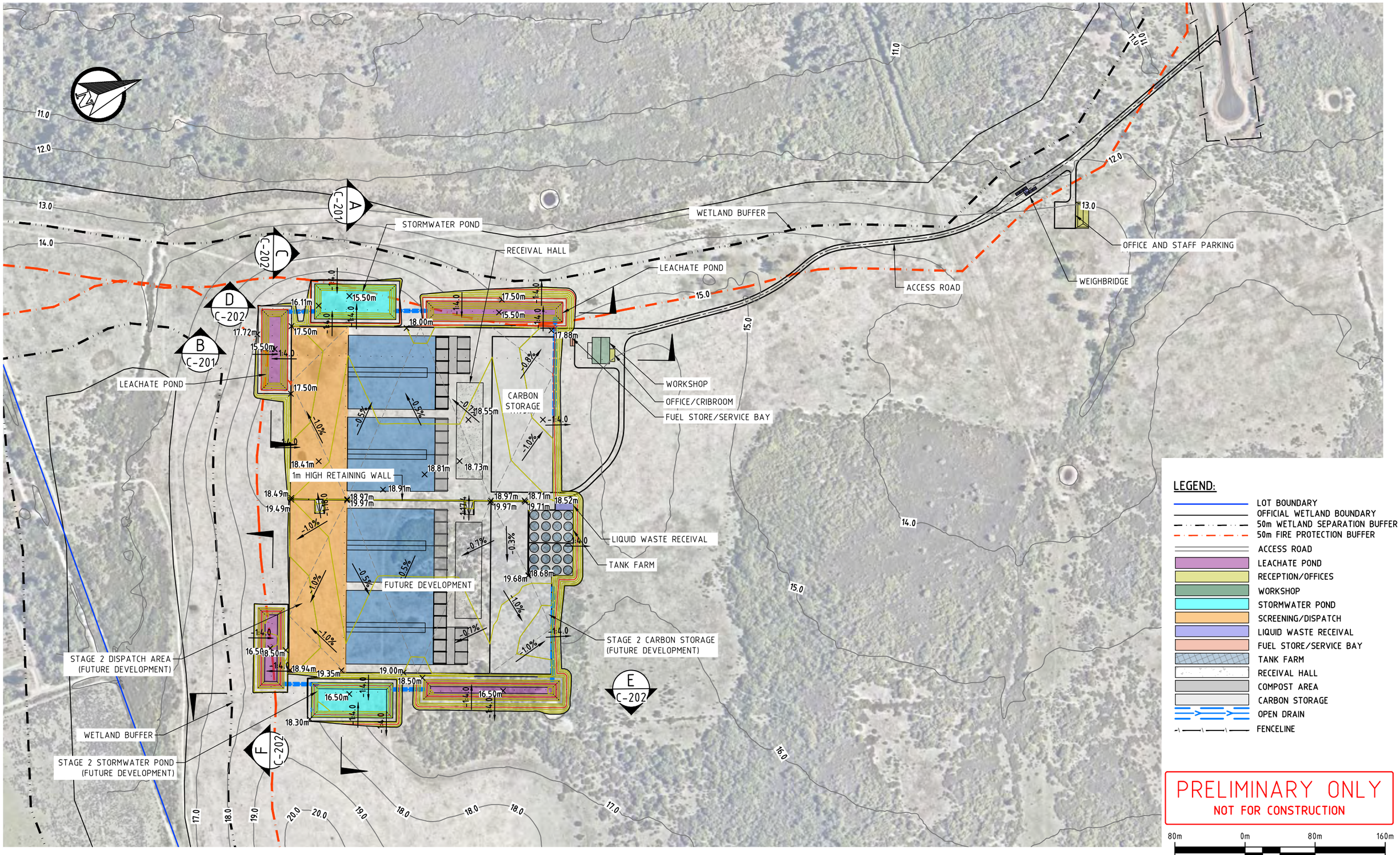
THE PROPOSED DEVELOPMENT/USE – BUSHFIRE PLANNING COMPLIANCE SUMMARY		
Environmental Considerations		Assessment Outcome
Will land with identified environmental, biodiversity and conservation values limit the full application of the required bushfire protection measures?		No
Will land with identified environmental, biodiversity and conservation values need to be managed in the implementation and maintenance of the bushfire protection measures - but not limit their application?		No
Required Bushfire Protection Measures The Acceptable Solutions of the Bushfire Protection Criteria (Guidelines)		Assessment Outcome
Element	The Acceptable Solutions	
1: Location	A1.1 Development location	Fully Compliant
2: Siting and Design of Development	A2.1 Asset Protection Zone (APZ)	Fully Compliant
3: Vehicular Access	A3.1 Public roads	Fully Compliant
	A3.2a Multiple access routes	Not Compliant
	A3.2b Emergency access way	N/A
	A3.3 Through-roads	Partly Compliant
	A3.4a Perimeter roads	N/A
	A3.4b Fire service access route	N/A
	A3.5 Battle-axe legs	N/A
	A3.6 Private driveways	Fully Compliant
4: Water	A4.1 Identification of future water supply	N/A
	A4.2 Provision of water for firefighting purposes	Fully Compliant
5: Vulnerable Tourism Land Uses		
Day Uses	A5.13a Siting and design – APZ	Fully Compliant
	A5.13b Siting and design – onsite shelter – pedestrian paths	N/A
	A5.13c Siting and design – onsite shelter – exposure to hazard	Fully Compliant
	A5.13d Siting and design – onsite shelter – construction requirements.	Fully Compliant
	A5.14a Vehicular access – multiple access routes	Not Compliant

	A5.14b Vehicular access – no-through roads – maximum length	N/A
	A5.14c Vehicular access – EAW – alternative access option	N/A
	A514d Vehicular access – access limitations - onsite shelter option	Fully Compliant
	A5.14e Vehicular access – public roads - technical requirements	Fully Compliant
	A5.14f Vehicular access – internal access/private driveway – tech. req.	Partly Compliant
	A5.14g Vehicular access – internal access/private driveway - availability	Fully Compliant
	A5.14h Vehicular access – signage	Fully Compliant
	A5.15a Provision of water – reticulated	N/A
	A5.15b Provision of water – non-reticulated – tank capacity	Fully Compliant
	A5.15c Provision of water – non-reticulated technical requirements	Fully Compliant
Other 'Bushfire Planning' Documents to Be Produced This necessity for additional documents is determined by the proposed development/use type and the requirements established by SPP 3.7 and the associated Guidelines (as amended). They may be produced concurrently or subsequent to the BMP. Relevant actions will be identified within Section 6 'Responsibilities for Implementation of Bushfire Protection Measures.		Required
Bushfire Emergency Plan: An operational document presenting prevent, prepare, respond and recover procedures and associated actions. As necessary, supporting information to justify determinations is included.		Yes
Summary Statement: Due to the type of facility and its remote location a BEP will be required.		
Bushfire Emergency Information (Poster): As a concise response information poster for certain vulnerable land uses.		Yes
Summary Statement: A Bushfire Emergency Poster will be created as part of the Bushfire Emergency Plan and will be required to be displayed on site.		
Bushfire Emergency Information (Content): As content for inclusion into the Site's Emergency Plan for certain high risk land uses:		Yes
Bushfire Risk Assessment and Management Report:		Yes
Summary Statement: The proposed development is considered a 'high-risk' land use as defined by SPP 3.7 and its associated Guidelines. This triggers the requirement, through the development of a Risk Assessment and Management Report to: • Identify the level of exposure and vulnerability of any onsite stored materials and liquids to bushfire attack mechanisms (threats); • Identify any potential source of ignition threat the use may present to adjoining and/or adjacent bushfire prone vegetation; and • Recommend protection measures that can be incorporated into the site operations emergency plan as necessary. The requirement for this report to be developed and any variation to content, can be decided by the planning approval decision maker (e.g., the local government). Otherwise, SPP 3.7 states it 'should' be produced.		

1 PROPOSAL DETAILS AND THE BUSHFIRE MANAGEMENT PLAN

1.1 The Proposed Development/Use Details, Plans and Maps

The **Proposal's** Planning Stage For which certain bushfire planning documents are required to accompany the planning application.		Development Application	
The Subject Land/Site		Lot 9500 on Plan 414516	
Total Area of Subject Lot/Site		1608.903 hectares	
Number of Additional Lots Created		N/A	
Primary Proposed Construction	Type(s)	Waste management	
	NCC Classification	Class 8 (factory/workshop/laboratory)	Class 5 (office building - professionals)
The 'Specific' Land Use Type for Bushfire Planning When applicable, this classification establishes a requirement to conduct assessments and develop documents that are additional to this Bushfire Management Plan.		Facility: High-Risk Land Use Additional consideration: Vulnerable Tourism Land Use	
Factors Determining the 'Specific Bushfire Planning' Land Use Type		The land use will store combustible materials and/or flammable hazardous materials onsite that may be exposed and vulnerable to ignition from the direct attack mechanisms of bushfire (flame contact, radiant heat and embers). Business operations/activities may include those that are a potential source of ignition for onsite or offsite combustible/flammable materials, including bushfire prone vegetation.	
Additional **Factors Determining the 'Specific'** Land Use Type		The proposed development is a land use that is categorised as a Day uses (Group Tours)	
Additional **Factors Determining the 'Specific' Land** Use Type		The proposed land use involves visitors who are unfamiliar with the surroundings and/or presents evacuation challenges. The proposal would benefit from a Bushfire Emergency Plan to manage the safety of occupants in a bushfire event.	
Description of the Proposed Development/Use			
Proposed Food Organics and Garden Organics (FOGO) Facility including provision for educational day tours/school groups.			



LEGEND:

- LOT BOUNDARY
- OFFICIAL WETLAND BOUNDARY
- 50m WETLAND SEPARATION BUFFER
- 50m FIRE PROTECTION BUFFER
- ACCESS ROAD
- LEACHATE POND
- RECEPTION/OFFICES
- WORKSHOP
- STORMWATER POND
- SCREENING/DISPATCH
- LIQUID WASTE RECEIVAL
- FUEL STORE/SERVICE BAY
- TANK FARM
- RECEIVAL HALL
- COMPOST AREA
- CARBON STORAGE
- OPEN DRAIN
- FENCELINE

PRELIMINARY ONLY
NOT FOR CONSTRUCTION

80m 0m 80m 160m

1:4000 @ A3

VERTICAL DATUM: AUSTRALIAN HEIGHT DATUM
HORIZONTAL DATUM: MGA 94 ZONE 50

talis consultants
ASSET
ENGINEERING
ENVIRONMENT
NOISE
SPATIAL
WASTE
PERTH
604 Newcastle Street Leederville WA 6007
PO Box 454 Leederville WA 6903
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Client: C-WISE Soil Carbon Solutions

NOTES

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2. DO NOT SCALE, use figured dimensions only, if in doubt please contact Talis Consultants.
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No.	Date	Drwn.	Chk.	Amendment / Issue	App.
D	16.01.2023	MH	AB	SITE LAYOUT UPDATED	MH
C	15.11.2022	AB	MH	BOUNDARIES UPDATED	MH
B	02.03.2022	YJ	AB	SECTIONS AND ISOPACHYTE LAYOUT ADDED	MH
A	15.11.2021	YJ	AB	PRELIMINARY ISSUE	MH

Project: C-WISE DUE DILIGENCE AND APPROVALS

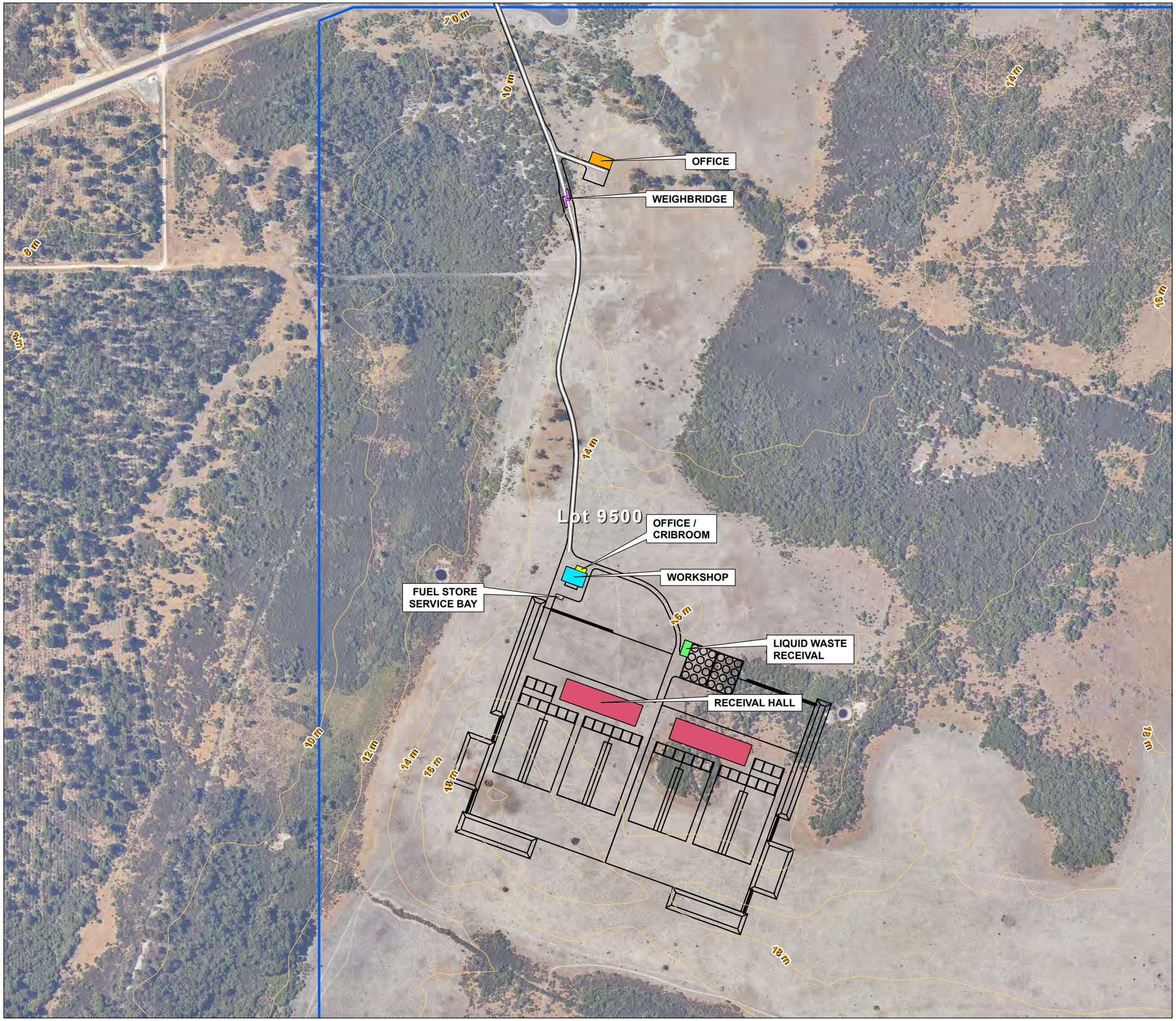
Title: SITE PLAN LAYOUT

Scale: 1:4000 @ A3 Date: 02.03.2022
Drawn: YJ Checked: AB Approved: MH
Job No: TW21124 Drg. No: C-101 Rev: D
Filename: TW21124-SET.DWG

Figure 1.2

Proposed Development

Lot 9500 on Plan 414516, Area : 1,608.9031 ha
320 Gull Road,
KERALUP 6182
SHIRE OF MURRAY



------ LEGEND ------

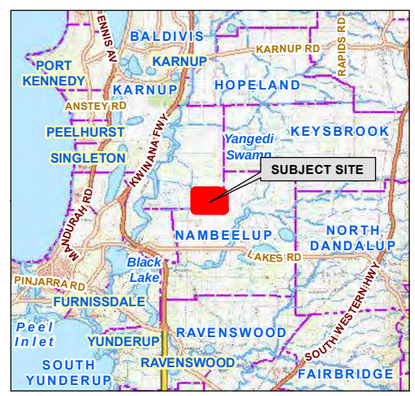
- Development Site
- Subject Site
- Other Lots
- Development

Description

- Office
- Office / Cribroom
- Workshop
- Receival Hall
- Weighbridge
- Liquid Waste Receival
- Fuel Store Service Bay
- Driveway

0 50 100 150 200 250
Metres

------ LOCALITY ------



Aerial Imagery : Landgate/SLIP
Image Date : Feb 2022

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator Units: Metre
Map compiled by: Ian Ross 13/10/2023
Map updated by: Ian 13/10/2023
A3 Scale 1:5,000

BUSHFIRE PRONE PLANNING

Map Document Path / Name: K:\Projects\Jobs 2022\220666 - 320 Gull Road Keralup (BMP)\Mapping\MXD\220666_Fig1-2_DEV_320 Gull Road Keralup.mxd

Figure 1.3

Location Plan

Lot 9500 on Plan 414516, Area : 1,608.9031 ha
320 Gull Road,
KERALUP 6182
SHIRE OF MURRAY

DEVELOPMENT SITE

Lot 9500

------ LEGEND ------

- Development Site
- Subject Site
- Development
- Future Development
- Locality / Suburb
- Career Fire & Rescue Service
- State Emergency Service Unit
- Volunteer Fire & Emergency Service Unit
- Volunteer Fire & Rescue Service
- Driveway

0 1 2 3
Kilometres

------ LOCALITY ------

Aerial Imagery : Landgate/SLIP
Image Date : Feb 2022

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator Units: Metre
Map compiled by: Ian Ross 13/11/2022
Map updated by: Ian 13/11/2022
A3 Scale 1:50,000

BUSHFIRE PRONE PLANNING

Map Document Path / Name: K:\Projects\Jobs 2022\220666 - 320 Gull Road Keralup (BMP)\Mapping\MXD\220666_Fig1-3_LOC_320 Gull Road Keralup.mxd

WHERE SPP 3.7 AND THE GUIDELINES ARE TO APPLY – DESIGNATED BUSHFIRE PRONE AREAS

All higher order strategic planning documents, strategic planning proposals, subdivisions and development applications located in designated bushfire prone areas need to address SPP 3.7 and its supporting Guidelines. This also applies where an area is not yet designated as bushfire prone but is proposed to be developed in a way that introduces a bushfire hazard.

For development applications where only part of a lot is designated as bushfire prone and the proposed development footprint is wholly outside of the designated area, the development application will not need to address SPP 3.7 or the Guidelines. (Guidelines DPLH 2021 v1.4, s1.2).

For subdivision applications, if all the proposed lots have a BAL-LOW indicated, a BMP is not required. (Guidelines DPLH 2021 v1.4, s5.3.1).

Figure 1.4

Bushfire Prone Area

Lot 9500 on Plan 414516, Area : 1,608.9031 ha
320 Gull Road,
KERALUP 6182
SHIRE OF MURRAY

Lot 9500

GULL RD

------ LEGEND ------

- Development Site
- Subject Site
- Other Lots
- Development

Description

- Office
- Office / Cribroom
- Workshop
- Receival Hall
- Weighbridge
- Liquid Waste Receival
- Fuel Store Service Bay
- Driveway

Bush Fire Prone Areas

- Bushfire Prone Areas (2021)

0 200 400 600 800 1,000
Metres

------ LOCALITY ------

Aerial Imagery : Landgate/SLIP
Image Date : Feb 2022

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator Units: Metre
Map compiled by: Ian Ross 13/10/2023
Map updated by: Ian 13/10/2023
A3 Scale 1:15,000

BUSHFIRE PRONE PLANNING

Map Document Path / Name: K:\Projects\Jobs 2022\220666 - 320 Gull Road Keralup (BMP)\Mapping\MXD\220666_Fig1-4_BPA_320 Gull Road Keralup.mxd

1.2 The Bushfire Management Plan (BMP)

1.2.1 Commissioning and Purpose

Landowner / proponent:	C-Wise
Bushfire Prone Planning commissioned to produce the BMP by:	Talis Consultants
Purpose of the BMP:	To apply the requirements established by State Planning Policy 3.7: Planning in Bushfire Prone Areas (SPP 3.7) and accompany the development application.
BMP to be submitted to:	Shire of Murray

1.2.2 Existing Documents with Implications for Development of this BMP

This section identifies any known assessments, reports or plans that have been conducted and prepared previously, or are being prepared concurrently, and are relevant to the subject site and the proposal/application. They potentially have implications for the assessment of bushfire threats and the implementation of the protection measures that are dealt with in the Bushfire Management Plan.

Table 1.4: Existing documents that may impact threat assessments and protection measure development.

EXISTING RELEVANT DOCUMENTS			
Existing Document	Relevant to the Proposal and the BMP	Copy Provided by Proponent / Developer	Title
Structure Plan	No	No	-
Bushfire Management Plan	No	No	-
Bushfire Emergency Plan or Information	Yes	N/A	-
Implications for the BMP: Bushfire Prone Planning to develop BEP for this site.			
Bushfire Risk – Assessment and Management Report	Yes	N/A	-
Implications for the BMP: Bushfire Prone Planning to develop Risk Report for this site.			
Environmental Asset or Vegetation Survey	Yes	Yes	Lot 9500 Gull Road Keralup -Flora, Vegetation and Fauna Survey (December 2021)
Implications for the BMP: Vegetation survey completed in 2021. No Threatened of Priority Flora were identified during the survey. (See Addendum)			
Landscaping (Revegetation) Plan	No	No	-
Implications for the BMP: N/A			
DPLH BMP Guidance 'Regions & Uses'	No	No	-
Implications for the BMP: N/A			

2 ENVIRONMENTAL CONSERVATION (DESKTOP ASSESSMENT)

Important: This 'desktop' assessment must not be considered as a replacement for a full Environmental Impact Assessment. It is a summary of potential environmental values at the subject site, inferred from information contained in listed datasets and/or reports, which are only current to the date of last modification.

These data sources must be considered indicative where the subject site has not previously received a site-specific environmental assessment by an appropriate professional.

Many bushfire prone areas also have high biodiversity values. Consideration of environmental priorities within the boundaries of the land being developed can avoid excessive or unnecessary modification or clearing of vegetation. Approval processes (and exemptions) apply at both Commonwealth and State levels.

Any 'modification' or 'clearing' of vegetation to reduce bushfire risk is considered 'clearing' under the *Environmental Protection Act 1986* (EP Act) and requires a clearing permit under the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* (Clearing Regulations) – unless for an exempt purpose.

Clearing native vegetation is an offence, unless done under a clearing permit or the clearing is for an exempt purpose. Exemptions are contained in the EP Act or are prescribed in the Clearing Regulations (note: these do not apply in environmentally sensitive areas).

The *Department of Water and Environmental Regulation* (DWER) is responsible for issuing 'clearing' permits and the framework for the regulation of clearing. Approvals under other legislation, from other agencies, may also be required, dependent on the type of flora or fauna present.

Local Planning Policy or Local Biodiversity Strategy: Natural areas that are not protected by the above Act and Regulation (or any other National or State Acts) may be protected by a local planning policy or local biodiversity strategy. Permission from the local government will be required for any modification or removal of native vegetation in these Local Natural Areas (LNA's). Refer to the relevant local government for detail.

For further Information refer to Guidelines v1.4, the Bushfire and Vegetation Factsheet - WAPC, Dec 2021 and https://www.der.wa.gov.au/our-work/clearing-permits

2.1 Existing Vegetation on Private Land

2.1.1 Declared Environmentally Sensitive Areas (ESA)

Table 2.1: Identification of relevant ESA.

IDENTIFICATION OF ESA							
ESA Class	Relevant to Proposal	Influence on Bushfire Threat Levels and / or Application of Bushfire Protection Measures	Relevant Dataset	Information Source(s) Applied to Identification of Relevant Vegetation			Further Action Required
				Dataset	Landowner or Developer	Environmental Asset or Vegetation Survey	
Wetlands and their 50m Buffer (Ramsar, conservation category and nationally important)	Yes	Yes-Significant	DBCA-010 and 011, 019, 040, 043, 044	☒	☐	☐	None
Bush Forever	No	No	DPLH-022, SPP 2.8	☒	☐	☐	None
Threatened and Priority Flora + 50m Continuous Buffer	No	No	DBCA-036	Restricted Scale of	☐	☐	None

Threatened Ecological Community	No	No	DBCA-038	Data Available (security)	☐	☐	None
Heritage Areas National / World	No	No	Relevant register or mapping	☒	☐	☐	None
Environmental Protection (Western Swamp Tortoise) Policy 2002	No	No	DWER-062	☒	☐	☐	None

DESCRIPTION OF THE IDENTIFIED ENVIRONMENTALLY SENSITIVE AREAS

A wetland exists to the east and south of the development. A wetland buffer has been applied to the development. Vegetation within the area has been classified as worst-case scenario in the Post Development Vegetation Map(Figure 3.1.1) and BAL Contour map (Figure 3.2)

2.2 Existing Vegetation on Public Land

Table 2.4: Identification of vegetation on public land with environmental, biodiversity and conservation values.

IDENTIFICATION OF PROTECTED VEGETATION ON PUBLIC LAND							
Land with Environmental, Biodiversity, Conservation and Social Values	Relevant to Proposal	Influence on Bushfire Threat Levels and / or Application of Bushfire Protection Measures	Relevant Dataset	Information Source(s) Applied to Identification of Relevant Vegetation			Further Action Required
				Dataset	Landowner or Developer	Environmental Asset or Vegetation Survey	
Legislated Lands (tenure includes national park/reserve, conservation park, crown reserve and state forest)	No	N/A	DBCA-011	☒	☐	☐	N/A
Conservation Covenants	No	N/A	DPIRD-023	Only Available to Govt.	☐	☐	N/A
National World Heritage Areas	No	No	-	☒	☐	☐	N/A
Designated Public Open Space	No	N/A	-	☒	☐	☐	N/A

2.3 Planned Landscaping and/or Re-vegetation

Table 2.5: Identification of land subject to planned vegetation modification.

AREAS OF LAND PLANNED FOR RE-VEGETATION OR LANDSCAPING			
Land with Environmental, Biodiversity, Conservation and Social Values	Relevant to Proposal	Planned Vegetation Modification	Description
Riparian Zones	No	N/A	
Foreshore Areas	No	N/A	
Wetland Buffers	Yes	Re-vegetate	Existing wetland vegetation to the east and south of the development allowed to naturally vegetate within the applied buffers (Figure 2.1). This is classified as worst case scenario (Class A Forest) in Figure 3.1.1.
Legislated Lands	No	N/A	
Public Open Space	No	N/A	
Road Verges	No	N/A	

2.4 Identified Requirement for Onsite Vegetation Modification or Removal

IDENTIFICATION OF POTENTIAL NATIVE VEGETATION MODIFICATION OR REMOVAL	
Has a requirement to modify or remove native vegetation to establish the required bushfire protection measures on the subject site been identified?	Yes
Comments: Modification and removal will be required around the FOGO plant to achieve an Asset Protection Zone of minimum BAL-29.	
Is evidence provided (from relevant agencies, the environmental or planning consultant and/or the local government), that the required modification or removal of the vegetation can be achieved?	Yes
Comments: Always consult with Local Government Authority prior to the removal of native vegetation.	

2.5 Implications for the Proposed Development and the BMP

Table 2.6: Consideration of the implications that identified protected areas of vegetation (i.e., those with environmental and subject to conservation) have for the development proposal and the BMP.

THE IMPLICATIONS FOR THE PROPOSED DEVELOPMENT (AND BMP) FROM THE IDENTIFIED **'PROTECTED' VEGETATION**	
The Determination of Bushfire Threat Levels and the Exposure of at Risk Elements	Relevant to the BMP
The ability to reduce the potential bushfire impact on the development through modification or removal of vegetation is limited due to the existence of 'protected' areas of vegetation.	No
The planned development will result in additional areas of bushfire prone vegetation (due to re-vegetation and/or landscaping) that will support fire and that may impact the development. This vegetation has been accounted for within the BMP.	No
The Application of Design and/or Construction Responses to Limit Vegetation Modification or Removal	Relevant to the BMP
Modify the development location to reduce exposure by increasing separation distance.	Not required
Redesign development, structure plan or subdivision.	Not required
Reduction of lot yield where this can increase available separation distances.	Not required
Cluster development to limit modification or removal of vegetation.	Not required
Construct building(s) to the requirements corresponding to higher BAL ratings to reduce required separation distances.	Not required

Figure 2.1

Environmental Considerations

Lot 9500 on Plan 414516, Area : 1,608.9031 ha
320 Gull Road,
KERALUP 6182
SHIRE OF MURRAY

Lot 9500

GULL RD

------ LEGEND ------

- Development Site
- Subject Site
- Other Lots
- Development
- 50m Wetland Buffer

Description

- Office
- Office / Cribroom
- Workshop
- Receival Hall
- Weighbridge
- Liquid Waste Receival
- Fuel Store Service Bay
- Driveway

Geomorphic Wetlands

- Dampland
- Palusplain
- Sumpland

Clearing Regulations

- Clearing Regulations

0 200 400 600 800 1,000
Metres

------ LOCALITY ------

Aerial Imagery : Landgate/SLIP
Image Date : Feb 2022

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator Units: Metre
Map compiled by: Ian Ross 13/10/2023
Map updated by: Ian 13/10/2023
A3 Scale 1:15,000

BUSHFIRE PRONE PLANNING

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3 BUSHFIRE ATTACK LEVEL (BAL) ASSESSMENT

BUSHFIRE ATTACK LEVELS (BAL) - UNDERSTANDING THE RESULTS

The transfer (flux/flow) of radiant heat from the bushfire to a receiving object is measured in kW/m^2. The AS 3959:2018 BAL determination methodology establishes the ranges of radiant heat flux that correspond to each bushfire attack level. These are identified as BAL-LOW, BAL-12.5, BAL-19, BAL-29, BAL-40 and BAL-FZ.

The bushfire performance requirements for certain classes of buildings are established by the Building Code of Australia (Vol. 1 & 2 of the NCC). The BAL will establish the bushfire resistant construction requirements that are to apply in accordance with AS 3959:2018 - Construction *of buildings in bushfire prone areas* and the NASH Standard – *Steel framed construction in bushfire areas (NS 300 2021),* whose solutions are deemed to satisfy the NCC bushfire performance requirements.

DETERMINED BAL RATINGS

A BAL Certificate can be issued for a determined BAL. A BAL can only be classed as 'determined' for an existing or future building/structure when:

1. It's final design and position on the lot are known and the stated separation distance from classified bushfire prone vegetation exists and can justifiably be expected to remain in perpetuity; or

2. It will always remain subject to the same BAL regardless of its design or position on the lot after accounting for any regulatory or enforceable building setbacks from lot boundaries as relevant and necessary (e.g., R-codes, restrictive covenants, defined building envelopes) or the retention of any existing classified vegetation either onsite or offsite.

If the BMP derives determined BAL(s), the BAL Certificate(s) required for submission with building applications can be provided, using the BMP as the assessment evidence.

INDICATIVE BAL RATINGS

A BAL Certificate cannot be issued for an indicative BAL. A BAL will be classed as 'indicative' for an existing or future building/structure when the required conditions to derive a determined BAL are not met.

This class of BAL rating indicates what BAL(s) could be achieved and the conditions that need to be met are stated.

Converting the indicative BAL into a determined BAL is conditional upon the currently unconfirmed variable(s) being confirmed by a subsequent assessment and evidential documentation. These variables will include the future building(s) location(s) being established (or changed) and/or classified vegetation being modified or removed to establish the necessary vegetation separation distance. This may also be dependent on receiving approval from the relevant authority for that modification/removal.

BAL RATING APPLICATION – PLANNING APPROVAL VERSUS BUILDING APPROVAL

1. Planning Approval: SPP.3.7 establishes that where BAL- LOW to BAL-29 will apply to relevant future construction (or existing structures for proposed uses), the proposed development may be considered for approval (dependent on the other requirements of the relevant policy measures being met). That is, BAL40 or BAL-FZ are not acceptable on planning grounds (except for certain limited exceptions).

   Because planning is looking forward at what can be achieved, as well as looking at what may currently exist, both determined and indicative BAL ratings are acceptable assessment outcomes on which planning decisions can be made (including conditional approvals).

2. Building Approval: The Building Code of Australia (Vol. 1 & 2 of the NCC) establishes that relevant buildings in bushfire prone areas must be constructed to the bushfire resistant requirements corresponding to the BAL rating that is to apply to that building. Consequently, a determined BAL rating and the BAL Certificate is required for a building permit to be issued - an indicative BAL rating is not acceptable.

3.1 BAL Assessment Summary - Contour Map Format

INTERPRETATION OF THE BAL CONTOUR MAP

The BAL contour map is a diagrammatic representation of the results of the bushfire attack level assessment.

The map presents different coloured contours extending out from the areas of classified vegetation. Each contour represents a set range of radiant heat flux that potentially will transfer to an exposed element (building, person or other defined element), when it is located within that contour.

Each of the set ranges of radiant heat flux corresponds to a different BAL rating as defined by the AS 3959:2018 BAL determination methodology.

The width of each shaded BAL contour will vary dependant on both the BAL rating and the relevant parameters (calculation inputs) for the subject site. Their width represents the minimum and maximum vegetation separation distances that correspond to each BAL rating (refer to the relevant table below for these distances).

The areas of classified vegetation to be considered in developing the BAL contours, are those that will remain at the intended end state of the subject development once earthworks, clearing and/or landscaping and re-vegetation have been completed. Variations to this statement that may apply include:

- Both pre and post development BAL contour maps are produced; and/or
- Each stage of a development is assessed independently.

3.1.1 The BAL Determination Method(s) Applied and the Location of Data and Results

Procedure Method (AS 3959:2018)	Applied to the BAL Assessment	Location of the Site Assessment Data			Location of the Results
		Classified Vegetation and Topography Map(s)	Calculation Input Variables		Assessed Bushfire Attack Levels and/or Radiant Heat Levels
			Summary Data	Detailed Data with Explanatory and Supporting Information	
Method 1 (Simplified)	Yes	Figure 3.1	Table 3.1	Appendix A1	BAL Contour Map Table 3.1

Figure 3.1

Classified Vegetation & Topography

Lot 9500 on Plan 414516, Area : 1,608.9031 ha
320 Gull Road,
KERALUP 6182
SHIRE OF MURRAY

AREA : 1
Class (D) Scrub
Effective slope: 0°

AREA : 2
Class (A) Forest
Effective slope: 0°

AREA : 3
Class (G) Grassland
Effective slope: 0°

Excluded

Lot 9500

------ LEGEND ------

- Development Site
- Subject Site
- Other Lots
- Development
- Photo & Direction

Description

- Office
- Office / Cribroom
- Workshop
- Receival Hall
- Weighbridge
- Liquid Waste Receival
- Fuel Store Service Bay
- Driveway

150m Vegetation Assessment Area

- 150m from Subject Site

Classified Vegetation

- Class (A) Forest
- Class (D) Scrub
- Class (G) Grassland
- Exclusion 2.2.3.2

0 100 200 300 400 500
Metres

------ LOCALITY ------

Aerial Imagery : Landgate/SLIP
Image Date : Feb 2022

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator Units: Metre
Map compiled by: Ian Ross 13/10/2023
Map updated by: Ian 13/10/2023
A3 Scale 1:7,500

BUSHFIRE PRONE PLANNING

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Figure 3.1.1

Classified Vegetation & Topography (Post Development)

Lot 9500 on Plan 414516, Area : 1,608.9031 ha
320 Gull Road,
KERALUP 6182
SHIRE OF MURRAY

AREA : 1
Class (D) Scrub
Effective slope: 0°

AREA : 2
Class (A) Forest
Effective slope: 0°

AREA : 3
Class (G) Grassland
Effective slope: 0°

Excluded

Lot 9500

90 m

186 m

29.5 m

8 m

13 m

10 m

12 m

14 m

16 m

18 m

20 m

22 m

------ LEGEND ------

- Development Site
- Subject Site
- Other Lots
- 50m Wetland Buffer
- Development

Radiant Heat Flux
- <10kw Zone (Within Subject Site)

Asset Protection
- Indicative BAL 29 APZ

Description
- Office
- Office / Cribroom
- Workshop
- Receival Hall
- Weighbridge
- Liquid Waste Receival
- Fuel Store Service Bay
- Driveway

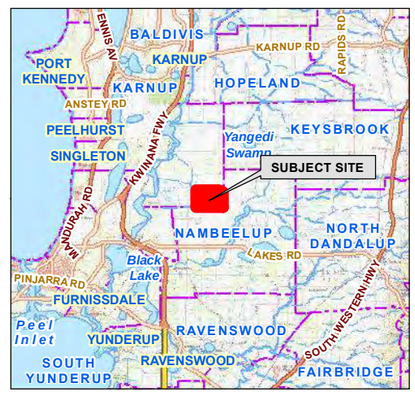
150m Vegetation Assessment Area
- 150m from Subject Site

Classified Vegetation
- Class (A) Forest
- Class (D) Scrub
- Class (G) Grassland
- Exclusion 2.2.3.2

- APZ Distance
- Vegetation Distance

0 100 200 300 400 500
Metres

------ LOCALITY ------



Aerial Imagery : Landgate/SLIP
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Map updated by: Ian 17/10/2023
A3 Scale 1:7,500

BUSHFIRE PRONE PLANNING

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Figure 3.1.2

Classified Vegetation & Topography (Post Development) Showing 10kw APZ

Lot 9500 on Plan 414516, Area : 1,608.9031 ha
320 Gull Road,
KERALUP 6182
SHIRE OF MURRAY

------ LEGEND ------

- Development Site
- Subject Site
- Other Lots
- 50m Wetland Buffer
- Development

Radiant Heat Flux
- <10kw Zone (Within Subject Site)

Description
- Office
- Office / Cribroom
- Workshop
- Receival Hall
- Weighbridge
- Liquid Waste Receival
- Fuel Store Service Bay
- Driveway

150m Vegetation Assessment Area
- 150m from Subject Site

Classified Vegetation
- Class (A) Forest
- Class (D) Scrub
- Class (G) Grassland
- Exclusion 2.2.3.2
- APZ Distance

0 100 200 300 400 500
Metres

------ LOCALITY ------

Aerial Imagery : Landgate/SLIP
Image Date : Feb 2022

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator Units: Metre
Map compiled by: Ian Ross 5/12/2023
Map updated by: Ian 5/12/2023
A3 Scale 1:7,500

BUSHFIRE PRONE PLANNING

Map Document Path / Name: K:\Projects\Jobs 2022\220666 - 320 Gull Road Keralup (BMP)\Mapping\MXD\220666_BRMP_Fig3-1-2_VEG_POST_320 Gull Road.mxd

CONSTRUCTION OF THE BAL CONTOUR MAP(S) – RELEVANT CLASSIFIED VEGETATION	
Identification of Classified Vegetation that is Relevant to the Production of the BAL Contour Map(s)	Relevant Map
All identified areas of classified vegetation that exist at the time of the site assessment – both within the subject site (onsite) and external to the subject site (offsite) will be the relevant vegetation.	Figure No.3.1.1
All identified areas of classified vegetation that exist at the time of the site assessment – both within the subject site (onsite) and external to the subject site (offsite) will be the relevant vegetation for the post-development BAL contour map.	Figure No.3.2
Supporting Assessment Details: N/A	

3.1.3 Summary Site Data Applied to Construction of the BAL Contour Map(s)

Table 3.1: Summary of applied calculation input variables applied to determining the site specific separation distances corresponding to each bushfire attack level.

SUMMARY OF CALCULATION INPUT VARIABLES (INCLUDING SITE DATA) APPLIED TO THE DETERMINATION OF SEPARATION DISTANCES CORRESPONDING TO BUSHFIRE ATTACK LEVELS [1]												
Applied BAL Determination Method	METHOD 1 - SIMPLIFIED PROCEDURE (AS 3959:2018 CLAUSE 2.2)											
Calculation Variables Corresponding to BAL Determination Method												
Methods 1 and 2		Method 1	Method 2									
Vegetation Classification		FDI	Effective Slope		Site Slope	FFDI or GFDI	Flame Temp.	Elevation of Receiver	Flame Width	Fireline Intensity	Flame Length	Modified View Factor
			Applied Range	Measured								
Area	Class		degree range	degrees	degrees		K	metres	metres	kW/m	metres	% Reduction
1	(D) Scrub	80	Upslope or flat 0	flat 0	-	-	-	-	-	-	-	-
2	(A) Forest	80	Upslope or flat 0	flat 0	-	-	-	-	-	-	-	-
3	(G) Grassland	80	Upslope or flat 0	flat 0	-	-	-	-	-	-	-	-

[1] All data and information supporting the determination of the classifications and values stated in this table and any associated justification, is presented in Appendix A.

Where the values are stated as 'default' these are either the values stated in AS 3959:2018, Table B1 or the values calculated as intermediate or final outputs through application of the equations of the AS 3959:2018 BAL determination methodology. They are not values derived by the assessor.

Table 3.2: Vegetation separation distances corresponding to radiant heat levels and illustrated as BAL contours in Figure 3.2.

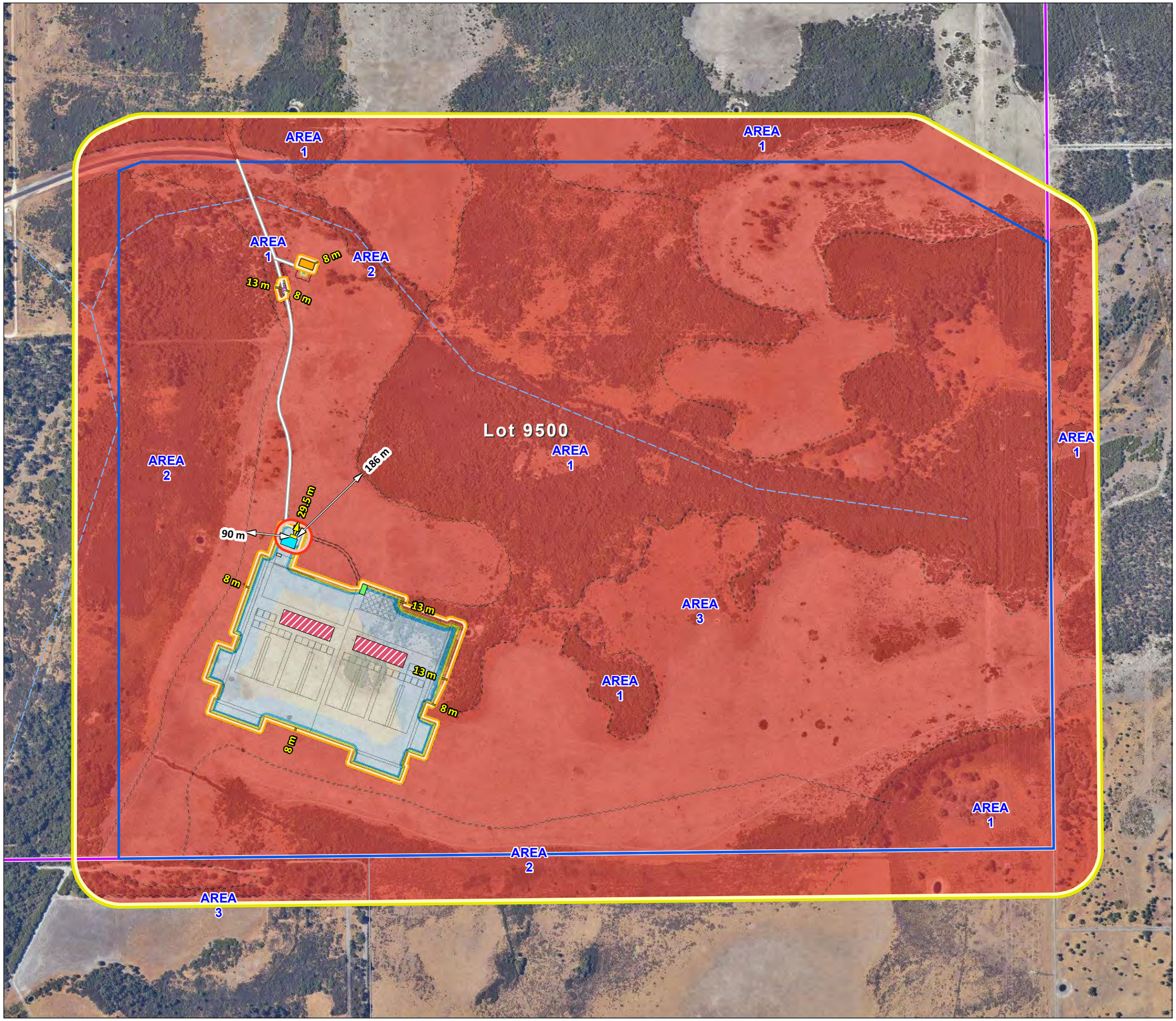
THE CALCULATED VEGETATION SEPARATION DISTANCES CORRESPONDING TO THE STATED LEVEL OF RADIANT HEAT [1]									
Vegetation Classification		Separation Distances Corresponding to Stated Level of Radiant Heat (metres)							
		Bushfire Attack Level						Maximum Radiant Heat Flux	
Area	Class	BAL-FZ	BAL-40	BAL-29	BAL-19	BAL12.5	BAL-LOW	10 kW/m^2	2 kW/m^2
1	(C) Shrubland	<7	7-<9	9-<13	13-<19	19-<100	>100	-	-
2	(A) Forest	<16	16-<21	21-<31	31-<42	42-<100	>100		
3	(G) Grassland	<6	6-<8	8-<12	12-<17	17-<50	>50	-	-

[1] All calculation input variables are presented in Table 3.1. The summary 'printouts' of calculation input and output values for each area of classified vegetation are presented in Appendix A.

Figure 3.2

BAL Contour Map

Lot 9500 on Plan 414516, Area : 1,608.9031 ha
320 Gull Road,
KERALUP 6182
SHIRE OF MURRAY



------ LEGEND ------

- Development Site
- Subject Site
- Other Lots
- Development

Radiant Heat Flux
- <10kw Zone (Within Subject Site)

Asset Protection
- Indicative BAL 29 APZ

Description
- Office
- Office / Cribroom
- Workshop
- Receival Hall
- Weighbridge
- Liquid Waste Receival
- Fuel Store Service Bay
- Driveway

100m Vegetation Assessment Area
- 100m from Subject Site

Indicative Bushfire Attack Levels
- BAL FZ
- BAL 40
- BAL 29
- BAL 19
- BAL 12.5
- BAL LOW
- APZ Distance
- Vegetation Distance

0 100 200 300 400 500
Metres

------ LOCALITY ------

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A3 Scale 1:7,500

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Figure 3.2.1

BAL Contour Map

Infrastructure Detail

Lot 9500 on Plan 414516, Area : 1,608.9031 ha
320 Gull Road,
KERALUP 6182
SHIRE OF MURRAY

OFFICE AND WEIGHBRIDGE INSET

OFFICE / CRIBROOM INSET

See Inset

AREA 1
AREA 2
AREA 3

8 m
13 m
29.5 m
90 m
186 m

Office
Workshop

0 20 40 60 80
Metres

------ LEGEND ------

- Development
- 50m Wetland Buffer

Radiant Heat Flux
- <10kw Zone (Within Subject Site)

Asset Protection
- Indicative BAL 29 APZ

Description
- Office
- Office / Cribroom
- Workshop
- Receival Hall
- Weighbridge
- Liquid Waste Receival
- Fuel Store Service Bay
- Driveway

Indicative Bushfire Attack Levels
- BAL FZ
- BAL 40
- BAL 29
- BAL 19
- BAL 12.5
- BAL LOW
- APZ Distance
- Vegetation Distance

0 50 100 150 200
Metres

------ LOCALITY ------

N

Aerial Imagery : Landgate/SLIP
Image Date : Feb 2022

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator Units: Metre
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A3 Scale 1:4,500

BUSHFIRE PRONE PLANNING

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3.1.5 BAL Ratings Derived from the Contour Map

Table 3.3: Indicative and determined BAL(s) for existing and/or proposed building works.

BUSHFIRE ATTACK LEVEL FOR EXISTING/PLANNED BUILDINGS/STRUCTURE [1]		
Building/Structure Description	Indicative BAL [2]	Determined BAL [2]
Office near weighbridge	BAL-29	N/A
Office/Crib-room (onsite shelter)	BAL-12.5	N/A
Workshop	BAL-19	N/A

[1] The assessment data used to derive the BAL ratings is sourced from Table 3.1 and Figure 3.2.

[2] Refer to the start of Section 3 for an explanation of indicative versus determined BAL ratings.

4 IDENTIFICATION OF BUSHFIRE HAZARD ISSUES

The Guidelines for Planning in Bushfire Prone Areas (WAPC 2021 v1.4), Appendix 5, establish that the application of this section of the BMP is intended to support *strategic planning* proposals. At the strategic planning stage there will typically be insufficient proposed development detail to enable all required assessments, including the assessment against the bushfire protection criteria.

Strategic Planning Proposals

For strategic planning proposals this section of the BMP will identify:

- Issues associated with the level of the threats presented by any identified bushfire hazard;
- Issues associated with the ability to implement sufficient and effective bushfire protection measures to reduce the exposure and vulnerability levels (of elements exposed to the hazard threats), to a tolerable or acceptable level; and
- Issues that will need to be considered at subsequent planning stages.

All Other Planning Proposals

For all other planning stages, this BMP will address what are effectively the same relevant issues but do it within the following sections:

- Section 2 – Environmental Conservation: Assess environmental, biodiversity and conservation values);
- Section 3 – Potential Bushfire Impact: Assess the bushfire threats with the focus on flame contact and radiant heat; and
- Section 5 – Assessment Against the Bushfire Protection Criteria (including the guidance provided by the *Position Statement: 'Planning in bushfire prone areas – Demonstrating Element 1: Location and Element 2'):* Assess the ability of the proposed development to apply the required bushfire protection measures thereby enabling it to be considered for planning approval for these factors.

Is the proposed development a strategic planning proposal?	No

5 ASSESSMENT AGAINST THE BUSHFIRE PROTECTION CRITERIA (GUIDELINES V1.4)

5.1 Bushfire Protection Criteria Elements Applicable to the Proposed Development/Use

APPLICATION OF THE CRITERIA, ACCEPTABLE SOLUTIONS AND PERFORMANCE ASSESSMENT

The criteria are divided into five elements – location, siting and design, vehicular access, water and vulnerable tourism land uses. Each element has an intent outlining the desired outcome for the element and reflects identified planning and policy requirements in respect of each issue.

The example acceptable solutions (bushfire protection measures) provide one way of meeting the element's intent. Compliance with these automatically achieves the element's intent and provides a straightforward pathway for assessment and approval.

Where the acceptable solutions cannot be met, the ability to develop design responses (as alternative solutions that meet bushfire performance requirements) is an alternative pathway that is provided by addressing the applicable performance principles (as general statements of how best to achieve the intent of the element).

A merit based assessment is established by the SPP 3.7 and the Guidelines as an additional alternative pathway along with the ability of using discretion in making approval decisions (sections 2.5, 2.6 and 2.7). This is formally applied to certain development (minor and unavoidable – sections 5.4.1 and 5.7). Relevant decisions by the State Administrative Tribunal have also supported this approach more generally.

Elements 1 – 4 should be applied for all strategic planning proposals, subdivision or development applications, except for vulnerable tourism land uses which should refer to Element 5. Element 5 incorporates the bushfire protection criteria in Elements 1 – 4 but caters them specifically to tourism land uses. (Guidelines DPLH 2021v1.4)

The Bushfire Protection Criteria	Applicable to the Proposed Development/Use
Element 1: Location	Yes
Element 2: Siting and Design	Yes
Element 3: Vehicular Access	Yes
Element 4: Water	Yes
Element 5: Vulnerable Tourism Land Uses	Yes

5.2 Local Government Variations to Apply

Local governments may add to or modify the acceptable solutions to recognise special local or regional circumstances (e.g., topography / vegetation / climate). These are to be endorsed by both the WAPC and DFES before they can be considered in planning assessments. (Guidelines DPLH 2021v1.4).

Do endorsed regional or local variations to the acceptable solutions apply to the assessments against the Bushfire Protection Criteria for the proposed development /use?	None known or identified

5.3 Assessment Statements for Element 1: Location

LOCATION					
Element Intent	To ensure that strategic planning proposals, subdivision and development applications are located in areas with the least possible risk of bushfire to facilitate the protection of people, property and infrastructure.				
Proposed Development/Use – Relevant Planning Stage	(Do) Development application other than for a single dwelling, ancillary dwelling or minor development				
Element Compliance Statement	The proposed development/use achieves the intent of the element by being fully compliant with all applicable acceptable solutions.				
Pathway Applied to Provide an Alternative Solution	N/A				
Acceptable Solutions - Assessment Statements *All details of acceptable solution requirements are established in the Guidelines for Planning in Bushfire Prone Areas, DPLH v1.4 (Guidelines) and apply the guidance established by the Position Statement: 'Planning in bushfire prone areas – Demonstrating Element 1: Location and Element 2: Siting and design' (WAPC Nov 2019) and the 'Bushfire Management Plan Guidance for the Dampier Peninsula' (WA Department of Planning, Lands and Heritage, 2021 Rev B) as relevant. These documents are available at https://www.wa.gov.au/government/document-collections/state-planning-policy-37-planning-bushfire-prone-areas.*					
Solution Component Check Box Legend	☑ Relevant & met	☒ Relevant & not met	⃠ Not relevant		
A1.1 Development location	Applicable:	Yes	Compliant:	Yes	
ASSESSMENT AGAINST THE REQUIREMENTS ESTABLISHED BY THE GUIDELINES					
☑ ☐ ☐ The development application is located in an area that is or will, on completion, be subject to either a moderate or low bushfire hazard level, or BAL-29 or below.					
Supporting Assessment Details: All habitable buildings and associated buildings within the development fall within BAL-29. BAL-40 or BAL-FZ construction requirements will not be required to be applied. This meets the requirements established by Acceptable Solution A1.1 and its associated explanatory note. In addition, the vegetation surrounding the proposed development can be classed as a moderate bushfire hazard level.					
ASSESSMENTS APPLYING THE GUIDANCE ESTABLISHED BY THE WAPC ELEMENT 1 & 2 POSITION STATEMENT (2019)					
"Consideration should be given to the site context where 'area' is the land both within and adjoining the subject site. The hazards remaining within the site should not be considered in isolation of the hazards adjoining the site, as the potential impact of a bushfire will be dependent on the wider risk context, including how a bushfire could affect the site and the conditions for a bushfire to occur within the site." Strategic Planning Proposals: Consider the threat levels from any vegetation adjoining and within the subject site for which the potential intensity of a bushfire in that vegetation would result in it being classified as an Extreme Bushfire Hazard Level (BHL). Identify any proposed design strategies to reduce these threats. Structure Plans (lot layout known) and Subdivision Applications: As for strategic planning proposals but within the subject site the relevant threat levels to consider are the radiant heat levels represented by BAL-FZ and BAL-40 ratings.					
The planning proposal is a development application, consequently the referred to position statement is not applicable to the Element 1 assessment.					

5.4 Assessment Statements for Element 2: Siting and Design

SITING AND DESIGN OF DEVELOPMENT					
Element Intent	To ensure that the siting and design of development minimises the level of bushfire impact. (BPP Note: not building/construction design)				
Proposed Development/Use – Relevant Planning Stage	(Do) Development application other than for a single dwelling, ancillary dwelling or minor development				
Element Compliance Statement	The proposed development/use achieves the intent of the element by being fully compliant with all applicable acceptable solutions.				
Pathway Applied to Provide an Alternative Solution	N/A				
Acceptable Solutions - Assessment Statements *All details of acceptable solution requirements are established in the Guidelines for Planning in Bushfire Prone Areas, DPLH v1.4 (Guidelines) and apply the guidance established by the Position Statement: 'Planning in bushfire prone areas – Demonstrating Element 1: Location and Element 2: Siting and design' (WAPC Nov 2019) and the 'Bushfire Management Plan Guidance for the Dampier Peninsula' (WA Department of Planning, Lands and Heritage, 2021 Rev B) as relevant. These documents are available at https://www.wa.gov.au/government/document-collections/state-planning-policy-37-planning-bushfire-prone-areas.*					
Solution Component Check Box Legend	☑ Relevant & met	☒ Relevant & not met	⃠ Not relevant		
A2.1 Asset Protection Zone (APZ)	Applicable:	Yes	Compliant:	Yes	

UNDERSTANDING THE APZ PLANNING ASSESSMENT VERSUS APZ IMPLEMENTATION REQUIREMENTS

Note: Appendix B: 'Onsite Vegetation Management' provides further information regarding the different APZ dimensions that can be referenced, their purpose and the specifications of the APZ that is to be established and maintained.

To reduce risk to buildings (and indirectly to persons) from a bushfire event, a key bushfire protection measure required to be implemented is reducing the exposure of building elements to the direct bushfire threats of flame contact, radiant heat and embers and the indirect threat of consequential fires that result from the subsequent ignition of other combustible materials that may be constructed, stored or accumulate in the area surrounding buildings.

This is achieved by separating existing and/or proposed buildings from areas of classified bushfire prone vegetation. The total area of separation is identified as the Asset Protection Zone (APZ), which exists as an area of minimal fire fuels (or no fuel) and is considered able and likely to remain a low threat and/or be maintained to a low threat state in perpetuity. The required separation distances will vary according to the site specific conditions.

THE APZ PLANNING ASSESSMENT: To achieve planning approval for this factor it must be demonstrated that separation distances that correspond to a maximum level of radiant transfer to a building (29 kW/m^2), either exist or can be established (with certain exceptions). These separation distances are the dimensions of the **'Planning BAL-29' APZ**.

The purpose of this planning assessment is to identify and justify how this low threat area (the Planning BAL-29' APZ) can exist – or not.

THE DIMENSIONS OF THE 'PLANNING BAL-29' APZ MAY EXTEND OUTSIDE SUBJECT LOT BOUNDARIES. THE APZ MAY NOT BE EQUIDISTANT AROUND A BUILDING AS THE REQUIRED SEPARATION DISTANCES DEPEND ON THE TYPE OF VEGETATION PRESENT IN EACH DIRECTION ALONG WITH OTHER SITE VARIABLES.

IT IS IMPORTANT **TO UNDERSTAND THAT THE 'PLANNING BAL-29' APZ IS NOT NECESSARILY THE SIZE OF THE APZ THAT MUST** BE PHYSICALLY ESTABLISHED AND MAINTAINED BY A LANDOWNER. IT IS A SCREENING TOOL FOR MAKING PLANNING APPROVAL DECISIONS.

THE APZ TO BE IMPLEMENTED: The required dimensions to be established and maintained by the landowner will be those that correspond to the determined BAL rating of a relevant building but limited to the land of the subject lot (with limited exceptions). The requirement for a greater dimension within a lot will only exist if it is required by the relevant local government's annual firebreak / hazard reduction notice or the APZ size is increased as an additional bushfire protection measure as a recommendation of this BMP. Within this BMP it is the 'Planning BAL-29' APZ that will be identified on maps, diagrams and in tables as necessary. The exceptions are the data provided in Appendix B part B1 and when a Property Bushfire Management Statement is required to be produced for a development application, in which case the '**Landowner' APZ** dimensions will be shown on the site map (refer to s6.3.1 when relevant).
ASSESSMENT AGAINST THE REQUIREMENTS ESTABLISHED BY THE GUIDELINES
☑ ☐ ☐ APZ Width: The proposed (or a future) habitable building(s) on the lot(s) of the proposed development - or an existing building for a proposed change of use – can be (or is) located within the developable portion of the lot and be surrounded by a 'Planning BAL-29' APZ of the required dimensions (measured from any external wall or supporting post or column to the edge of the classified vegetation), that will ensure their exposure to the potential radiant heat impact of a bushfire does not exceed 29 kW/m^2. Notes: When established by the relevant decision maker, the meeting of this requirement may also apply to proposed non-habitable buildings and other structures.
☐ ☐ ⦸ Restriction on Building Location: It has been identified that the current developable portion of a lot(s) provides for the proposed future (or a future) building/structure location that will result in that building/structure being subject to a BA-40 or BAL-FZ rating. Consequently, it may be considered necessary to impose the condition that a restrictive covenant to the benefit of the local government pursuant to section 129BA of the Transfer of Land Act 1893, is to be placed on the certificate(s) of title of the proposed lot(s) advising of the existence of a restriction on the use of that portion of land (refer to Code F3 of Model Subdivision Conditions Schedule, WAPC June 2021 and Guidelines s5.3.2).
☑ ☐ ☐ APZ Location: The required dimensions for a 'Planning BAL-29' APZ can be contained solely within the boundaries of the lot(s) on which the proposed (or a future) habitable building(s) - or an existing building(s) for a proposed change of use – is situated.
☐ ☐ ⦸ APZ Location: The required dimensions for a 'Planning BAL-29' APZ can be partly established within the boundaries of the lot(s) on which the proposed (or a future) habitable building(s) - or an existing building(s) for a proposed change of use – is situated. The balance of the APZ would exist on adjoining land that satisfies the exclusion requirements of AS 3959:2018 cl 2.2.3.2 for low threat vegetation and non-vegetated areas.
☐ ☐ ⦸ APZ Location: It can be justified that any adjoining (offsite) land forming part of a 'Planning BAL-29' APZ will: • If non-vegetated, remain in this condition in perpetuity; and/or • If vegetated, be low threat vegetation managed in a minimal fuel condition in perpetuity.
☑ ☐ ☐ APZ Management: The area of land (within each lot boundary), that is to make up the required 'Landowner' APZ dimensions (refer to Appendix B, Part B1), can and will be managed in accordance with the requirements of the Guidelines Schedule 1 'Standards for Asset Protection Zones' (refer to Appendix B).

☐ ☐ ⊘	Subdivision Staging: There are undeveloped future stages of subdivision, containing bushfire prone vegetation, that have been taken into consideration for their potentially 'temporary' impact on the ability to establish a 'Planning BAL-29' APZ on adjoining developed lots. A staging plan is developed to manage this.
☑ ☐ ☐	Firebreak/Hazard Reduction Notice: Any additional requirements established by the relevant local government's annual notice to install firebreaks and manage fuel loads (issued under s33 of the Bushfires Act 1954), can and will be complied with.

Supporting Assessment Details: Asset Protection Zones will be maintained in accordance with Schedule 1: Standards for Asset Protection Zones (see extract below) established by the Guidelines;

The associated explanatory notes (Guidelines E2) that address (a) managing an asset protection zone (APZ) to a low threat state (b) landscaping and design of an asset protection zone and (c) plant flammability; and

Any additional requirements established by the Shire of Murray Firebreak Notice.

ASSESSMENTS APPLYING THE GUIDANCE ESTABLISHED BY THE WAPC ELEMENT 1 & 2 POSITION STATEMENT (2019)

Strategic Planning Proposals: "At this planning level there may not be enough detail to demonstrate compliance with this element. The decision-maker may consider this element is satisfied where A1.1 is met."

Structure Plans (lot layout known) and Subdivision Applications: "Provided that Element 1 is satisfied, the decision-maker may consider approving lot(s) containing BAL-40 or BAL-FZ under the following scenarios.

The planning proposal is a development application, consequently the position statement is not applicable to the proposed development.

5.5 Assessment Statements for Element 3: Vehicular Access

VEHICULAR ACCESS					
Element Intent	To ensure that the vehicular access serving a subdivision/development is available and safe during a bushfire event.				
Proposed Development/Use – Relevant Planning Stage	(Do) Development application other than for a single dwelling, ancillary dwelling or minor development				
Element Compliance Statement	The proposed development/use cannot comply with all applicable acceptable solutions. An alternative solution cannot be provided. The intent of the element cannot be achieved.				
Pathway Applied to Provide an Alternative Solution	Bushfire Risk - Assessment and Management Report - is developed to demonstrate all possible bushfire protection measures that can be implemented and identify the subsequent residual risk levels applying to elements exposed to the bushfire hazard.				
Acceptable Solutions - Assessment Statements *All details of acceptable solution requirements are established in the Guidelines for Planning in Bushfire Prone Areas, DPLH v1.4 (Guidelines) and apply the guidance established by the Position Statement: 'Planning in bushfire prone areas – Demonstrating Element 1: Location and Element 2: Siting and design' (WAPC Nov 2019) and the 'Bushfire Management Plan Guidance for the Dampier Peninsula' (WA Department of Planning, Lands and Heritage, 2021 Rev B) as relevant. These documents are available at https://www.wa.gov.au/government/document-collections/state-planning-policy-37-planning-bushfire-prone-areas.* *The technical construction requirements for access types and components, and for each firefighting water supply component, are also presented in Appendices 2 and 3. The local government will advise the proponent where different requirements are to apply and when any additional specifications such as those for signage and gates are to apply (these are included in the relevant appendix if requested by the local government).*					
Solution Component Check Box Legend	☑ Relevant & met	☒ Relevant & not met	⃠ Not relevant		
A3.1 Public roads			Applicable:	Yes	Compliant: Yes
☑ ☐ ☐ The technical construction requirements of vertical clearance and weight capacity (Guidelines, Table 6) can and will be complied with (Refer also to Appendix C in this BMP).					
☑ ☐ ☐ All other applicable technical requirements of trafficable width, gradients and curves, are required to be in "accordance with the class of road as specified in the IPWEA Subdivision Guidelines, Liveable Neighbourhoods, Ausroad Standards and/or any applicable standard in the local government area" (Guidelines, Table 6 and E3.1. Refer also to Appendix C in this BMP). The assessment conducted for the bushfire management plan indicates that it is likely that the proposed development can and will comply with the requirements. However, the applicable class of road, the associated technical requirements and subsequent proposal compliance, will need to be confirmed with the relevant local government and/or Main Roads WA.					
☑ ☐ ☐ A traversable verge is available adjacent to classified vegetation (Guidelines, E3.1), as recommended.					
Supporting Assessment Details: Existing public road network is compliant with the local government standards.					

A3.2a Multiple access routes	Applicable:	Yes	Compliant:	No

☐ ☐ ⊘	For each lot, two-way public road access is provided in two different directions to at least two different suitable destinations with an all-weather surface.
☐ ☐ ⊘	The two-way access is available at an intersection no greater than 200m from the relevant boundary of each lot, via a no-through road.
☐ ☒ ☐	The two-way access is not available at an intersection within 200m from the relevant boundary of each lot. However, the available no-through road satisfies the established exemption for the length limitation in every case. These requirements are: • Demonstration of no alternative access (refer to A3.3 below); • The no-through road travels towards a suitable destination; and • The balance of the no-through road that is greater than 200m from the relevant lot boundary is within a residential built-out area or is potentially subject to radiant heat levels from adjacent bushfire prone vegetation that correspond to the BAL-LOW rating (<12.5 kW/m^2).
Supporting Assessment Details: Gull Road is the only access route to and from site. It is approximately 4km from the site to the nearest two-way access route at Lakes Road. However, an onsite shelter building will be provided for occupants as an alternative solution.	

A3.2b Emergency access way	Applicable:	No	Compliant:	N/A

☐ ☐ ⊘	The proposed or existing EAW provides a through connection to a public road.
☐ ☐ ⊘	The proposed or existing EAW is less than 500m in length and will be signposted and gated (remaining unlocked) to the specifications stated in the Guidelines and/or required by the relevant local government.
☐ ☐ ⊘	The technical construction requirements for widths, clearances, capacity, gradients and curves (Guidelines, Table 6 and E3.2b. Refer also to Appendix C in this BMP), can and will be complied with.
Supporting Assessment Details: None	

A3.3 Through-roads	Applicable:	Yes	Compliant:	Partly

☑ ☐ ☐	A no-through public road is necessary as no alternative road layout exists due to site constraints.
☐ ☒ ☐	The no-through public road length does not exceed the established maximum of 200m to an intersection providing two-way access (Guidelines, E3.3).
☐ ☒ ☐	The no-through public road exceeds 200m but satisfies the exemption provisions of A3.2a as demonstrated in A3.2a above.
☑ ☐ ☐	The public road technical construction requirements (Guidelines, Table 6 and E3.1. Refer also to Appendix C in this BMP), can and will be complied with as established in A3.1 above.
☑ ☐ ☐	The turnaround area requirements (Guidelines, Figure 24) can and will be complied with.

Supporting Assessment Details: Gull Road is the only access route to and from site. It is approximately 4km from the site to the nearest two-way access route at Lakes Road. However, an onsite shelter building will be provided for occupants as an alternative solution.				
A3.4a Perimeter roads	Applicable:	No	Compliant:	No
☐ ☐ ⊘	The proposed greenfield or infill development consists of 10 or more lots (including those that are part of a staged subdivision) and therefore should have a perimeter road. This is planned to be installed.			
☐ ☐ ⊘	The proposed greenfield or infill development consists of 10 or more lots (including those that are part of a staged subdivision). However, it is not required on the established basis of: • The vegetation adjoining the proposed lots is classified Class G Grassland; • Lots are zoned rural living or equivalent; • It is demonstrated that it cannot be provided due to site constraints; or • All lots have existing frontage to a public road.			
☐ ☐ ⊘	The technical construction requirements of widths, clearances, capacity, gradients and curves (Guidelines, Table 6 and E3.4a) can and will be complied with.			
Supporting Assessment Details: None Required.				
A3.4b Fire service access route	Applicable:	No	Compliant:	No
☐ ☐ ⊘	The FSAR can be installed as a through-route with no dead ends, linked to the internal road system every 500m and is no further than 500m from a public road.			
☐ ☐ ⊘	The technical construction requirements of widths, clearances, capacity, gradients and curves (Guidelines, Table 6 and E3.4b. Refer also to Appendix C in this BMP), can and will be complied with.			
☐ ☐ ⊘	The FSAR can and will be signposted. Where gates are required by the relevant local government, the specifications can be complied with.			
☐ ☐ ⊘	Turnaround areas (to accommodate type 3.4 fire appliances) can and will be installed every 500m on the FSAR.			
Supporting Assessment Details: None Required.				
A3.5 Battle-axe access legs	Applicable:	No	Compliant:	No
☐ ☐ ⊘	A battle-axe leg cannot be avoided due to site constraints.			
☐ ☐ ⊘	The proposed development is in a reticulated area and the battle-axe access leg length from a public road is no greater than 50m. No technical requirements need to be met.			
☐ ☐ ⊘	The technical construction requirements for widths, clearances, capacity, gradients and curves (Guidelines, Table 6 and E3.5. Refer also to Appendix C in this BMP), can and will be complied with.			
☐ ☐ ⊘	Passing bays can and will be installed every 200m with a minimum length of 20m and a minimum additional trafficable width of 2m.			

Supporting Assessment Details: None Required.

A3.6 Private driveways	Applicable:	Yes	Compliant:	Yes
☐ ☐ ⊘	The private driveway to the most distant external part of the development site is within a lot serviced by reticulated water, is accessed via a public road with a speed limit of 70 km/hr or less and has a length is no greater than 70m (measured as a hose lay). No technical requirements need to be met.			
☑ ☐ ☐	The technical construction requirements for widths, clearances, capacity, gradients and curves (Guidelines, Table 6 and E3.6. Refer also to Appendix C in this BMP), can and will be complied with.			
☐ ☐ ⊘	Passing bays can and will be installed every 200m with a minimum length of 20m and a minimum additional trafficable width of 2m.			
☑ ☐ ☐	The turnaround area requirements (Guidelines, Figure 28, and within 30m of the habitable building) can and will be complied with.			
Supporting Assessment Details: The proposed private driveway will be two-way and 6 metres wide. The driveway will be a limestone road base and compliant with the technical standards (see Appendix C). Slashing of 3m is required on road verges.				

5.6 Assessment Statements for Element 4: Water

FIREFIGHTING WATER	
Element Intent	To ensure water is available to enable people, property and infrastructure to be defended from bushfire.
Proposed Development/Use – Relevant Planning Stage	(Do) Development application other than for a single dwelling, ancillary dwelling or minor development
Element Compliance Statement	The proposed development/use achieves the intent of the element by being fully compliant with all applicable acceptable solutions.
Pathway Applied to Provide an Alternative Solution	N/A

Acceptable Solutions - Assessment Statements

All details of acceptable solution requirements are established in the Guidelines for Planning in Bushfire Prone Areas, DPLH v1.4 (Guidelines) and apply the guidance established by the Position Statement: 'Planning in bushfire prone areas – Demonstrating Element 1: Location and Element 2: Siting and design' (WAPC Nov 2019) and the 'Bushfire Management Plan Guidance for the Dampier Peninsula' (WA Department of Planning, Lands and Heritage, 2021 Rev B) as relevant. These documents are available at https://www.wa.gov.au/government/document-collections/state-planning-policy-37-planning-bushfire-prone-areas.

The technical construction requirements for access types and components, and for each firefighting water supply component, are also presented in Appendices 2 and 3. The local government will advise the proponent where different requirements are to apply and when any additional specifications such as those for signage and gates are to apply (these are included in the relevant appendix if requested by the local government).

Solution Component Check Box Legend ☑ Relevant & met ☒ Relevant & not met ⃠ Not relevant

A4.1 Identification of future firefighting water supply	Applicable:	No	Compliant:	N/A

☐ ☐ ⃠ It can be demonstrated that reticulated or sufficient non-reticulated water for firefighting can be provided at the subdivision and/or development application stage in accordance with the specifications of the relevant water supply authority or the requirements of Schedule 2.

Supporting Assessment Details: None Required.

A4.2 Provision of water for firefighting purposes	Applicable:	Yes	Compliant:	Yes

☐ ☐ ⃠ A reticulated water supply is available to the proposed development. The existing hydrant connection(s) are provided in accordance with the specifications of the relevant water supply authority.

☐ ☐ ⃠ A reticulated water supply will be available to the proposed development. Hydrant connection(s) can and will be provided in accordance with the specifications of the relevant water supply authority.

☑ ☐ ☐ A static water supply (tank) for firefighting purposes will be installed on the lot that is additional to any water supply that is required for drinking and other domestic purposes.

☐ ☐ ⃠ A strategic water supply (tank or tanks) for firefighting purposes will be installed within or adjacent to the proposed development that is additional to any water supply that is required for drinking and other domestic purposes. The required land will be ceded free of cost to the local government and the lot or road reserve where the tank is to be located will be identified on the plan of subdivision.

☐ ☐ ⊘	The strategic static water supply (tank or tanks) will be located no more than 10 minutes travel time from a subject site (at legal road speeds).
☑ ☐ ☐	The technical requirements (location, number of tanks, volumes, design, construction materials, pipes and fittings), as established by the Guidelines (A4.2, E4 and Schedule 2) and/or the relevant local government, can and will be complied with.
Supporting Assessment Details: A 50,000L water tank will need to be installed for bushfire firefighting. This will be located near the Tank farm. It can be moved or removed if hydrants are installed. Refer to information contained in Appendix D for the firefighting water supply specifications and technical requirements.	

5.7 Assessments Statements for Element 5: Vulnerable Tourism Land Uses

5.7.1 Day Uses

VULNERABLE TOURISM	
Element Intent	To provide bushfire protection for tourism land uses relevant to the characteristics of the occupants and/or the location, to preserve life and reduce the impact of bushfire on property and infrastructure.
Proposed Development/Use – Relevant Type	Day uses (with no overnight accommodation) including art gallery, brewery, exhibition centre, hotel, reception centre, restaurant/cafe, small bar, tavern, winery.
Element Compliance Statement	The proposed development/use cannot fully comply with all applicable acceptable solutions. An alternative solution(s) is provided.
Pathway Applied to Provide an Alternative Solution	Bushfire Risk - Assessment and Management Report - is developed to demonstrate all possible bushfire protection measures that can be implemented and identify the subsequent residual risk levels applying to elements exposed to the bushfire hazard.

Acceptable Solutions - Assessment Statements

All details of acceptable solution requirements are established in the Guidelines for Planning in Bushfire Prone Areas, DPLH v1.4 (Guidelines) and apply the guidance established by the 'Bushfire Management Plan Guidance for the Dampier Peninsula' (WA Department of Planning, Lands and Heritage, 2021 Rev B) as relevant. These documents are available at https://www.wa.gov.au/government/document-collections/state-planning-policy-37-planning-bushfire-prone-areas.

The technical construction requirements for access types and components, and for each firefighting water supply component, are also presented in Appendices C and D. The local government will advise the proponent where different requirements are to apply and when any additional specifications such as those for signage and gates are to apply (these are included in the relevant appendix if requested by the local government).

Solution Component Check Box Legend ☑ Relevant & met ☒ Relevant & not met ⃠ Not relevant

A5.13 Siting and Design				
A5.13a Asset protection zone (APZ)	Applicable:	Yes	Compliant:	Yes

APZ DIMENSIONS – DIFFERENCES IN REQUIREMENTS FOR PLANNING ASSESSMENTS COMPARED TO IMPLEMENTATION

A key required bushfire protection measure is to reduce the exposure of buildings/infrastructure (as exposed vulnerable elements at risk), to the direct bushfire threats of flame contact, radiant heat and embers and the indirect threat of consequential fires that result from the subsequent ignition of other combustible materials that may be constructed, stored or accumulate in the area surrounding these structures. This reduces the associated risks of damage or loss.

This is achieved by separating buildings (and consequential fire fuels as necessary) from areas of classified bushfire prone vegetation. This area of separation surrounding buildings is identified as the Asset Protection Zone (APZ) and consists of no vegetation and/or low threat vegetation or vegetation continually managed to a minimal fuel condition. The required separation distances will vary according to the site specific conditions and local government requirements.

The APZ dimensions stated and/or illustrated in this Report can vary dependent on the purpose for which they are being identified.

> *Note: Appendix B 'Onsite Vegetation Management' provides further information regarding the different APZ dimensions that can be referenced, their purpose and the specifications of the APZ that are to be established and maintained on the subject lot.*

THE 'PLANNING BAL-29' APZ DIMENSIONS

Purpose: To provide evidence of the development or use proposal's ability to achieve minimum vegetation separation distances. To achieve 'acceptable solution' planning approval for this factor, it must be demonstrated that the minimum separation distances corresponding to a maximum level of radiant transfer to a building of 29 kW/m^2, either exist or can be implemented (with certain exceptions). These separation distances are the 'Planning BAL-29' APZ dimensions.

The 'Planning BAL-29' APZ is not necessarily the size of the APZ that must be physically implemented and maintained *by a landowner. Rather, its sole purpose is to identify if an acceptable solution for planning approval can be met.*

THE 'REQUIRED' APZ DIMENSIONS

Purpose: Establishes the dimensions of the APZ to be physically implemented by the landowner on their lot: These will be the minimum required separation distances from the subject building(s) to surrounding bushfire prone vegetation (identified by type and associated ground slope). These are established by:

A. The 'BAL Rating APZ' of the subject building(s) when distances are greater than 'B' below (except when 'B' establishes a maximum distance); or

B. The 'Local Government' APZ' derived from the Firebreak/Hazard Reduction Notice when distances are greater than 'A' above, other than when a maximum distance is established, in which case this will apply; or

C. A combination of 'A' and 'B'.

*Within this Report/Plan it is the **'Planning BAL-29' APZ** that will be identified on maps, diagrams and in tables as necessary – unless otherwise stated.*

*The **'Required'** APZ dimension information will be presented in Appendix B1.1 and on the Property Bushfire Management Statement, when required to be included for a development application.*

☑ ☐ ☐	APZ Width: The proposed (or a future) habitable building(s) on the lot(s) of the proposed development - or an existing building(s) for a proposed change of use – can be (or is) located within the developable portion of the lot and be surrounded by a 'Planning BAL-29' APZ of the required dimensions (measured from any external wall or supporting post or column to the edge of the classified vegetation), that will ensure their exposure to the potential radiant heat impact of a bushfire does not exceed 29 kW/m^2.
☑ ☐ ☐	Restriction on Building Location: It has been identified that the current developable portion of a lot(s) provides for a future building location that will result in that building being subject to a BAL-40 or BAL-FZ rating. Consequently, it may be considered necessary to impose the condition that a restrictive covenant to the benefit of the local government pursuant to section 129BA of the Transfer of Land Act 1893, is to be placed on the certificate(s) of title of the proposed lot(s) advising of the existence of a restriction on the use of that portion of land (refer to Code F3 of Model Subdivision Conditions Schedule, WAPC June 2021 and Guidelines s5.3.2).
☑ ☐ ☐	APZ Location: The required dimensions for a 'Planning BAL-29' APZ can be contained solely within the boundaries of the lot(s) on which the proposed (or a future) habitable building(s) - or an existing building(s) for a proposed change of use – is situated.
☐ ☐ ⊘	APZ Location: The required dimensions for a 'Planning BAL-29' APZ can be partly established within the boundaries of the lot(s) on which the proposed (or a future) habitable building(s) - or an existing building(s) for a proposed change of use – is situated. The balance of the APZ would exist on adjoining land that satisfies the exclusion requirements of AS 3959:2018 cl 2.2.3.2 for non-vegetated areas and/or low threat vegetation and/or vegetation managed in a minimal fuel condition.

☐ ☐ ⊘	APZ Location: It can be justified that any adjoining (offsite) land forming part of a 'Planning BAL-29' APZ will: • If non-vegetated, remain in this condition in perpetuity; and/or • If vegetated, be low threat vegetation or vegetation managed in a minimal fuel condition in perpetuity.
☑ ☐ ☐	APZ Management: The area of land (within each lot boundary), that is to make up the required 'Landowner' APZ dimensions (refer to Appendix B, Part B1), can and will be managed in accordance with the requirements of the Guidelines Schedule 1 'Standards for Asset Protection Zones' (refer to Appendix B).
☐ ☐ ⊘	Subdivision Staging: There are undeveloped future stages of subdivision, containing bushfire prone vegetation, that have been taken into consideration for their potentially 'temporary' impact on the ability to establish a 'Planning BAL-29 APZ' on adjoining developed lots. A staging plan is developed to manage this.
☑ ☐ ☐	Firebreak/Hazard Reduction Notice: Any additional requirements established by the relevant local government's annual notice to install firebreaks and manage fuel loads (issued under s33 of the Bushfires Act 1954), can and will be complied with.
Supporting Assessment Details: The ability to establish the 10kW/m2 Zone dimensions is illustrated in Figure 3.2.1. Onsite native vegetation will be required to be modified and/or removed, for which the appropriate authority will be required (refer to Section 2 of this BMP). The onsite shelter to be constructed using NASH Standard and to BAL-29.	
A5.13b Onsite shelter – pedestrian paths	Applicable: Yes Compliant: Yes
☑ ☐ ☐	To comply with acceptable solution A5.14d (lack of vehicular access), pedestrian paths to an onsite shelter area or building, with the required signage, can and will be provided.
Supporting Assessment Details: Signage to be installed to direct persons on-site to the shelter building.	
A5.13c Onsite shelter – exposure to the bushfire hazard	Applicable: Yes Compliant: Yes
☑ ☐ ☐	To comply with acceptable solution A5.14d, a building that will function as a suitable onsite shelter can and will be provided that will reduce persons exposure to bushfire threats (through the shielding provided by the building). The building's exposure to the bushfire hazard threat of radiant heat will be limited to a maximum radiant heat flux of 10 kW/m2 (calculated with an assumed flame temperature of 1200K) by providing the required separation distances from the bushfire hazard.
☐ ☐ ⊘	To comply with acceptable solution A5.14d (lack of vehicular access), an open area that will function as a suitable onsite shelter can and will be provided that will limit persons exposure to a maximum radiant heat flux of 2 kW/m2 (calculated with an assumed flame temperature of 1200K) by providing the required separation distances from the bushfire hazard.
Supporting Assessment Details: The proposed admin/crib room will serve as on-site shelter building. The ability to establish the 10kW/m2 Zone dimensions is illustrated in Figure 3.2.1. Onsite native vegetation will be required to be modified and/or removed, for which the appropriate authority will be required (refer to Section 2 of this BMP).	
A5.13d Onsite shelter – bushfire construction requirements	Applicable: Yes Compliant: Yes
☐ ☐ ⊘	The building provided as an onsite shelter can and will be designed and constructed in accordance with the National Construction Code and the ABCB Community Shelter Handbook.

☑ ☐ ☐	The building(s) provided as an onsite shelter can and will be built to the bushfire construction requirements corresponding to BAL-29 (as per AS 3959 or the NASH Standard) as a minimum – while complying with A15.13c (being subject to a maximum radiant heat flux of 10 kW/m^2).
Supporting Assessment Details: The admin/crib room (on-site shelter building) is sited in an area that will be subject to a maximum heat flux of 10 kW/m^2 and built to BAL-29 construction standards.	
A5.14 Vehicular Access	
A5.14a Multiple access routes — Applicable: Yes — Compliant: No	
☐ ☒ ☐	Two-way access is available. Public road access is provided in two different directions to at least two different suitable destinations.
☐ ☐ ⦸	This exception applies. Secondary access cannot be achieved. The tourism land use is in a residential built out area.
☐ ☐ ⦸	This exception applies. Secondary access cannot be achieved. The bushfire emergency plan provides for closure on days with forecast extreme or fire danger rating and a total fire ban and provides for the early evacuation of patrons and staff.
☐ ☐ ⦸	This exception applies. Secondary access cannot be achieved. The bushfire emergency plan provides for non-operation during the bushfire season.
Supporting Assessment Details: Gull Road is the only access route to and from site. It is approximately 4km from the site to the nearest two-way access route at Lakes Road. However, an onsite shelter building will be provided for persons on site as an alternative solution.	
A5.14b No-through roads – maximum length — Applicable: No — Compliant: N/A	
☐ ☐ ⦸	The no-through public road for the proposed development is no longer than 200 metres. It is unavoidable and the adjoining classified vegetation (excluding the road reserve) is categorised an Extreme Bushfire Hazard Level (Guidelines, Table 3).
☐ ☐ ⦸	The no-through public road for the proposed development is no longer than 500 metres. It is unavoidable and the adjoining classified vegetation (excluding the road reserve) is categorised a Moderate Bushfire Hazard Level (Guidelines, Table 3).
☐ ☐ ⦸	The no-through public road is unavoidable and the adjoining classified vegetation (excluding the road reserve) is categorised a Low Bushfire Hazard Level (Guidelines, Table 3) or is not identified as bushfire prone. Consequently, there is no limit on its length.
Supporting Assessment Details: N/A	
A5.14c Emergency access way – alternative access options — Applicable: No — Compliant: N/A	
☐ ☐ ⦸	A5.14a andA5.14b cannot be achieved.
☐ ☐ ⦸	The proposed or existing EAW provides a through connection to a public road.

☐ ☐ ⊘	The proposed or existing EAW is less than 500m in length and will be signposted and gated (remaining unlocked) to the specifications stated in the Guidelines and/or required by the relevant local government.
☐ ☐ ⊘	The technical construction requirements for widths, clearances, capacity, gradients and curves (Guidelines, Table 6. Refer also to Appendix C in this BMP.), can and will be complied with.
Supporting Assessment Details: None required.	

A5.14d Access limitations - onsite shelter option	Applicable:	Yes	Compliant:	Yes

☑ ☐ ☐	The access requirements of two-way access, restricted no-through road length and provision of an EAW (established by A5.14a, A5.14b and A5.14c) cannot be achieved. The Guidelines provide for the protection measure of an onsite shelter to be provided in lieu of achieving these acceptable solutions.
☑ ☐ ☐	The capacity of the proposed development is no greater than 100 guests and staff at any one time.
☑ ☐ ☐	An onsite shelter can and will be provided in accordance with the requirements for exposure to the bushfire hazard, bushfire construction requirements and pedestrian paths (established by acceptable solutions A13b, A13c and A13d in 'Siting and Design').
Supporting Assessment Details: The nearest two-way intersection is Lakes Road approximately 6km from the development. The proposed admin /crib room will be the designated onsite shelter building. A maximum of 65 people will be present on site.	

A5.14e Public roads - technical requirements	Applicable:	Yes	Compliant:	Yes

☑ ☐ ☐	The technical construction requirements of vertical clearance and weight capacity (Guidelines, Table 6. Refer also to Appendix C in this BMP), can and will be complied with.
☑ ☐ ☐	The applicable class(s) of road and technical requirements have been confirmed with the relevant local government/Main Roads WA. These can and will be complied with.
☑ ☐ ☐	A traversable verge is available adjacent to classified vegetation (Guidelines, E3.1), as recommended.
Supporting Assessment Details: No new public roads are to be built as part of this development however the existing road network is complaint with the relevant standards. Flat gravel verge (1m each side) will be maintained on the sides of public roads.	

A5.14f Internal access/private driveway - technical requirements	Applicable:	Yes	Compliant:	Yes

☐ ☐ ⊘	The internal vehicular access/private driveway length is no greater than 70m. No technical requirements need to be met.
☑ ☐ ☐	The technical construction requirements for widths, clearances, capacity, gradients and curves (Guidelines, Table 6. Refer also to Appendix C in this BMP), can and will be complied with.
☐ ☐ ⊘	Passing bays can and will be installed every 200m with a minimum length of 20m and a minimum additional trafficable width of 2m.

☑ ☐ ☐	The turnaround area requirements (Guidelines, Figure 28, and within 30m of the habitable building) can and will be complied with.
Supporting Assessment Details: The proposed private driveway will be two-way and 6 metres wide. All proposed driveways will be constructed to public road standards and slashing of 3m is required on road verges.	
A5.14g Internal access/private driveway - availability	Applicable: Yes Compliant: Partly
☑ ☐ ☐	The internal vehicular access/private driveway can provide emergency access/egress for all patrons and staff in the event of a bushfire.
☐ ☒ ☐	It is possible to provide at least two internal access/egress points to the public road network.
Supporting Assessment Details: The nearest two-way intersection is Lakes Road approximately 6km from the development. The proposed admin /crib room will be the designated onsite shelter building .	
A5.14h Signage	Applicable: Yes Compliant: Yes
☑ ☐ ☐	The required information to inform the actions of those persons onsite in the event of a bushfire will be prominently displayed within the site.
☑ ☐ ☐	This information will include evacuation routes and distance and the site specific procedural detail that will be established by the Bushfire Emergency Plan (or Information) that is required to be developed for the proposed use.
Supporting Assessment Details: The Bushfire Information Poster will be displayed in an area for all occupants to view. A Bushfire Emergence Plan will be developed as part of the Development Application. Directional signage to the onsite shelter building will also be installed.	
A5.15 Provision of Water for Firefighting Purposes	
A5.15a Reticulated supply	Applicable: No Compliant: N/A
☐ ☐ ⊘	A reticulated water supply is available to the proposed development. The existing hydrant connection(s) are provided in accordance with the specifications of the relevant water supply authority.
☐ ☐ ⊘	A reticulated water supply is available to the proposed development. Hydrant connection(s) can and will be provided in accordance with the specifications of the relevant water supply authority.
Supporting Assessment Details: N/A	
A5.15b Non-reticulated supply – water tank capacity	Applicable: Yes Compliant: Yes
☑ ☐ ☐	A static water supply (tank) for firefighting purposes will be installed on the lot that is additional to any water supply that is required for drinking and other domestic purposes.
☐ ☐ ⊘	A water tank(s) will be provided with a minimum capacity of 10,000 litres/500 m^2 of habitable floor space to a maximum of 50,000 litres.
Supporting Assessment Details: A static water supply for firefighting purposes will be made available to the development. A 50,000L water tank will need to be installed for bushfire firefighting. This will be located near the Tank farm. It can be moved or removed if hydrants are installed.	

A5.15c Non-reticulated supply – technical requirements	Applicable:	Yes	Compliant:	Yes
☑ ☐ ☐ The technical requirements (design, construction materials, pipes and fittings), as established by the Guidelines (Element 4, Schedule 2, s2.2) and/or the relevant local government, can and will be complied with.				
Supporting Assessment Details: Refer to information contained in Appendix D for the firefighting water supply specifications and technical requirements.				

5.8 Additional Bushfire Protection Measures to be Implemented (derived from Bushfire Risk Management Report)

BUSHFIRE HAZARD THREAT REDUCTION RECOMMENDED ADDITIONAL BUSHFIRE PROTECTION MEASURES				
The Protection Mechanism	Ref No	Brief Description [1]	Recommendation Details	Implementation Priority Rating [2]
Prevent Bushfire ignition and/or severity by managing the fuels	1.4	Remove onsite bushfire fuel	Before clearing, approval must be obtained from the local government before removing or managing native vegetation.	Highest
	1.6	Reduce onsite bushfire fuel - mechanical	Local government approval required before clearing or managing native vegetation.	Highest
	1.8	Enforce compliance with local government property management directives	Include ongoing management requirements in facility guidance and operational documents.	High
Prevent bushfire ignition by managing heat energy sources	1.9	Robust and effective site operational procedures	Develop guidance documents and operating procedures.	High
	1.11	Design and construct equipment to prevent airborne ignition	Monitor purchase and construction of plant equipment for adequate protection measure against potential ignition sources.	Medium
	1.12	Actively enforce activity restrictions	Develop Standard Operating Procedures to restrict operation during TFB days. Consider documenting the process for exemptions for certain critical operations.	High
	1.14	Bushfire awareness and 'good practices' education	Basic fire awareness to be included in company induction. Relevant staff training required, site specific Bushfire Awareness and emergency response.	Medium
Prevent bushfire ignition	1.15	Barriers (shielding) between ignition sources and fuels	Include in the facility design stage items and equipment that may be exposed to excessive radiant heat or has the potential to allow the spread of fire.	High

BUSHFIRE HAZARD THREAT REDUCTION RECOMMENDED ADDITIONAL BUSHFIRE PROTECTION MEASURES				
The Protection Mechanism	Ref No	Brief Description [1]	Recommendation Details	Implementation Priority Rating [2]
by managing the interactions of heat energy sources and fuels	1.16	Equipment design and construction to reduce heat transfer	Consider in the facility design stage, to reduce the potential of ignition and heat transfer.	Medium
	1.17	Separation distance between ignition sources and fuels	Include the critical assets within the 10kWm2 area.	Highest
[1] The full description of each bushfire protection measure and the detail of the assessment is presented in Section 5.1.5 [2] Refer to Appendix A1.2.5 for implementation priority rating explanation.				

EXPOSURE REDUCING MEASURES - PERSONS

PERSONS EXPOSURE REDUCTION RECOMMENDED ADDITIONAL BUSHFIRE PROTECTION MEASURES				
The Protection Mechanism	Ref No	Brief Description [1]	Recommendation Details	Implementation Priority Rating [2]
	Persons Located Onsite and Temporarily Offsite			
Establish sufficient separation from relevant bushfire hazard threats	2.1	Stay away from the subject site	Recommend closing facility to non-essential staff and contractors during heightened fire conditions, being FDI above 75 and catastrophic fire danger days.	Medium
	2.2	Remote tourism sites - stay within the subject site	Apply protection measures. Include safer pathways in the facility design.	Medium
	2.4	Relocate (evacuate) to designated safer offsite location(s)	Include Bushfire Emergency Plan into operational documents including the site emergency plan. The cribroom is the nominated shelter in place building.	High
	2.6	Safer pathways for onsite movement	Apply protection measures. Include safer pathways in the facility design.	Highest
	2.7	Pre-emptively relocate to designated safer offsite location(s)	Develop guidelines and procedures to respond to pre-determined FDI and FDR days and other established conditions, eg restricted site access for non-essential people.	High
	Persons on Access / Egress Routes in Vehicles			
	3.1	Locating route away from adjacent hazards		Lowest
	3.2	Egress routes located to ensure driving away from hazard	Driveway verge to be managed. 3m from the limestone road base will be slashed prior fire season.	Medium

PERSONS EXPOSURE REDUCTION RECOMMENDED ADDITIONAL BUSHFIRE PROTECTION MEASURES				
The Protection Mechanism	Ref No	Brief Description [1]	Recommendation Details	Implementation Priority Rating [2]
	3.3	Greater road width	The driveway will meet public road requirements and additional verge slashing is required. 3m wide verge slashing is required.	Medium
	3.4	Reduce and maintain road verge fuel to low threat state	3m wide verge slashing is required.	Medium
Establish shielding from relevant bushfire hazard threats	Persons Located Onsite and Temporarily Offsite			
	2.9	On-site shelter building – not to community refuge standard	Will be constructed to NASH Standard	High
	2.10	On-site shelter building – not a 'vulnerable' use	The flame temperature will be calculated at 1200k rather than 1090k and the office/crib room will be constructed to NASH standard	Highest
	Persons on Access / Egress Routes in Vehicles			

[1] The full description of each bushfire protection measure and the detail of the assessment is presented in Section 5.3.1.1 and Section 5.3.2.1

[2] Refer to Appendix A1.2.5 for implementation priority rating explanation.

EXPOSURE REDUCING MEASURES – ALL STRUCTURES AND MATERIALS STORED OUTDOORS

ALL STRUCTURES & MATERIALS STORED OUTDOORS EXPOSURE REDUCTION RECOMMENDED ADDITIONAL BUSHFIRE PROTECTION MEASURES				
The Protection Mechanism	Ref No	Brief Description [1]	Recommendation Details	Implementation Priority Rating [2]
Establish sufficient separation from relevant bushfire hazard threats	4.2 5.2 6.2 6.1	Designed location of non-vegetated areas and/or managed open space	Use roads, hardstand areas and footpaths as open managed spaces. Construct and maintain the APZ to ensure maximum heat flux exposure does not exceed 10kWm2.	Medium
	4.3 5.3 6.2	Landscaping - asset protection zone (APZ)	10kWm2 @ 1200k APZ will be constructed and maintained around the nominated shelter in place building. A Landscape Management Plan will be provided. To minimise exposure from external radiant heat, a <10kWm2 @ 1090k APZ is required to be established. The dimensions for this APZ are provided within the associated BMP. The increased APZ to 10kWm2 will reduce the overall preheating on combustible materials. Develop an emergency Management Plan Install an appropriate fire hydrant system (and water runoff/catchment) Install appropriate fire sprinkler suppression systems (and water runoff/catchment) External storage management of organic material Maximum height of any stockpile loosed piled or baled <4.8m. Maximum width of a stockpile is to be 20m Maximum length of a stockpile to be <50m Arrangement of stockpiles is to minimise the likelihood of fire spread and provide access for fire appliances.	Highest

ALL STRUCTURES & MATERIALS STORED OUTDOORS EXPOSURE REDUCTION RECOMMENDED ADDITIONAL BUSHFIRE PROTECTION MEASURES				
The Protection Mechanism	Ref No	Brief Description [1]	Recommendation Details	Implementation Priority Rating [2]
			DFES Information Note September 2014 – Spontaneous combustion of green waste windrows and stockpiles due to elevated internal temperatures. Moisture content of the composting windrows will be maintained above 45% as part of the composting process, and by virtue will reduce the risk of spontaneous combustion. This will be maintained by watering once a day or as required. Moisture content of the green waste received on site will not exceed 20% to prevent the generation of heat occurring through biological activity occurring and in turn resulting in spontaneous combustion.	
	4.4 5.4	Landscaping - tree location	Avoid planting trees that allow fire to ascend the trunk and produce embers and firebrands. A Landscape Management Plan will be provided.	High
	4.6 5.6 6.3	Separation from stored flammable products – fuels / other hazardous materials (consequential fire fuels)	Include in facility guidelines to direct the storage of fuel, flammable liquids and workshop gas bottles, used and new oils storage and other flammable items. Where external heat sources have not been considered by the manufacture or Standard, then the separation distance, than item # 7.7 is to be used. If cabling and other flammable items are exposed to direct radiant heat, than <10kWm2 will be the maximum exposure. Include in the facilities emergency plan and operational documents where to store the items, state the separation distances and provide direction on maintaining buildup of fine and heavy fuels. Provide staff training.	High

ALL STRUCTURES & MATERIALS STORED OUTDOORS EXPOSURE REDUCTION RECOMMENDED ADDITIONAL BUSHFIRE PROTECTION MEASURES				
The Protection Mechanism	Ref No	Brief Description [1]	Recommendation Details	Implementation Priority Rating [2]
	4.7 5.7 6.4	Separation from stored and constructed combustible items (consequential fire fuels)	Details: Include in the guidance document separation distances required for flammable and combustible materials. Detail in the facilities guidance document and information in the Emergency Management Plan guidance on storage of heavy fuels and separation distances. It is recommended that this 10m buffer form all hard fix assets is sealed or compacted with concrete, compacted limestone, gravel, blue metal etc.	Highest
Establish shielding from relevant bushfire hazard threats	4.8 5.8 6.5	Constructed barrier – shielding from bushfire	Fencing, external walls and retaining walls to be constructed using non-combustible materials.	Medium
	4.9 5.9 6.9 8.6	Constructed barrier – shielding from consequential fire	Ensure all subfloor spaces are sealed. Shield fuel lines and electrical components extending form the infrastructure. When Separating Masonry walls are used, the walls are to be marked showing the maximum height and width to identify the stockpile limits.	Medium
	4.11 5.11 6.8	Planted vegetation barrier	Include in the facility guidance documents and operational documents management of planted vegetation. Vegetation planting to be in accordance with the Landscape Plan. Plantings to be managed to low threat if located in the APZ and Guidelines for Planning lin Bushfire Prone Areas - Schedule 1.	Medium
	4.12 5.12	Shield operation critical non-structural elements	Position all critical non-structural items in less than 10kWms area and shield electrical cabling, poly tanks and pipes, valves and any other item susceptible to low radiant heat. Include a maintenance regime for debris accumulation management within the guidance document.	Highest

[1] The full description of each bushfire protection measure, the detail of the assessment and any recommendation, is presented in Section 5.3.3.1. and Section 5.3.4.1 & 5.3.5.1

ALL STRUCTURES & MATERIALS STORED OUTDOORS EXPOSURE REDUCTION RECOMMENDED ADDITIONAL BUSHFIRE PROTECTION MEASURES				
The Protection Mechanism	Ref No	Brief Description [1]	Recommendation Details	Implementation Priority Rating [2]
[2] Refer to Appendix A1.2.5 for implementation priority rating explanation.				

VULNERABILITY REDUCING MEASURES - PERSONS

PERSONS VULNERABILITY REDUCTION RECOMMENDED ADDITIONAL BUSHFIRE PROTECTION MEASURES				
The Protection Mechanism	Ref No	Brief Description [1]	Recommendation Details	Implementation Priority Rating [2]
Transport and multiple evacuation destinations and routes available	Persons Located Onsite and Temporarily Offsite			
	6.1	Sufficient evacuation transport available	People on site will have their own transport.	Lowest
	6.2	Multiple safer offsite locations available	A BEP has been developed for the facility	High
Provision of bushfire emergency information and education	6.3	Develop a bushfire emergency plan	A BEP has been developed and provided.	High
	6.4	Relevant operational documents to contain the bushfire protection measures to be implemented	Update the Fire Response Plan and develop Guidance documents before facility becomes operational	High
	6.5	Prominent display of bushfire emergency information	Bushfire information to be displayed at the weigh bridge office and the administration office.	Medium
	6.6	Direct to persons emergency messaging system	Emergency messaging system to be developed.	High
	6.7	Egress pathway signage	Identified safer onsite location.	Medium
	6.8	Personnel are trained to implement the bushfire emergency plan	Staff to be trained in emergency response and bushfire awareness.	Highest

PERSONS VULNERABILITY REDUCTION RECOMMENDED ADDITIONAL BUSHFIRE PROTECTION MEASURES				
The Protection Mechanism	Ref No	Brief Description [1]	Recommendation Details	Implementation Priority Rating [2]
Onsite persons capable of managing a bushfire emergency are available	6.12	Onsite persons available to manage bushfire emergency procedures	Ensure enough appropriately trained staff are onsite at all times during the bushfire season to assist with emergency procedures. Emergency procedures to be reviewed annually.	Highest
	6.13	Onsite persons can operate firefighting equipment	Provide a mobile response unit. Recommend 2 x slip-on units and basic bushfire awareness and response.	Highest
	6.14	External emergency response services available	Safe early evacuation is the preferred response. Local brigade turnout is 20 minutes.	Highest
Lower risk road construction (design and materials)	Persons on Access / Egress Routes in Vehicles			
	7.1	Greater road width	The driveway will be constructed to public road standards as per Table 6 of the Guidelines for planning in Bushfire Prone Areas.	Medium
	7.4	Stable road surfaces	Road surfaces will meet the technical requirement of the Guidelines. Recommend the driveway is limestone road base.	Medium
Evacuees are self-sufficient and have local awareness and own transport	7.8	Self-sufficient persons with local awareness	Site induction and contractor information to include information about the sites evacuation process. Include in the Facility guidelines and induction.	High
	7.9	Onsite persons have own transport	Include in facility training and induction program.	Medium

[1] The full description of each bushfire protection measure, the detail of the assessment and any recommendation, is presented in Section 5.4.1.1 and Section 5.3.5.1

[2] Refer to Appendix A1.2.5 for implementation priority rating explanation.

VULNERABILITY REDUCING MEASURES – STRUCTURES

STRUCTURES VULNERABILITY REDUCTION RECOMMENDED ADDITIONAL BUSHFIRE PROTECTION MEASURES				
The Protection Mechanism	Ref No	Brief Description [1]	Recommendation Details	Implementation Priority Rating [2]
Construction design and materials	9.1 10.1	Construct to AS 3959:2018	Built infrastructure assets - Fit ember screens, gaps to be 2mm or less. The built infrastructure assets where applicable will implement the protection measures. Comment - Nominated shelter in place building to comply with NASH standard.	Medium
	9.2 10.2	Construct to NASH Standard	Nominated shelter in place building to comply with NASH standard. The facilities built infrastructure assets where applicable will implement the protection measures.	Highest
	9.3 12.3 14.3	Construction materials for external and internal cavity building elements	Where possible use non-combustible material.	Medium
	9.4 10.4	Construction materials for consequential fire fuels	Use of non-combustible materials is preferred/recommended.	Medium
	9.5 10.5	Construction design/materials resistant to high wind damage	Construct shelter in place building to NASH standard. NASH Standard has been designed for impact of wind.	High
	9.7 10.7	Construction of electricity supply	Cabling to be underground wherever possible. Cabling above ground to be shielded and cradled a minimum 100mm above the ground.	High
	9.8 10.8	Minimise re-entrant detail to minimise debris and ember accumulation	The shelter in place building (office) to consider design features to minimise debris and ember accumulation.	Lowest

STRUCTURES VULNERABILITY REDUCTION RECOMMENDED ADDITIONAL BUSHFIRE PROTECTION MEASURES				
The Protection Mechanism	Ref No	Brief Description [1]	Recommendation Details	Implementation Priority Rating [2]
	9.9 10.9	Minimise debris and ember trapping surfaces	The facility is constructed for a specific industry use therefore the trapping surfaces may be flat.	Lowest
	9.10 10.10	Protect roof plumbing to minimise debris and ember accumulation	Design of facility, workshop pluming and associated structures and equipment to consider reducing the risk off ignition. The office (shelter in place building) will be constructed using the NASH protection measures.	Medium
	9.11 10.11	Minimise construction cavities to minimise debris and ember accumulation	The office will be constructed the BAL-29 requirements. Built infrastructure Assets - Seal subfloor space and apply ember screening to opening.	Highest
	9.12 10.12	Minimise external openings to limit flame / radiant heat / ember / debris entry	For the facility, workshop and associated structures, protection measure to be applied where practicable. Office to comply with the NASH Standard protection measures.	High
	9.13 10.13	Screen and seal gaps and penetrations	For the facility, workshop and associated structures and built assets, protection measure to be applied where practicable. Office to comply with the NASH Standard protection measures.	High
	9.14 12.14 14.14	Screen external doors and windows	For the facility, workshop and associated structures, protection measure to be applied where practicable.	High
	9.15 10.15	Shutter external doors and windows		N/A

STRUCTURES VULNERABILITY REDUCTION RECOMMENDED ADDITIONAL BUSHFIRE PROTECTION MEASURES				
The Protection Mechanism	Ref No	Brief Description [1]	Recommendation Details	Implementation Priority Rating [2]
	10.16	Construction materials for critical non-structural elements	The critical non-structural elements to be located in <10kWm2 area or shielded.	Highest
Availability of a firefighting response capability	9.16 10.17	Firefighting water supply	Firefighting water tanks are to be non-combustible. Minimum 50,000lt are required and to be fitted with coupling as per BMP requirements. If hydrants are installed, the 50,000lt tank will not be required.	Highest
	9.17 10.18	Firefighting equipment actively operated	Sprinkler system required for all stockpiles of flammable materials. Training required for system operations. Operational plans required for sprinkler operations. As a minimum, 2 x slip-on firefighting units (not trailer type) are required. Staff training required in unit operations. Training operation manual to be developed in response and equipment operations. PPE to be provided to trained staff.	Highest
	9.18 10.19	Firefighting equipment passively operated	Sprinkler system required for all stockpiles of flammable materials. Training required for system operations. Operational plans required for sprinkler operations.	Highest
	9.19 10.20	Firefighting equipment operability maintained	Develop operational manual and maintenance schedule.	Highest
	12.20 10.21	Access via firebreaks provided	The site will comply with the Firebreak Notice.	Medium

STRUCTURES VULNERABILITY REDUCTION RECOMMENDED ADDITIONAL BUSHFIRE PROTECTION MEASURES				
The Protection Mechanism	Ref No	Brief Description [1]	Recommendation Details	Implementation Priority Rating [2]
Manage and maintain effectiveness of applied protection measures	9.21 10.22	Formal documents created to guide and enforce management	Guidance documents to be developed for site operations and emergency management (maintenance of equipment & training) The different documents will be able to satisfactorily perform this function to differing extents.	High

[1] The full description of each bushfire protection measure, the detail of the assessment and any recommendation, is presented in Sections 5.4.3.1 & 5.4.3.4

[2] Refer to Appendix A1.2.5 for implementation priority rating explanation.

6 RESPONSIBILITIES FOR IMPLEMENTATION AND MANAGEMENT OF THE BUSHFIRE PROTECTION MEASURES

6.1 Developer / Landowner Responsibilities – Prior to Sale or Occupancy/Operation

DEVELOPER/LANDOWNER RESPONSIBILITIES – PRIOR TO SALE OR OCCUPANCY/OPERATION	
No.	Implementation Actions
1	The local government may condition a development application approval with a requirement for the landowner/proponent to register a notification onto the certificate of title and deposited plan. This will be done pursuant to Section 70A *Transfer of Land Act 1893* as amended ('Factors affecting use and enjoyment of land, notification on title'). This is to give notice of the bushfire hazard and any restrictions and/or protective measures required to be maintained at the owner's cost. This condition ensures that: 1. Landowners/proponents are aware their lot is in a designated bushfire prone area and of their obligations to apply the stated bushfire risk management measures; and 2. Potential purchasers are alerted to the Bushfire Management Plan so that future landowners/proponents can continue to apply the bushfire risk management measures that have been established in the Plan.
2	Establish the 'Landowner' Asset Protection Zone (APZ) around habitable buildings (and other structures as required) to satisfy: • The minimum required dimensions. These are to be the greatest measurements derived from either the separation distances corresponding to the determined BAL rating for the subject building/structure, or the local government's annual firebreak / hazard reduction notice (issued under s33 of the Bushfires Act 1954), or a combination of these requirements [refer to Appendix B]; and • The standards established by the Guidelines DPLH, 2021 v1.4, Schedule 1, or as varied by the local government through their annually issued firebreak / hazard reduction notice when the variations have been endorsed by the WAPC and DFES as per s4.5.3 of the Guidelines. If native vegetation is required to be modified or removed, ensure that approval has been received from the relevant authority (refer to the applicable local government for advice). This is the responsibility of the developer.
3	Prior to sale or occupancy, a copy of the Bushfire Emergency Plan (BEP) must be provided to the landowner, and they are to be informed that it contains responsibilities that must be actioned due to the use of the land being defined as a 'Vulnerable Land Use' for the reasons identified in Section 1.1. The 'Pre-Season Preparation Procedure' instructions must be complied with.
4	Prior to operation, construct the private driveways to comply with the technical requirements referenced in the BMP.
5	Prior to operation, install the required firefighting static water supply to comply with the technical requirements stated in the BMP.
6	Prior to occupancy, there is an outstanding obligation, created by this Bushfire Management Plan, for a Bushfire Emergency Plan for proposed occupants to be developed and approved for the 'vulnerable' land use.

7	Prior to occupancy, signage must be prominently displayed within the site that informs the actions of those persons onsite in the event of a bushfire. This will include evacuation route information, site procedures – as per the instructions within the Bushfire Emergency Plan or Bushfire Information Poster developed for the site and use.
8	Prior to occupancy, all actions contained within the 'Pre-Season Preparation Procedure' established by the Bushfire Emergency Plan, must be completed.
9	For the 'high risk land use' there is an outstanding obligation, created by Guidelines and consequently this Bushfire Management Plan, for a 'Bushfire Risk Assessment and Management Report' to be produced. Additional protection measures that have been identified in the Report, are to be incorporated into the operation's site emergency plan (produced by the operator to address all potential emergencies) Refer Section 5.8 of this report.
10	Prior to relevant building work, inform the builder of the existence of this approved Bushfire Management Plan (BMP). The plan identifies that the development site is within a designated bushfire prone area and states the indicative (or determined) BAL rating(s) that may (or will) be applied to buildings/structures. A BAL assessment report may be required to confirm determined ratings and will be required when ratings are indicative. BAL certificates will need to be issued to accompany building applications. The BMP may also establish, as an additional bushfire protection measure, that construction requirements to be applied will be those corresponding to a specified higher BAL rating. Compliance with the Building Code of Australia (Volumes 1 and 2 of the National Construction Code), will require certain bushfire resistant construction requirements be applied to residential buildings in bushfire prone areas (i.e., Class 1, 2 and 3 and associated Class 10a buildings and decks). Other classes of buildings may also be required to comply with these construction when established by the relevant authority or if identified as an additional bushfire protection measure within the BMP. The deemed to satisfy solutions that will meet the relevant bushfire performance requirements are found in AS 3959 – Construction of Building in Bushfire Prone Areas (as amended) and the NASH Standard - Steel Framed Construction in Bushfire Areas (as amended).
11	On going maintenance of the separation distances between the onsite shelter building and the bushfire prone vegetation.

6.2 Landowner / Occupier Responsibilities – Ongoing Management

LANDOWNER/OCCUPIER – ONGOING MANAGEMENT	
No.	Management Actions
1	Maintain the 'Landowner' Asset Protection Zone (APZ) around habitable buildings (and other structures as required) to satisfy: • The minimum required dimensions. These are to be the greatest measurements derived from either the separation distances corresponding to the determined BAL rating for the subject building/structure, or the local government's annual firebreak / hazard reduction notice (issued under s33 of the Bushfires Act 1954), or a combination of these requirements [refer to Appendix B]; and • The standards established by the Guidelines DPLH, 2021 v1.4, Schedule 1, or as varied by the local government through their annually issued firebreak / hazard reduction notice when the variations have been endorsed by the WAPC and DFES as per s4.5.3 of the Guidelines.
2	Comply with the Shire of Murray Firebreak Notice and Bushfire Information 2022-2023 issued under s33 of the Bush Fires Act 1954. Check the notice annually for any changes.
3	Maintain private driveway within the lot to comply with the technical requirements referenced in the BMP.
4	Maintain the static firefighting water supply tank and associated pipes/fittings/pump and vehicle hardstand in good working condition.
5	Ensure that builders engaged to construct dwellings/additions and/or other relevant structures on the lot, are aware of the existence of this approved Bushfire Management Plan (BMP). The plan identifies that the development site is within a designated bushfire prone area and states the indicative (or determined) BAL rating(s) that may (or will) be applied to buildings/structures. A BAL assessment report may be required to confirm determined ratings and will be required when ratings are indicative. BAL certificates will need to be issued to accompany building applications. The BMP may also establish, as an additional bushfire protection measure, that construction requirements to be applied will be those corresponding to a specified higher BAL rating. Compliance with the Building Code of Australia (Volumes 1 and 2 of the National Construction Code), will require certain bushfire resistant construction requirements be applied to residential buildings in bushfire prone areas (i.e., Class 1, 2 and 3 and associated Class 10a buildings and decks). Other classes of buildings may also be required to comply with these construction when established by the relevant authority or if identified as an additional bushfire protection measure within the BMP. The deemed to satisfy solutions that will meet the relevant bushfire performance requirements are found in AS 3959 – Construction of Building in Bushfire Prone Areas (as amended) and the NASH Standard - Steel Framed Construction in Bushfire Areas (as amended).
6	Ensure all future buildings the landowner has responsibility for, are designed and constructed in full compliance with: • The bushfire resistant construction requirements of the Building Code of Australia (Volumes 1 and 2 of the National Construction Code), as established by the Building Regulations 2012 (WA Building Act 2011); and • Any additional bushfire protection measures this Bushfire Management Plan has established are to be implemented.

7	Annually review the Bushfire Emergency Plan and complete all actions contained within the 'Pre-Season Preparation Procedure' and the 'In-Season Preparation Procedure' at the appropriate times of the year.
8	The bushfire specific content of the operation's site emergency plan must be reviewed annually, relevant information updated and ensure all bushfire related preparation procedures are carried out.

6.3 Local Government Responsibilities – Ongoing Management

LOCAL GOVERNMENT – ONGOING MANAGEMENT	
No.	Management Actions
1	Monitor landowner compliance with the annual Shire of Murray Firebreak Notice and Bushfire Information 2022-2023 and with any bushfire protection measures that are: • Established by this BMP; • Are required to be maintained by the landowner/occupier; and • Are relevant to local government operations.

APPENDIX A: DETAILED BAL ASSESSMENT DATA AND SUPPORTING INFORMATION

A1: BAL Assessment Inputs Common to the Method 1 and Method 2 Procedures

A1.1: FIRE DANGER INDICES (FDI/FDI/GFDI)

When using Method 1 the relevant FDI value required to be applied for each state and region is established by AS 3959:2018, Table 2.1. Each FDI value applied in Tables 2.4 – 2.7 represents both the Forest Fire Danger Index (FFDI) and a deemed equivalent for the Grassland Fire Danger Index (GFDI), as per Table B2 in Appendix B. When using Method 2, the relevant FFDI and GFDI are applied.

The values may be able to be refined within a jurisdiction, where sufficient climatological data is available and in consultation with the relevant authority.

Relevant Jurisdiction:	WA	Region:	Whole State	Method 1	Applied FDI:	80
				Method 2	Applied FFDI:	N/A
					Applied GFDI:	N/A

A1.2: VEGETATION ASSESSMENT AND CLASSIFICATION

Vegetation Types and Classification

In accordance with AS 3959:2018 clauses 2.2.3 and C2.2.3.1, all vegetation types within 100 metres of the 'site' (defined as "the part of the allotment of land on which a building stands or is to be erected"), are identified and classified. Any vegetation more than 100 metres from the site that has influenced the classification of vegetation within 100 metres of the site, is identified and noted. The maximum excess distance is established by AS 3959: 2018 cl 2.2.3.2 and is an additional 100 metres.

Classification is also guided by the Visual Guide for Bushfire Risk Assessment in WA (WA Department of Planning February 2016) and any relevant FPA Australia practice notes.

Modified Vegetation

The vegetation types have been assessed as they will be in their natural mature states, rather than what might be observed on the day. Vegetation destroyed or damaged by a bushfire or other natural disaster has been assessed on its expected re-generated mature state. Modified areas of vegetation can be excluded from classification if they consist of low threat vegetation managed in a minimal fuel condition, satisfying AS 3959:2018 s2.2.3.2(f), and there is sufficient justification to reasonable expect that this modified state will exist in perpetuity.

The Influence of Ground Slope

Where significant variation in effective slope exists under a consistent vegetation type, these will be delineated as separate vegetation areas to account for the difference in potential bushfire behaviour, in accordance with AS 3959:2018 clauses 2.2.5 and C2.2.5.

THE INFLUENCE OF VEGETATION GREATER THAN 100 METRES FROM THE SUBJECT SITE	
Vegetation area(s) within 100m of the site whose classification has been influenced by the existence of bushfire prone vegetation from 100m – 200m from the site:	None
Assessment Statement:	N/A

VEGETATION AREA 1				
Classification	D. SCRUB			
Types Identified	Open scrub D-14			
Effective Slope	Measured	Flat 0 degrees	Applied Range (Method 1)	Upslope or flat 0 degrees
Dominant & Sub-Dominant Layers (species as relevant)	Mixed shrubs and scrub species growing up to 3 metres in height across undulating terrain.			
Understorey:	Pastural Grasses and sedges with scattered seasonal herbs.			
Additional Justification:	Not Required.			
Post Development Assumptions:	Vegetation is classified as worst-case scenario. Classified vegetation located within the asset protection zone will be managed to a low threat state by subject site landowner. Note: Any offsite vegetation cannot be managed or removed by the subject site landowner			

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PHOTO ID: 5	PHOTO ID: 6

VEGETATION AREA 2						
Classification	A. FOREST					
Types Identified	Open forest A-03					
Exclusion Clause	N/A					
Effective Slope	Measured	flat 0 degrees		Applied Range (Method 1)	Upslope or flat 0 degrees	
Foliage Cover (all layers)	30-70%	Shrub/Heath Height	1-2m	Tree Height	Over 30m	
Dominant & Sub-Dominant Layers (species as relevant)	Mixed eucalyptus and corymbia species found in low-lying wet areas and creeklines.					
Understorey:	Mixed native shrubs and pastural grasses.					
Additional Justification:	Not Required.					
Post Development Assumptions:	Vegetation is classified as worst-case scenario. Classified vegetation located within the asset protection zone will be managed to a low threat state by subject site landowner Note: Any offsite vegetation cannot be managed or removed by the subject site landowner					

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VEGETATION AREA 3				
Classification	G. GRASSLAND			
Types Identified	Tussock grassland G-22 Open herbfield G-27			
Effective Slope	Measured	Flat 0 degrees	Applied Range (Method 1)	Upslope or flat 0 degrees
Additional Justification:	Class G Grassland with occasional shrub present. Foliage cover is less than 10%.			
Post Development Assumptions:	Vegetation is classified as worst-case scenario. Classified vegetation located within the asset protection zone will be managed to a low threat state by subject site landowner Note: Any offsite vegetation cannot be managed or removed by the subject site landowner			

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A1.3: EFFECTIVE SLOPE

Measuring

Effective slope refers to the slope "under the classified vegetation which most significantly influences bushfire behaviour (AS 3959:2018, clause B4, CB4). It is not the average slope.

It is described as upslope, flat or downslope when viewed from the exposed element (e.g., building) looking towards the vegetation – and measured in degrees. Ground slope has a direct and significant influence on a bushfire's rate of spread and intensity, which increases when travelling up a slope.

The slope under the vegetation in closest proximity to the exposed element(s), over the distance that will most likely carry the entire depth of the flaming front, will be a significant consideration in the determination of the effective slope. This distance is determined as a function of the potential quasi-steady rate of spread and expected residence time (i.e., the flaming combustion period at a single point on the ground), of a bushfire in the specific vegetation type/landscape scenario.

Slope Variation Within Areas of Vegetation

Where a significant variation in effective slope exists under a consistent vegetation type, these will be delineated as separate vegetation areas to account for the difference in potential bushfire behaviour, in accordance with AS 3959:2018 clauses 2.2.5 and C2.2.5.

Slope Variation Due to Multiple Development Sites

When the effective slope, under a given area of bushfire prone vegetation, will vary significantly relative to multiple proposed development sites (exposed elements), then the effective slopes corresponding to each of the different locations, are separately identified.

The relevant (worst case) effective slope is determined in the direction corresponding to the potential directions of fire spread towards the subject building(s).

Differences in Application of Effective Slope - AS 3959:2018 Method 1 versus Method 2 Procedures

The Method 1 procedure provides five different slope ranges from flat (including all upslopes) to 20 degrees downslope to define the effective slope and bushfire behaviour model calculations apply the highest value in each range (i.e., 0^0, 5^0, 10^0, 15^0 or 20^0).

The Method 2 procedure requires an actual slope (up or down in degrees) to be determined. AS 3959:2018, clause B1 limits the effective slope that can be applied to 30 degrees downslope and 15 degrees upslope. Where any upslope is greater than 15 degrees, then 15 degrees is to be used.

SITE ASSESSMENT DETAILS - EXPLANATION & JUSTIFICATION

The effective slopes determined from the site assessment are recorded in Table 3.1 of this Bushfire Management Plan. When their derivation requires additional explanation and justification, this is provided below.

A1.4: SEPARATION DISTANCE

Measuring

The separation distance is the distance in the horizontal plane between the receiver (building/structure or area of land being considered) and the edge of the classified vegetation (AS 3959:2018, clause 2.2.4)

The relevant parts of a building/structure from which the measurement is taken is the nearest part of an external wall or where a wall does not exist, the supporting posts or columns. Certain parts of buildings are excluded including eaves and roof overhangs.

The edge of the vegetation, for forests and woodlands, will be determined by the unmanaged understorey rather than either the canopy (drip line) or the trunk (AS 3959:2018, clause C2.2.5).

Measured Separation Distance as a Calculation Input

If a separation distance can be measured because the location of the building/structure relative to the edge of the relevant classified vegetation is known, this figure can be entered into the BAL calculation. The result is a determined BAL rating.

Assumed Separation Distance as a Calculation Input

When the building/structure location within the lot is not known, an assumed building location may be applied that would establish the closest positioning of the building/structure relative to the relevant area of vegetation.

The assumed location would be based on a factor that puts a restriction on a building location such as:

- An established setback from the boundary of a lot, such as a residential design code setback or a restrictive covenant; or
- Within an established building envelope.

The resultant BAL rating would be indicative and require later confirmation (via a Compliance Report) of the building/structure actual location relative to the vegetation to establish the determined BAL rating.

Separation Distance as a Calculation Output

With the necessary site specific assessment inputs and using the AS 3959:2018 bushfire modelling equations, the range of separation distances that will correspond to each BAL rating (each of which represents a range of radiant heat flux), can be calculated. This has application for bushfire planning scenarios such as:

- When the separation distance cannot be measured because the exact location of the exposed element (i.e., the building, structure or area), relative to classified vegetation, is yet to be determined.

  In this scenario, the required information is the identification of building locations onsite that will correspond to each BAL rating. That is, indicative BAL ratings can be derived for a variety of potential building/structure locations; or

- The separation distance is known for a given building, structure or area (and a determined BAL rating can be derived), but additional information is required regarding the exposure levels (to the transfer of radiant heat from a bushfire), of buildings or persons, that will exist at different points within the subject site.

The calculated range of separation distances corresponding to each BAL rating can be presented in a table and/or illustrated as a BAL Contour Map – whichever is determined to best fit the purpose of the assessment.

For additional information refer to the information boxes in Section 3 'Bushfire Attack Levels (BAL) - Understanding the Results and Section 3.2. 'Interpretation of the BAL Contour Map'.

SITE ASSESSMENT DETAILS - EXPLANATION & JUSTIFICATION

For the subject development/use the applicable separation distances values are derived from calculations applying the assessed site data. They are an output value, not an input value and therefore are not presented or justified in this appendix.

The derived values are presented in Section 3, Table 3.2 and illustrated as a BAL contour map in Figure 3.2.

APPENDIX B: ONSITE VEGETATION MANAGEMENT - THE APZ

THE ASSET PROTECTION ZONE (APZ) - DESCRIPTION

This is an area surrounding a habitable building containing either no fire fuels and/or low threat fire fuels that are managed in a minimal fuel condition. The primary objectives include:

- To ensure the building is sufficiently separated from the bushfire hazard to limit the impact of its direct attack mechanisms. That is, the dimensions of the APZ will, for most site scenarios, remove the potential for direct flame contact on the building, reduce the level of radiant heat to which the building is exposed and ensure some reduction in the level of ember attack (with the level of reduction being dependent on the vegetation types of present);
- To ensure any vegetation retained within the APZ presents low threat levels and prevents surface fire spreading to the building;
- To ensure other combustible materials that can result in consequential fire (typically ignited by embers) within both the APZ and parts of the building, are eliminated, minimised and/or appropriately located or protected. (Note: The explanatory notes in the Guidelines provide some guidance for achieving this objective and other sources are available. Research shows that consequential fire, ignited by embers, is the primary cause of building loss in past bushfire events); and
- To provide a defendable space for firefighting activities.

B1: The Dimensions and Location of the APZ to be Established and Maintained

UNDERSTANDING THE APZ PLANNING ASSESSMENT VERSUS ITS IMPLEMENTATION REQUIREMENTS

THE 'PLANNING BAL-29' APZ

It is important ***to understand is that the 'Planning BAL-29' APZ is not necessarily the size of the APZ that must be*** *physically established and maintained by a landowner. It is a screening tool for making planning approval decisions.*

The assessment against the Bushfire Protection Criteria is conducted for planning approval purposes. To satisfy acceptable solution 'A2.1: Asset Protection Zone', it must be demonstrated that certain minimum separation distances between the relevant building/structure and different classes of bushfire prone vegetation either exist or can be created and will remain in perpetuity.

The required minimum separation distances are those that will ensure the potential radiant heat impact on relevant existing or future buildings does not exceed 29 kW/m^2. The area of land contained within these separation distances is described as an Asset Protection Zone (APZ) and is to be comprised of non-vegetated land or low threat vegetation managed in a minimal fuel condition.

The applicable minimum separation distances will vary dependent on the vegetation types, the slope of the land they are growing on and other relevant factors specific to the site and its use.

The resulting **'Planning BAL-29'** APZ dimensions may extend outside subject lot boundaries.

It is the purpose of the bushfire consultant's 'Supporting Assessment Detail', that is presented in the assessment against the acceptable solution A2.1, that will identify and justify how any offsite land within the 'Planning BAL-29 APZ (which the subject landowner has no authority or responsibility to manage), will meet the requirements of being either non-vegetated land or low threat vegetation managed in a minimal fuel condition and likely to remain in this state in perpetuity. Or otherwise, explain how this condition cannot be met.

It is the 'Planning BAL-29' APZ dimensions that will be stated in relevant tables and shown on maps as necessary in this BMP. The exceptions are the tables that are included within this appendix - when relevant to the subject lot(s) - which will present 'BAL Rating' and 'Landowner' APZ dimensions.

THE 'BAL RATING' APZ

The 'BAL Rating' APZ will ensure that the potential radiant heat exposure of the building/structure will be limited to the level that the applied construction requirements, (i.e., those corresponding to the building/structure's determined BAL rating), are designed to resist.

The minimum dimensions of the 'BAL Rating' APZ to be established and maintained will be those that correspond to the determined BAL rating for the specific building/structure. They will account for the specific conditions on and surrounding the subject lot.

The required dimensions of the ***'BAL Rating' APZ establish the size of the APZ that must physically exist either*** *entirely within a subject lot or in combination with an area of adjoining land.*

If in combination with adjoining (offsite) land, it must be justified how the offsite land can most reasonably be expected to either remain unvegetated or be able to meet and maintain the APZ Standards in perpetuity, without any actions by the owner of the subject lot.

The applicable determined BAL rating will have been stated in the relevant assessment section of this BMP when it can be assessed as a 'determined' rather than 'indicative' rating. Otherwise, it will be shown on the BAL Certificate that is submitted as part of a building application.

THE 'LANDOWNER' APZ

Dimensions: The 'Landowner' APZ is to be established and maintained by the owner of the subject lot. The minimum dimensions are the 'BAL Rating' APZ dimensions except that they will be limited to the distance that they can be established within the subject lot. (Note: Any removal of native vegetation my require the approval of the relevant authority.

The remaining required separation distance outside the lot has been assessed by the bushfire consultant to be most likely to remain in a low threat state in perpetuity without any actions to be taken by the owner of the subject lot.

These minimum 'within the lot' APZ dimensions will only be greater when the relevant local government's annual firebreak / hazard reduction notice (issued under s33 of the Bushfires Act 1954), specifies the APZ dimensions to be applied within the lot and they are greater. Consequently, the 'Landowner' APZ dimensions can be a combination of the 'BAL Rating' Dimensions and the Local Government requirements. Check their annual notice for revisions to these requirements.

The dimensions of the 'Landowner' *APZ establish the size of the APZ that must be established and maintained by the landowner within the subject lot.*

Location: The 'Landowner' APZ for which the landowner has the responsibility to establish and maintain, is that which will exist entirely within the boundaries of the relevant lot, unless an approved formal and enforceable agreement allows them to manage a specified area of land external to the subject lot.

In most cases the landowner will only have authority and responsibility to establish and manage the APZ within the subject lot.

Otherwise, when there is a remaining part of the 'BAL Rating' APZ existing outside the subject lot, then these areas of land will, in most situations, include non-vegetated areas (e.g., roads / parking / drainage / water body), formally managed areas of vegetation (e.g., public open space / recreation areas / services installed in a common section of land) or an APZ on a neighbouring lot that is required to be established and maintained by the owner of that adjoining lot.

> *For vulnerable land uses, the 'BAL Rating' APZ and 'Landowner' APZ will also refer to the dimensions corresponding to radiant heat impact levels of 10 kW/m² and 2 kW/m² (calculated using 1200K flame temperature).*
>
> *For development applications only, the 'Landowner' APZ dimensions are also shown on the Property Bushfire Management Statement in Section 6.3.1 of this BMP when it is a required component of the Bushfire Management Plan.*

Table B1.1: The applicable 'Landowner' APZ Dimensions when indicative BAL ratings have been established by the BMP.

DETERMINATION OF **THE** 'REQUIRED' **APZ DIMENSIONS TO BE** IMPLEMENTED AND MAINTAINED BY LANDOWNER WITHIN THEIR LOT									
Relevant Buildings(s)	Vegetation Classification [Refer to Fig 3.1]		Minimum Required Separation Distances from Building to Vegetation (metres)						
			Established by the 'BAL Rating' APZ Dimension					Established by the "Local Government' APZ Dimension	The 'Required' APZ Dimensions [see note]
			Determined Radiant Heat Impact	Stated 'Indicative' or 'Conditional' BAL				Firebreak / Hazard Reduction Notice	
	Area	Class		BAL-29	BAL-19	BAL-12.5	BAL-LOW		
Workshop, Office	1	(D) Scrub	N/A	13	19	27	100	'20m'	20
	2	(A) Forest		21	31	42	100	'20m'	21
	3	(G) Grassland		8	12	17	50	'20m'	20
Office/Cribroom (onsite shelter	1	(D) Scrub		N/A				N/A	44
	2	(A) Forest						N/A	63
	3	(G) Grassland						N/A	29

Note:
Workshop and Office
The 'Required' APZ Dimension corresponding to each area of vegetation is the greater of the 'BAL Rating' or the 'Firebreak/Hazard Reduction Notice' APZ dimensions - unless a local government maximum distance(s) is established as a result of their environmental assessment of the subject site. The area of the APZ will also be limited to the subject lot boundary unless otherwise justified in this Report/Plan. Final determination of the dimensions will require that any indicative or conditional BAL becomes a 'Determined' BAL.

Onsite shelter building: Office /Cribroom
The office/cribroom (on-site shelter building) will be sited in an area 73m from the nearest forest classifiable vegetation. It will be subject to a maximum heat flux of 10 kW/m^2 and built to BAL-29 construction standards.

Comments: In accordance with the Shire of Murray Firebreak Notice all vegetation within the Asset Protection Zone reduced and maintained. The flammable material is to be reduced and maintained to a height of less than 5 centimetres.

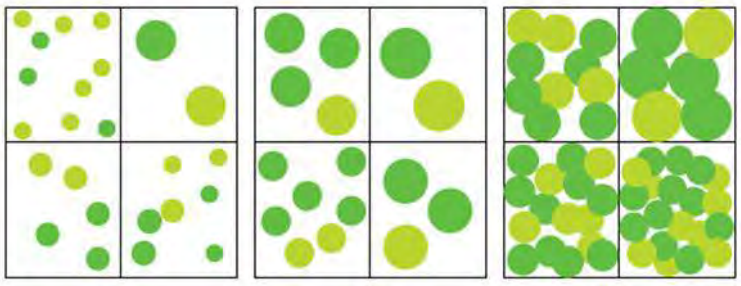
B2: The Standards for the APZ as Established by the Guidelines (DPLH, v1.4)

Within the Guidelines (source: https://www.wa.gov.au/government/document-collections/state-planning-policy-37-planning-bushfire-prone-areas), the management Standards are established by:

- Schedule 1: Standards for Asset Protection Zones (see extract below) established by the Guidelines; and
- The associated explanatory notes (Guidelines E2) that address (a) managing an asset protection zone (APZ) to a low threat state (b) landscaping and design of an asset protection zone and (c) plant flammability.

ELEMENT 2: SITING AND DESIGN OF DEVELOPMENT

SCHEDULE 1: STANDARDS FOR ASSET PROTECTION ZONES

OBJECT	REQUIREMENT
Fences within the APZ	• Should be constructed from non-combustible materials (for example, iron, brick, limestone, metal post and wire, or bushfire-resisting timber referenced in Appendix F of AS 3959).
Fine fuel load (Combustible, dead vegetation matter <6 millimetres in thickness)	• Should be managed and removed on a regular basis to maintain a low threat state. • Should be maintained at <2 tonnes per hectare (on average). • Mulches should be non-combustible such as stone, gravel or crushed mineral earth or wood mulch >6 millimetres in thickness.
Trees* (>6 metres in height)	• Trunks at maturity should be a minimum distance of six metres from all elevations of the building. • Branches at maturity should not touch or overhang a building or powerline. • Lower branches and loose bark should be removed to a height of two metres above the ground and/or surface vegetation. • Canopy cover within the APZ should be <15 per cent of the total APZ area. • Tree canopies at maturity should be at least five metres apart to avoid forming a continuous canopy. Stands of existing mature trees with interlocking canopies may be treated as an individual canopy provided that the total canopy cover within the APZ will not exceed 15 per cent and are not connected to the tree canopy outside the APZ. **Figure 19:** Tree canopy cover – ranging from 15 to 70 per cent at maturity  15% 30% 70%

Shrub* and scrub* (0.5 metres to six metres in height). Shrub and scrub >6 metres in height are to be treated as trees.	• Should not be located under trees or within three metres of buildings. • Should not be planted in clumps >5 square metres in area. • Clumps should be separated from each other and any exposed window or door by at least 10 metres.
Ground covers* (<0.5 metres in height. Ground covers >0.5 metres in height are to be treated as shrubs)	• Can be planted under trees but must be maintained to remove dead plant material, as prescribed in 'Fine fuel load' above. • Can be located within two metres of a structure, but three metres from windows or doors if >100 millimetres in height.
Grass	• Grass should be maintained at a height of 100 millimetres or less, at all times. • Wherever possible, perennial grasses should be used and well-hydrated with regular application of wetting agents and efficient irrigation.
Defendable space	• Within three metres of each wall or supporting post of a habitable building, the area is kept free from vegetation, but can include ground covers, grass and non-combustible mulches as prescribed above.
LP Gas Cylinders	• Should be located on the side of a building furthest from the likely direction of a bushfire or on the side of a building where surrounding classified vegetation is upslope, at least one metre from vulnerable parts of a building. • The pressure relief valve should point away from the house. • No flammable material within six metres from the front of the valve. • Must sit on a firm, level and non-combustible base and be secured to a solid structure.

** Plant flammability, landscaping design and maintenance should be considered – refer to explanatory notes*

B3: The Standards for the APZ as Established by the Local Government

Refer to the firebreak / hazard reduction notice issued annually (under s33 of the Bushfires Act 1954) by the relevant local government. It may state Standards that vary from those established by the Guidelines and that have been endorsed by the WAPC and DFES as per Section 4.5.3 of the Guidelines.

A copy of the applicable notice is not included here as they are subject to being reviewed and modified prior to issuing each year. Refer to ratepayers notices and/or the local government's website for the current version.

B4: Maintaining Low Threat and Non-Vegetated Areas Excluded from Classification

AS 3959 establishes the methodology for determining a bushfire attack level (BAL). The methodology includes the classification of the subject site's surrounding vegetation according to their 'type' and the application of the corresponding bushfire behaviour models to determine the BAL. Certain vegetation can be considered as low threat and excluded from classification. Where this has occurred in assessing the site, the extract from AS3959:2018 below state the requirements (including the size of the vegetation area if relevant to the assessment) for maintenance of those areas of land.

2.2.3.2 *Exclusions—Low threat vegetation and non-vegetated areas*

The following vegetation shall be excluded from a BAL assessment:

(a) Vegetation of any type that is more than 100 m from the site.

(b) Single areas of vegetation less than 1 ha in area and not within 100 m of other areas of vegetation being classified vegetation.

(c) Multiple areas of vegetation less than 0.25 ha in area and not within 20 m of the site, or each other or of other areas of vegetation being classified vegetation.

(d) Strips of vegetation less than 20 m in width (measured perpendicular to the elevation exposed to the strip of vegetation) regardless of length and not within 20 m of the site or each other, or other areas of vegetation being classified vegetation.

(e) Non-vegetated areas, that is, areas permanently cleared of vegetation, including waterways, exposed beaches, roads, footpaths, buildings and rocky outcrops.

(f) Vegetation regarded as low threat due to factors such as flammability, moisture content or fuel load. This includes grassland managed in a minimal fuel condition, mangroves and other saline wetlands, maintained lawns, golf courses (such as playing areas and fairways), maintained public reserves and parklands, sporting fields, vineyards, orchards, banana plantations, market gardens (and other non-curing crops), cultivated gardens, commercial nurseries, nature strips and windbreaks.

NOTES:

1 Minimal fuel condition means there is insufficient fuel available to significantly increase the severity of the bushfire attack (recognizable as short-cropped grass for example, to a nominal height of 100 mm).

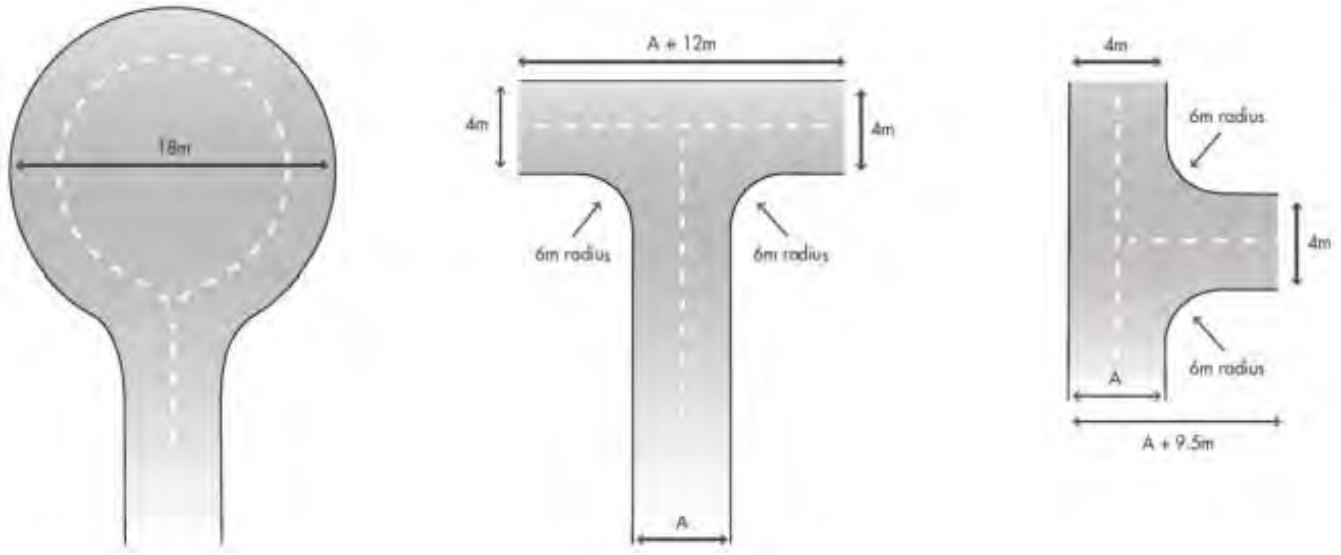
2 A windbreak is considered a single row of trees used as a screen or to reduce the effect of wind on the leeward side of the trees.

The design/layout requirements for access are established by the acceptable solutions of the Guidelines (DPLH, 2021 v1.4) Element 3 and vary dependent on the access component, the land use and the presence of 'vulnerable' persons. Consequently, the best reference source are the Guidelines. The technical requirements that are fixed for all components and uses are presented in this appendix.

GUIDELINES TABLE 6, EXPLANATORY NOTES E3.3 & E3.6 AND RELEVANT ACCEPTABLE SOLUTIONS

Technical Component	Vehicular Access Types / Components			
	Public Roads	Emergency Access Way [1]	Fire Service Access Route [1]	Battle-axe and Private Driveways [2]
Minimum trafficable surface (m)	In accordance with A3.1	6	6	4
Minimum Horizontal clearance (m)	N/A	6	6	6
Minimum Vertical clearance (m)	4.5			
Minimum weight capacity (t)	15			
Maximum Grade Unsealed Road [3]	As outlined in the IPWEA Subdivision Guidelines	1:10 (10%)		
Maximum Grade Sealed Road [3]		1:7 (14.3%)		
Maximum Average Grade Sealed Road		1:10 (10%)		
Minimum Inner Radius of Road Curves (m)		8.5		

Turnaround Area Dimensions for No-through Road, Battle-axe Legs and Private Driveways [4]



Passing Bay Requirements for Battle-axe leg and Private Driveway

When the access component length is greater than the stated maximum, passing bays are required every 200m with a minimum length of 20m and a minimum additional trafficable width of 2m (i.e. the combined trafficable width of the passing bay and constructed private driveway to be a minimum 6m).

Emergency Access Way – Additional Requirements

Provide a through connection to a public road, be no more than 500m in length, must be signposted and if gated, gates must be open the whole trafficable width and remain unlocked.

[1] To have crossfalls between 3 and 6%.

[2] Where driveways and battle-axe legs are not required to comply with the widths in A3.5 or A3.6, they are to comply with the Residential Design Codes and Development Control Policy 2.2 Residential Subdivision.

[3] Dips must have no more than a 1 in 8 (12.5% or 7.1 degree) entry and exit angle.

[4] The turnaround area should be within 30m of the main habitable building.

D1: Reticulated Areas – Hydrant Supply

The Guidelines state "where a reticulated water supply is existing or proposed, hydrant connection(s) should be provided in accordance with the specifications of the relevant water supply authority."

The main scheme water suppliers / authorities in WA are The Water Corporation, AqWest – Bunbury Water Corporation and Busselton Water Corporation. Various local authority exists in other non-scheme and regional areas. However, most existing fire hydrants are connected to Water Corporation water mains.

Consequently, the hydrant location specifications from The Water Corporation's 'No 63 Water Reticulation Standard' (Ver 3 Rev 15) are provided in the extract below with the key distances relevant to bushfire planning assessments being highlighted. This Standard is deemed to be the baseline criteria for developments and should be applied unless different local water supply authority conditions apply. Other applicable specification will be found in the Standard.

Note: The maximum distance from a hydrant to the rear of a lot/building is generally interpreted as not applicable to large lot sizes where the maximum distance becomes an impractical limitation i.e., typically rural residential areas.

2.2.1.5 Appurtenances

c. Hydrants

Hydrants shall be screw-down hydrant with built-in isolation valve and installed only on DN100 or larger pipes. Hydrants shall be located:

- so that the maximum distance between a hydrant and the rear of a building envelope, (or in the absence of a building envelope the rear of the lot) shall be 120m;
- so that spacing (as measured by hose-run) between hydrants in non-residential or mixed use areas shall be maximized and no greater than 100m;
- so that spacing (as measured by hose-run) between hydrants in residential areas with lots per dwelling <10,000m^2 shall be maximized and no greater than 200m;
- so that spacing between hydrants (as measured by hose-run) in rural residential areas where minimum lots per dwelling is >10,000 m^2 (1ha) shall be maximized and no greater than 400m;
- centrally along the frontage of a lot to avoid being under driveways, unless the lot features a frontage 6m or less, in which case it shall be placed to the side opposite the driveway;
- at lots that have the widest frontage in the local area;
- where appropriate at the truncation of road junctions or intersections so that they can serve more than one street and can be readily located;
- on both sides of the major roads at staggered intervals where there are mains on both sides of the road;
- at major intersections on dual multi-lane roads, where two hydrants are to be sited on diagonally opposite corners;
- hydrants should be located at least 20m from traffic calming devices i.e., median slow points or chokers, chicanes, mini traffic circles, and intersection 'pop-outs' to ensure traffic is not impeded;
- in a position not less than 10m from any high voltage main electrical distribution equipment such as transformers and distribution boards, liquefied petroleum gas or other combustible storage;
- directly on top of the main using a tee unless proved to be impractical.

D2: Non-Reticulated Areas – Static Supply

For specified requirements, refer to the Guidelines Element 4: Water – Acceptable Solution A4.2 , Explanatory Notes E4 (that provide water supply establishment detail under the headings of water supply; independent water and power supply; strategic water supplies, alternative water sources and location of water tanks) and the technical requirements established by Schedule 2 (reproduced below).

SCHEDULE 2: WATER SUPPLY DEDICATED FOR BUSHFIRE FIREFIGHTING PURPOSES

2.1 Water supply requirements

Water dedicated for firefighting should be provided in accordance with Table 7 below, and be in addition to water required for drinking purposes.

Table 7: Water supply dedicated for bushfire firefighting purposes

PLANNING APPLICATION	NON-RETICULATED AREAS
Development application	10,000L per habitable building
Structure Plan / Subdivision: Creation of 1 additional lot	10,000L per lot
Structure Plan / Subdivision: Creation of 3 to 24 lots	10,000L tank per lot **or** 50,000L strategic water tank
Structure Plan / Subdivision: Creation of 25 lots or more	50,000L per 25 lots or part thereof Provided as a strategic water tank(s) or 10,000L tank per lot

2.2 Technical requirements

2.2.1 Construction and design

An above-ground tank and associated stand should be constructed of non-combustible material. The tank may need to comply with AS/NZS 3500.1:2018.

Below ground tanks should have a 200mm diameter access hole to allow tankers or emergency service vehicles to refill direct from the tank, with the outlet location clearly marked at the surface. The tank may need to comply with AS/NZS 3500.1:2018. An inspection opening may double as the access hole provided that the inspection opening meets the requirements of AS/NZS 3500.1:2018. If the tank is required under the BCA as part of fire hydrant installation, then the tank will also need to comply with AS 2419.

Where an outlet for an emergency service vehicle is provided, then an unobstructed, hardened ground surface is to be supplied within four metres of any water supply.

2.2.2 Pipes and fittings

All above-ground, exposed water supply pipes and fittings should be metal. Fittings should be located away from the source of bushfire attack and be in accordance with the applicable section below, unless otherwise specified by the local government.

2.2.2.1 Fittings for above-ground water tanks:

- Commercial land uses: 125mm Storz fitting; or
- Strategic water tanks: 50mm or 100mm (where applicable and adapters are available) male camlock coupling with full flow valve; or
- Standalone water tanks: 50mm male camlock coupling with full flow valve; or
- Combined water tanks: 50mm male camlock coupling with full flow valve or a domestic fitting, being a standard household tap that enables an occupant to access the water supply with domestic hoses or buckets for extinguishing minor fires.

2.2.2.2 Remote outlets

In certain circumstances, it may be beneficial to have the outlet located away from the water supply. In such instances in which a remote outlet is to be used, the applicant should consult the local government and DFES on their proposal.

EXAMPLE CONSTRUCTION AND FITTINGS	
	
Strategic 47,000 Litre Concrete Tank & Protected Fittings	
	
10,000 Litre Concrete Tank	Storz and Camlock Couplings
	
Full Flow 50mm Ball Valve	Full Flow 50mm Gate Valve and Male Camlock

(To be provided by Proponent)

ADDENDUM 2 : METHOD 2 FLAMESOL CALCULATIONS FOR 10KWM^2 (ONSITE SHELTER)

Calculated December 6, 2022, 5:59 pm (MDc v.4.9)

Minimum Distance Calculator - AS3959-2018 (Method 2)			
Inputs		Outputs	
Fire Danger Index	80	Rate of spread	2.4 km/h
Vegetation classification	Forest	Flame length	19.8 m
Understorey fuel load	25 t/ha	Flame angle	63 °, 68 °, 73 °, 75 °, 77 ° & 82 °
Total fuel load	35 t/ha	Elevation of receiver	8.82 m, 9.17 m, 9.460000000000001 m, 9.56 m, 9.640000000000001 m & 9.800000000000001 m
Vegetation height	n/a	Fire intensity	43,400 kW/m
Effective slope	0 °	Transmissivity	0.843, 0.822, 0.796, 0.775, 0.764 & 0.712
Site slope	0 °	Viewfactor	0.4235, 0.3149, 0.2132, 0.144, 0.1168 & 0.0313
Flame width	100 m	Minimum distance to < 40 kW/m²	22.9 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	29.9 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	41.2 m
Flame temperature	1,200 K	Minimum distance to < 12.5 kW/m²	54.9 m
		Minimum distance to < 10 kW/m²	63.2 m

Rate of Spread - Mcarthur, 1973 & Noble et al., 1980

Flame length - NSW Rural Fire Service, 2001 & Noble et al., 1980

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005

FPA AUSTRALIA | FLAMESOL

Calculated December 6, 2022, 6:00 pm (MDc v.4.9)

Minimum Distance Calculator - AS3959-2018 (Method 2)			
Inputs		Outputs	
Fire Danger Index	80	Rate of spread	4.16 km/h
Vegetation classification	Scrub	Flame length	11.62 m
Understorey fuel load	25 t/ha	Flame angle	65 °, 71 °, 76 °, 79 °, 80 ° & 84 °
Total fuel load	25 t/ha	Elevation of receiver	5.26 m, 5.49 m, 5.64 m, 5.7 m, 5.72 m & 5.78 m
Vegetation height	m	Fire intensity	53,815 kW/m
Effective slope	0 °	Transmissivity	0.865, 0.848, 0.824, 0.8, 0.788 & 0.732
Site slope	0 °	Viewfactor	0.413, 0.3045, 0.2058, 0.1396, 0.1134 & 0.0304
Flame width	100 m	Minimum distance to < 40 kW/m²	13.9 m
Windspeed	45 km/h	Minimum distance to < 29 kW/m²	18.7 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	27 m
Flame temperature	1,200 K	Minimum distance to < 12.5 kW/m²	37.5 m
		Minimum distance to < 10 kW/m²	44.1 m

Rate of Spread - Catchpole et al. 1998

Flame length - Byram, 1959

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005

FPA AUSTRALIA | FLAMESOL

Calculated December 6, 2022, 5:57 pm (MDc v.4.9)

Minimum Distance Calculator - AS3959-2018 (Method 2)			
Inputs		Outputs	
Grassland Fire Danger Index	110	Rate of spread	14.3 km/h
Vegetation classification	Grassland	Flame length	6.87 m
Understorey fuel load	4.5 t/ha	Flame angle	66 °, 72 °, 78 °, 81 °, 82 ° & 86 °
Total fuel load	4.5 t/ha	Elevation of receiver	3.13 m, 3.26 m, 3.36 m, 3.39 m, 3.4 m & 3.42 m
Vegetation height	n/a	Fire intensity	33,247 kW/m
Effective slope	0 °	Transmissivity	0.881, 0.869, 0.85, 0.828, 0.8159999999999999 & 0.75
Site slope	0 °	Viewfactor	0.4037, 0.2976, 0.1994, 0.1344, 0.1096 & 0.0297
Flame width	100 m	Minimum distance to < 40 kW/m²	8.4 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	11.4 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	16.9 m
Flame temperature	1,200 K	Minimum distance to < 12.5 kW/m²	24.6 m
		Minimum distance to < 10 kW/m²	29.5 m

Rate of Spread - Noble et al. 1980

Flame length - Purton, 1982

Elevation of receiver - Douglas & Tan, 2005

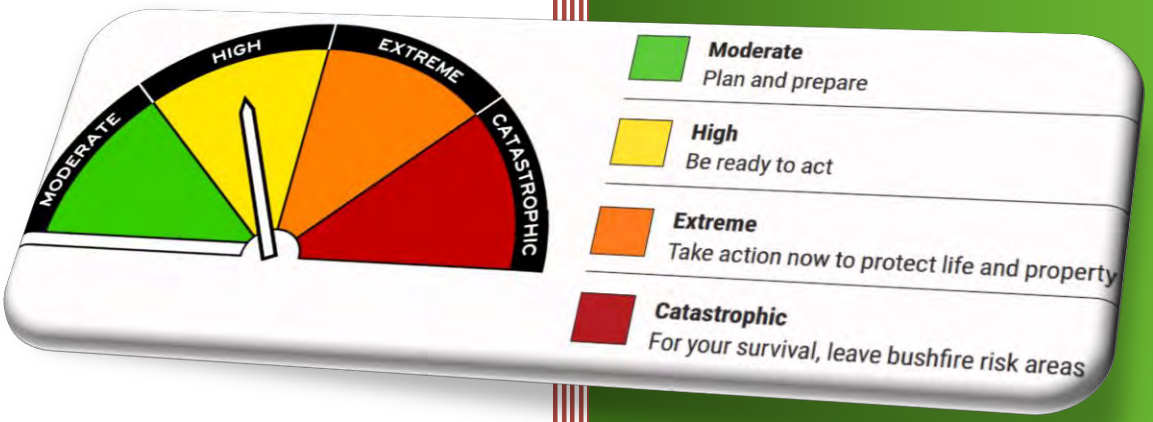
Flame angle - Douglas & Tan, 2005

Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005

BUSHFIRE PRONE PLANNING

Bushfire Emergency Plan

The Operational Document for Onsite Personnel Responsible for Emergency Management



PREVENT | PREPARE | RESPOND | RECOVER

Lot 9500 Gull Road Keralup

Shire of Murray

Facility/Premises Use: FOGO (Food Organics, Garden Organics Facility)

2 October 2023

Associated BMP: BPP Ref. No. 220666

ATTENTION

It is important that all relevant persons at this facility/premises receive formal training in the application of this Bushfire Emergency Plan, as established in the associated Bushfire Management Plan.

BPP GROUP PTY LTD T/A BUSHFIRE PRONE PLANNING

ACN: 39 166 551 784 | ABN: 39 166 551 784

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		-		☐	☐

Limitation of Liability: The procedures and their associated actions contained in this Bushfire Emergency Plan do not guarantee that, in the event of a bushfire, buildings or infrastructure will not be damaged, persons injured, or fatalities occur either on the subject site or off the site while evacuating. This is substantially due to the unpredictable nature and behaviour of fire and fire weather conditions. Additionally, the correct implementation of the required procedures will depend upon, among other things, the ongoing actions of the landowners and/or operators over which Bushfire Prone Planning has no control.

Any representation, statement, opinion, or advice expressed or implied in this document is made in good faith based on information available to Bushfire Prone Planning at the time. Bushfire Prone Planning will not, except as the law may require, be liable for any loss or other consequences whether or not due to the negligence, lack of care or otherwise of their consultants, their servants or agents, arising out of the services provided by their consultants.

THE BUSHFIRE EMERGENCY PLAN – ITS PURPOSE AND APPLICATION

The purpose of this Bushfire Emergency Plan (BEP) is to assist persons conduct the operations of the facility/premises that are directed at managing and protecting persons and property from the risks associated with a bushfire event.

To best support the purpose, this BEP is constructed to be used as an OPERATIONAL DOCUMENT that facilitates the reliable implementation of required actions at different times of the year, including during the urgent and high pressure conditions of a bushfire event.

The BEP utilises an approach that:

- Establishes Situational Scenarios as Triggers to Implement an Emergency Procedure: Each scenario has a corresponding initial bushfire emergency procedure, and associated actions, that is to be implemented. These have been developed considering the specifics of the facility/premises and its use.
- Facilitates Effective Implementation: It is structured logically and written concisely. The important reference information in the appendices assists with applying the procedures and their actions, of which the included indicative fire behaviour for the bushfire prone vegetation relevant to the facility/premises is particularly important.
- Encourages Formal Training in the Application of the BEP: It is important that persons responsible for actioning this BEP are fully aware of and knowledgeable in the application of the information presented in both the operational sections and the appendices.
- Presents Supporting Data as Necessary: This is data that may include identification of the level and types of potential risks to the site and its use and justifies the choice of protection measures incorporated into this BEP to manage those risks.

  The necessity for inclusion (as an addendum) is dependent on the complexity and scale of the facility/premises site/use and when there is a need to explain why certain procedures/actions have been applied to inform relevant persons (managers and decision makers as applicable).

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1. APPLYING THE BUSHFIRE EMERGENCY PLAN

TO DETERMINE THE REQUIRED ACTIONS TO IMPLEMENT

- At any time of the year;
- For any day of operation; and
- Whether a bushfire exists or not.

REFER TO THE *PRIMARY GUIDANCE TABLE* ON THE NEXT PAGE AND

1. Identify the applicable situational scenario that acts as the *trigger* for implementing an *initial procedure*; and
2. Identify the corresponding initial procedure and its page number.

THEN PROCEED TO THE APPLICABLE *INITIAL PROCEDURE* AND CONDUCT ALL STATED *ACTIONS*.

2. PRIMARY GUIDANCE TABLE – THE TRIGGERS TO IMPLEMENT AN *INITIAL* BUSHFIRE EMERGENCY PROCEDURE

		THE IMPLEMENTATION TRIGGERS ESTABLISHED AS SITUATIONAL SCENARIOS RELEVANT TO THE SITE	THE INITIAL PROCEDURE TO IMPLEMENT [1]						
			PREVENT	PREPARE		RESPOND			RECOVER
			NO BUSHFIRE EXISTS			A BUSHFIRE EXISTS			
			PRE-SEASON PREPARE	MONITOR & MAINTAIN	PRE-EMPTIVE	ELEVATED THREAT	SAFE (EARLY) EVACUATION	SHELTER-IN-PLACE	RECOVERY
I.D.			Page 12	Page 17	Page 19	Page 21	Page 24	Page 28	Page 31
DURING THE BUSHFIRE SEASON (OCTOBER TO APRIL) WHEN LARGE PUBLIC EVENTS ARE NOT A PART OF PREMISES OPERATIONS									
A	A BUSHFIRE EXISTS	A bushfire EMERGENCY or WATCH AND ACT warning has been issued and applies to the site. The highest level response procedure (the primary response), as determined specifically for the site and its use, is triggered.					☒		
B	A BUSHFIRE EXISTS	A bushfire ADVICE warning has been issued and applies to the site.				☒			
C	A BUSHFIRE EXISTS	A bushfire warning has not been issued.				☒			
D	A BUSHFIRE EXISTS	The bushfire is either now controlled, or the fire front has moved past the facility/premises. Evacuation or shelter in place procedures may have been implemented earlier.							☒
E	NO BUSHFIRE EXISTS	The forecast Fire Danger Rating (FDR) is Catastrophic; OR The forecast Fire Danger Rating (FDR) is Extreme, and the forecast Fire Behaviour Index (FBI) is 75 or greater (refer to BOM website, see Section 4 'Emergency Information Sources'); AND/OR A Total Fire Ban is declared. A Harvest and Vehicle Movement Ban (HVMB) may also be declared.			☒				
F	NO BUSHFIRE EXISTS	The forecast fire danger rating (FDR) is High or Moderate or there is no FDR.		☒					

PROCEDURE IMPLEMENTATION TRIGGERS SITUATIONAL SCENARIOS RELEVANT TO THE SITE		THE INITIAL PROCEDURE TO IMPLEMENT [1]						
		PREVENT	PREPARE		RESPOND			RECOVER
		NO BUSHFIRE EXISTS			A BUSHFIRE EXISTS			
I.D.		PRE-SEASON PREPARE	MONITOR & MAINTAIN	PRE-EMPTIVE	ELEVATED THREAT	SAFE (EARLY) EVACUATION	SHELTER-IN-PLACE	RECOVERY
		Page 14	Page 19	Page 22	Page 23	Page 26	Page 31	Page 33
PRIOR TO THE BUSHFIRE SEASON (MAY TO SEPTEMBER)								
G	For the site location, this is the period of the year during which a bushfire event is considered to have a lower likelihood of occurrence and expected fire intensity will be lower. If a bushfire event does occur, the relevant 'Bushfire Identified' trigger will apply (see below).	☒						

Note [1]: Each trigger will activate an initial single emergency management PROCEDURE. **The corresponding** ACTIONS can include conducting a re-evaluation of the current situation. This can result in a different PROCEDURE needing to be implemented.

3. EMERGENCY CONTACTS

3.1. EMERGENCY SERVICES

AGENCY/AUTHORITY	SERVICES	CONTACT
Department of Fire and Emergency Services / Police / Ambulance	Will respond to life threatening emergencies. Use to report a fire.	Phone call: triple zero '000' Phone app: EMERGENCY PLUS
State Emergency Service (SES)	Emergency assistance - securing your property, rescuing persons.	13 2500

3.2. FACILITY/PREMISES PERSONNEL WITH EMERGENCY RESPONSIBILITIES

EMERGENCY ROLE	POSITION HELD AT FACILITY/PREMISES	LOCATION	CONTACT	
Chief Fire Warden	CEO	Offsite	Greg Watts	Phone 0428651009
Deputy Chief Fire Warden	Ops Manager	Onsite	Ross Cullen	Phone 0422643907
Fire Warden	General Manager	Onsite	Jacalyn Hammond	Phone 0412375338

3.3. UTILITIES / MEDICAL / ASSISTANCE

AGENCY/ORGANISATION	SERVICES	CONTACT
Peel Health Campus	Emergency medical services	9531 8000
Murray District Hospital	Emergency medical services	9531 7222
Western Power	Response to electricity supply outages and damage.	13 1351
Crisis Care	Crisis accommodation	1800 199 008
Australian Red Cross	Humanitarian assistance	1800 733 276 redcross.org.au/emergencies
Salvation Army	Social services care	13 72 58 (13 SALVOS) salvationarmy.org.au/need-help/disasters-and-emergencies/

4. EMERGENCY INFORMATION SOURCES

THE IMPORTANCE OF BEING AWARE OF YOUR SURROUNDINGS

Know the types of vegetation that grow on surrounding land. Be aware of the potential behaviour of a fire in this vegetation and the threats it can present under different conditions. Relevant information is included in Appendix 6.

Knowledge and awareness of the local environment and immediate past and current conditions is a valuable source of information that will assist with decision making – with hot/dry/windy weather presenting the worst conditions.

Lookout for smoke (i.e., evidence of fire) within your surrounding landscape, for as far as you can see. Be aware of the current and forecast wind direction as any fire will be likely to spread in the direction to which the wind is blowing.

YOUR FIRE WEATHER DISTRICT (BOM)	Swan Coastal South

SOURCE	INFORMATION
Emergency WA emergency.wa.gov.au	This is the primary and most up to date source of information (maps and lists) for: • Current warnings and incidents. • Designated bushfire evacuation centre. • Fire Danger Ratings (FDR) • Total Fire Bans (TFB)
Bureau of Meteorology (BOM) bom.gov.au/wa/forecasts/fire-danger-ratings.shtml	Fire Danger Ratings (FDR) and the corresponding Fire Behaviour Index (FBI).
WA Department of Fire & Emergency Services (DFES) Information Line: 13 3337 (13 DFES) dfes_wa dfeswa dfes.wa.gov.au/hazard-information/bushfire	Republishing of Emergency WA Warnings. General emergency information. Provides overviews of bushfire hazard educational information, including bushfire behaviour and preparation, response, recovery information, and FAQ.
Local Radio Stations ABC (AM/digital) or 6PR (882) abc.net.au/radio/stations	Current bushfire warnings, designated bushfire evacuation centre and other relevant information.
Emergency Alerts – through automated government telephone warning system	Voice messages (landline) and text messages (mobile) can be sent within a defined area under an immediate threat.
Bushfire.IO bushfire.io	Map based bushfire warnings, bushfire incidents and wind forecasts. A visual tool run privately – crosscheck with other sources.
WA Parks and Wildlife Service dpaw.wa.gov.au Website	Bushfire alerts and warnings, current prescribed burns in national parks.
Main Roads WA Phone: 13 8138 travelmap.mainroads.wa.gov.au/Home/Map	Road alerts and closures (incidents and roadworks).

5. RELOCATING PERSONS - IDENTIFIED SAFER LOCATIONS AND TRANSPORT

5.1. RELOCATION ONSITE – ASSEMBLY AND/OR SHELTER IN PLACE

DESIGNATED ON-SITE ASSEMBLY AREA	REFERENCE
Name: Car Park Description: Site Car Park Location: Adjacent to the Crib room	Figure 1 Site Response Map
DESIGNATED ONSITE SHELTER BUILDING or AREA	**REFERENCE**
Name: Office/Cribroom Building Description: Office/ Crib room Location: Southern part of the facility	Figure 1 Site Response Map

5.2. RELOCATION OFFSITE – EVACUATION DESTINATIONS

IDENTIFICATION OF THE OFFSITE SAFER LOCATION(S)

[this will correspond to use of the facility/premises and types of occupants]

IMPORTANT: DECLARATION OF OPERATIONAL BUSHFIRE EVACUATION CENTRES

If the facility/premises has potential Bushfire Evacuation Centres available, the declaration of which centre will become the operational centre will only be made by DFES and/or WA Police and with the involvement the Local Government - once the bushfire exists.

IN THE EVENT OF A BUSHFIRE ⇨ CHECK INFORMATION SOURCES FOR THE OPERATIONAL EVACUATION CENTRE

If this information is not yet available or if it is identified below that a Bushfire Evacuation Centre is not required, then the applicable offsite safer locations are stated on the following page. Multiple types may be applicable.

Safer Location Type	Description	Identified as Relevant to Facility / Premises
Type 1	Designated bushfire evacuation centres. Providing a safer location, away from the existing bushfire threats. Provides a temporary habitable space with potable water, toilet facilities, communication and possibly some medical services. Overnight(s) stay is likely required before returning to facility/premises or other arrangements are made.	
Type 2	Suitable buildings/grounds but not a designated bushfire evacuation centre. Providing the facilities and level of services required by the evacuees from the facility/premises. In some instances, such as significant health care dependency, these can be high level requirements. Overnight(s) stay may be required before returning to facility/premises or other arrangements are made.	

Type 3	Established urban/residential centres. Providing a safer location, away from the existing bushfire threats, that will likely provide some access to potable water and toilet facilities but no overnight stays. The evacuees will typically have no need to return to the facility/premises. From this location, relocation decisions will be made which may include returning home (local persons) or finding alternative accommodation.	✓
Type 4	A safer location within the public road network to initially head towards. No facilities or services will exist at this location. The evacuees will typically have no need to return to the facility/premises. From this location options exist for returning home (local persons), returning to local accommodation or otherwise relocating.	
Type 5	Safer open area. Providing the necessary reduction in exposure to bushfire threats for the limited period for which the threats will exist. Services and facilities will be non-existent or minimal, dependent on what provisions are possible and have been established by the Bushfire Emergency Plan and associated Bushfire Management Plan.	

SAFER OFFSITE LOCATION NO. 1	
Destination	Description/Name: 7/11 Petrol Station Address: 13 Lakes Road, Greenfields WA 6210 Nearest Cross Street: Stratford Road and Lakes Road Phone No: 9584 8752
Evacuation Route	Head South on Gull Road towards Lakes Road (4km) At the roundabout take the 3rd exit onto Lakes Road and head west over the freeway. At Gordon Road intersection follow Lakes Road left for 3.8km. Turn right onto Stratford Road and 7/11 Petrol Station will be on the left (80m)
SAFER OFFSITE LOCATION NO. 2	
Destination	Description/Name: Del Park Roadhouse Address: 4267 South Western Highway, North Dandalup WA 6207 Nearest Cross Street: Del Park Road and South Western Highway Phone No: 9530 1229
Evacuation Route	Head South on Gull Road towards Lakes Road (4km) At the roundabout take the 1st exit onto Lakes Road and head east towards north Dandalup (14km) Turn right onto South Western Highway and Del Park Roadhouse will be immediately on the left.

5.3. EVACUATION TIME & TRANSPORT – PERSONS AND VEHICLES

ESTIMATED TIME REQUIRED FOR EVACUATION - INITIATION TO COMPLETION

CONSIDERATION	ESTIMATED TIME (minutes)			
	Less Dependent / Lower Care Persons		High Dependency / High Care Persons	
	Own Transport	Provided Transport	Own Transport	Provided Transport
Preparation for evacuation (occupants, visitors/customers, staff)	20	0	0	0
Travel to furthest designated evacuation destination	15	0	0	0
When travelling to the furthest designated evacuation destination, relative safety for persons in vehicles may be attained at an earlier point enroute (refer to map). When applicable, this shorter time is applied.	0	0	0	0
APPLIED TOTAL	35	0	0	0

PLANNED MAXIMUM PERSON NUMBERS AND VEHICLE SOURCE

Person Type	Own Vehicles	Facility Transport	Contract Transport	Details
Occupants				
Visitors / Customers	20			Spring season potential for 25-30 approx drivers visiting site. Winter potential 30-40 daily drivers for a 30 min period over the full day
Staff	40			

Figure 1

Site Response Map

Lot 9500 on Plan 414516, Area : 1,608.9031 ha
320 Gull Road,
KERALUP 6182
SHIRE OF MURRAY

SOUTH AND WEST TO 7 ELEVEN
13 LAKES RD MANDURAH 12.7 KM

SOUTH AND EAST TO DEL PARK
ROADHOUSE S.W. HIGHWAY 17.9 KM

OFFICE

WEIGHBRIDGE

OFFICE / CRIBROOM

MUSTER POINT

SHELTER ON SITE

WORKSHOP

FUEL STORE SERVICE BAY

LIQUID WASTE RECEIVAL

RECEIVAL HALL

In Emergency Dial 000
or use EMERGENCY PLUS phone app

EMERGENCY INFORMATION	
emergency.wa.gov.au	13 DFES (13 33 37)
@dfeswa @dfes_wa	Local ABC Radio

BUSHFIRE WARNING SYSTEM

EMERGENCY WARNING
There is a threat to lives or homes.
You are in danger and need to take immediate action to survive.

WATCH AND ACT
There is a possible threat to lives or homes.
You need to leave or get ready to defend – do not wait and see.

ADVICE
A fire has started but there is no immediate threat to lives or homes.
Be aware and keep up to date.

THE AUSTRALIAN FIRE DANGER RATING SYSTEM
DESCRIBES THE POTENTIAL LEVEL OF DANGER SHOULD A BUSHFIRE START

NO RATING	MODERATE	HIGH	EXTREME	CATASTROPHIC
NO ACTION REQUIRED	PLAN AND PREPARE	BE READY TO ACT	TAKE ACTION NOW TO PROTECT YOUR LIFE AND PROPERTY	FOR YOUR SURVIVAL, LEAVE BUSH FIRE RISK AREAS

------ LEGEND ------

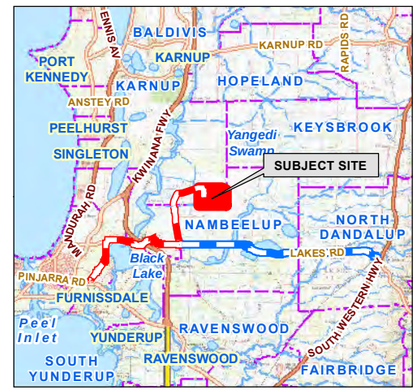
- Shelter On-Site Building
- Muster Point
- Evacuation Routes
- Development Site
- Development

Description

- Office
- Office / Cribroom
- Workshop
- Receival Hall
- Weighbridge
- Liquid Waste Receival
- Fuel Store Service Bay
- Driveway

0 50 100 150 200 250
Metres

------ LOCALITY ------



Aerial Imagery : Landgate/SLIP
Image Date : Feb 2022

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator Units: Metre
Map compiled by: Ian Ross 17/10/2023
Map updated by: Ian 17/10/2023
A3 Scale 1:5,000

BUSHFIRE PRONE PLANNING

Map Document Path / Name: K:\Projects\Jobs 2022\220666 - 320 Gull Road Keralup (BMP)\Mapping\MXD\220666_BEP_Fig1_SITE_320 Gull Road Keralup.mxd

Figure 2

Evacuation Routes and Destinations Map

Lot 9500 on Plan 414516, Area : 1,608.9031 ha
320 Gull Road,
KERALUP 6182
SHIRE OF MURRAY

YOU ARE HERE

7 ELEVEN LAKES RD.

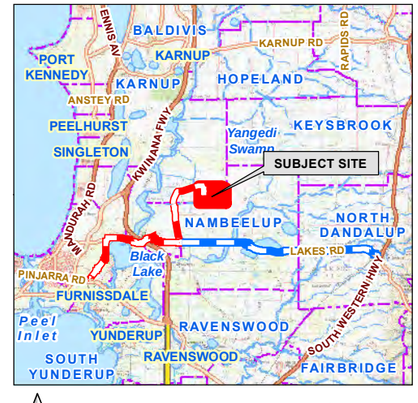
DEL PARK ROADHOUSE

------ LEGEND ------

- You Are Here
- Emergency Evacuation Centre
- Primary Evacuation Route
- Secondary Evacuation Route

0 1 2 3 4 5
Kilometres

------ LOCALITY ------



Aerial Imagery : Landgate/SLIP
Image Date : Feb 2022

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator Units: Metre
Map compiled by: Ian Ross 17/10/2023
Map updated by: Ian 17/10/2023
A3 Scale 1:70,000

BUSHFIRE PRONE PLANNING

BUSHFIRE WARNING SYSTEM

EMERGENCY WARNING
There is a threat to lives or homes.
You are in danger and need to take immediate action to survive.

WATCH AND ACT
There is a possible threat to lives or homes.
You need to leave or get ready to defend – do not wait and see.

ADVICE
A fire has started but there is no immediate threat to lives or homes.
Be aware and keep up to date.

In Emergency Dial 000
or use EMERGENCY PLUS phone app

EMERGENCY INFORMATION	
emergency.wa.gov.au	13 DFES (13 33 37)
@dfeswa	@dfes_wa Local ABC Radio

THE AUSTRALIAN FIRE DANGER RATING SYSTEM
DESCRIBES THE POTENTIAL LEVEL OF DANGER SHOULD A BUSHFIRE START

NO RATING	MODERATE	HIGH	EXTREME	CATASTROPHIC
NO ACTION REQUIRED	PLAN AND PREPARE	BE READY TO ACT	TAKE ACTION NOW TO PROTECT YOUR LIFE AND PROPERTY	FOR YOUR SURVIVAL, LEAVE BUSH FIRE RISK AREAS

Map Document Path / Name: K:\Projects\Jobs 2022\220666 - 320 Gull Road Keralup (BMP)\Mapping\MXD\220666_BEP_Fig2_EVAC_320 Gull Road Keralup.mxd

8. BUSHFIRE EMERGENCY PROCEDURES AND ACTIONS

8.1. PRE-SEASON PREPARE

PRE-SEASON PREPARE PROCEDURE – ACTIONS TO IMPLEMENT

When these actions are to be conducted by the facility/premises personnel with designated emergency responsibilities, ensure the Chief Fire Warden is informed of their completion.

1. STAFF PREPARATION – FORMAL TRAINING

Prior to the bushfire season (June to October), provide, to all staff, induction and refresher training to the degree necessary and corresponding to the scale and complexity of the facility/premises use.

Training is to consist of:

- Bushfire behaviour awareness specific to the site and its surrounds. Establish the necessity to operate and maintain an environment that mitigates the risks to persons and property from the direct threats of bushfire (flame contact, radiant heat, ember attack) and indirect threats of bushfire threats of bushfire (debris accumulation, consequential fire, wind attack and tree strike);
- Understand the content of this site specific Bushfire Emergency Plan and its application; and
- For staff assigned bushfire emergency management roles, provide the necessary training.

☐ All new and existing staff/employees to complete mandatory training in bushfire awareness and the application of the Bushfire Emergency Plan procedures and associated actions.

☐ Identify and assign the necessary bushfire emergency management roles to appropriate staff and provide training as necessary.

☐ Ensure enough daily rostered staff/employees hold current Senior First Aid Certification. BPP: When relevant to site operations

☐ Conduct simulation drills for evacuation and shelter in place procedures. BPP: When relevant to site operations

2. ANNUAL REVIEW OF THE BUSHFIRE EMERGENCY PLAN

Update and amend the Bushfire Emergency Plan as required. Assistance from a bushfire consultant is advised.

☐ Identify any requirements for reassignment of bushfire emergency management roles for facility/premises personnel.

☐ As necessary, change contact details (names, phone number) of those persons responsible for bushfire emergency management and planning at the facility/premises and any changes in roles.

☐ Make required changes to emergency contacts and emergency information sources. Ensure that any changes are also applied to the bushfire emergency information displayed within the facility/premises.

☐ Ensure the designated assembly area, shelter-in-place building/area and the off-site safer locations and nominated evacuation routes are still the best options. Incorporate any changes into the Bushfire Emergency Plan and the information displayed within the facility/premises.

☐ Where an offsite safer destination is an identified building(s), contact relevant persons to confirm continued availability for potential use during a bushfire emergency.

☐ Contact nominated third party transport suppliers to confirm continued availability and capability for use during a bushfire emergency.

☐ Account for any change to buildings or equipment onsite that has implications for emergency management.

☐ Incorporate any improvements or additions to the emergency management procedures/actions that have been identified by staff and/or emergency services resulting from relevant experience with a bushfire event or changes in best practice bushfire emergency management that are developed over time.

☐ In the event any part of this Bushfire Emergency Plan is amended as part of its annual review, replace old copies and destroy them.

3. DISPLAY & AVAILABILITY OF BUSHFIRE EMERGENCY INFORMATION

The required bushfire emergency information is to be displayed in prominent position/s and readily accessible to all persons.

☐ Ensure the following up to date bushfire emergency information is displayed (framed or laminated) within the relevant buildings (including near an assembly area and inside the designated 'shelter in place' building.

- The Site Emergency Information Map
- The Evacuation Routes Map
- The Emergency Contacts.
- The Bushfire Information Sources to Monitor

Additional information can be displayed when considered appropriate, examples of which are contained within the appendices and are available for download from the DFES website.

☐ Ensure signage for bushfire water supply, emergency assembly area and evacuation routes are in place and legible. BPP: state display locations as relevant or delete.

☐ Have available copies of the current Bushfire Emergency Plan in locations accessible by the facility/premises persons with bushfire emergency responsibilities.

☐ Ensure availability and supply of the record sheets for 'Persons in Shelter-in-Place Building.

4. BUILDING / EQUIPMENT PREPARATION

These actions address the required preparation of the buildings that comprise the facility/premises, prior to and during the bushfire season to ensure:

- Continued compliance with the construction standards that correspond to its Bushfire Attack Level (as determined in the Bushfire Management Plan);

- The vulnerability of buildings and other consequential fire fuels, to the direct and indirect attack mechanisms of bushfire is minimised; and
- The operational readiness of any installed firefighting equipment and infrastructure.

☐ If the facility/premises is constructed to BAL-12.5 requirements or higher, ensure any external gaps continue to be blocked or screened with non-combustible material (e.g. rock wool, sealant, mesh – maximum aperture of 2mm) to prevent ember entry. This includes under eaves, external cladding, roofs, external vents, skylights etc. Otherwise it is recommended that this action is applied.

☐ Check that all required window and door screening is in place. This prevents ember entry to internal spaces and reduces radiant heat load on the glass.

☐ If installed, ensure all installed bushfire shutters are operational.

☐ If there is recent construction or planned construction of attached structures (decks, stairs, patio, carport etc.) or adjacent structures (dwelling, shed, carport etc.), ensure bushfire resistant materials (including non-combustible) have been used to the greatest extent possible.

☐ If an evaporative air cooler is installed ensure it is either constructed to the required BAL rating or is fitted with an appropriate ember protection screen.

☐ Ensure all installed firefighting infrastructure and associated equipment including water storage tanks, pump, valves, pipework, fire hose reels & fire extinguishers are serviced, operating and correctly located.

☐ All gas cylinders to be installed and maintained in accordance with AS 1596. This standard includes requirements for small portable cylinders and larger cylinders used for domestic house supply. These include:

- Safety release valve shall be directed away from the building and persons access/egress routes;
- Metal piping and fittings shall be used on all piping inside the building's cavities and enclosable occupied spaces and the high pressure side of any gas regulators; and
- Tethers securing cylinders are to be non-combustible.

This is to limit the potential for flames and high levels of radiant heat from gas flaring or explosion, to directly impact a building. The heat from the bushfire or a closer consequential fire can cause gas cylinder pressures to reach critical levels beyond which their pressure release valve releases large quantities of LP gas. If these gas cylinders fall over, this pressure release valve may no longer function correctly, and internal pressures continue to rise with continued heating until the cylinder ruptures. The resulting explosion includes a pressure wave and large ball of flame which can threaten nearby life and buildings. Flared or ruptured gas bottles are commonly found in post bushfire surveys.

☐ Remove and maintain at low levels, accumulated vegetation debris (fine fuels) near, on, in and against buildings and structures, including:

- In construction crevices, gaps, on horizontal / shallow angle surfaces and at re-entrant corners in access ways, at wall/floor, wall/ground, roof/wall junctions and around doors, vents, windows;
- In roof gutters and valleys; and
- Adjoining/adjacent drains, culverts and pits.

☐ Around building(s), including verandahs and decks, remove or relocate away from the facility/premises those combustible items that may be seldom used or able to be stored more appropriately in the bushfire season. This includes furniture and mats. Refer to Appendix 7 'LANDSCAPING DESIGN & CONSTRUCTION PRINCIPLES TO

APPLY' for further information regarding consequential fire fuels and recommended separation distances.

☐ Ensure all first aid equipment and supplies are stocked, current and accessible.

☐ Ensure mobile phones are available for facility/premises personnel with emergency management roles.

☐ Ensure the designated Shelter-in-Place Building is stocked with adequate supplies of drinking water.

5. GROUNDS PREPARATION

These actions address the required management of onsite combustible items/materials (fuels) around, on or in buildings. By removing or reducing fuels, the likelihood and intensity of consequential fire is significantly reduced.

Consequential (local) fire which is the most significant cause of building/structure damage/loss in bushfire events.

Fuel management must be completed prior to the start of the bushfire season and maintained during the season.

For additional guidance, refer to:

- The *Guidelines for Planning in Bushfire Prone Areas within the Explanatory Notes for Element 2 of the Bushfire Protection Criteria and Schedule 1: Standards for Asset Protection Zones (WAPC 2021);*
- The DFES '*Bushfire Preparation Toolkit'* publication. Website: publications.dfes.wa.gov.au/?hazard=Bushfire; and
- Where initial or renovation landscaping of grounds surrounding the facility/premises is being conducted, apply the directions and principles of the measures presented in Appendix 7 to the greatest extent possible.

☐ The Firebreak Notice: Maintain compliance with the local government's annual firebreak and fuel load notice issued under section 33 of the Bush Fires Act 1954. Where the requirements are additional to or provide a greater level of bushfire protection than those established in this Bushfire Emergency Plan, they must be complied with.

☐ Accessibility: Ensure all property access/egress routes are kept clear and easily trafficable.

☐ The Asset Protection Zone (APZ) Dimensions: Ensure the APZ dimensions stated below (established by the associated Bushfire Management Plan for the premises/facility), are installed and maintained.

☐ Asset Protection Zone Management:

Trees (greater than 6 metres in height):

- Remove branches overhanging buildings and powerlines;
- Remove lower branches to a height of 2m above the ground or any surface vegetation; and
- Remove loose bark (rake) to at least a height of 2m above the ground or any surface vegetation.

Shrubs (0.5 metres to 5 metres in height) and ground covers (greater than 0.5 metres in height):

- Ensure location and clump sizes remain in accordance with guidance in Appendix 7; and
- Remove all dead plant material.

Grass to be reduced and maintained at a height of 50 mm.

Fine Fuels (i.e., less than 6 mm in thickness):

- Ensure combustible dead vegetation matter is reduced to and maintained at less than 2 t/ha on average. Collecting and weighing an indicative 1m^2 of this litter above the mineral earth will indicate

the fuel load (100g/m^2 = 1 t/ha); and

- Remove all debris piles.

Heavy Fuels (i.e., greater than 6 mm in thickness):

- Such as fallen branches, timber, firewood, packaging materials, building materials, outdoor furniture, and garbage bins.
- To be removed from the APZ or be separated from buildings/structures in accordance with guidance in Appendix 7.

Applied mulches:

- Should be non-combustible e.g., stone, gravel and crushed rock. Where wood mulch is used it should be greater than 6mm in thickness.

8.2. MONITOR AND MAINTAIN

MONITOR AND MAINTAIN PROCEDURE – ACTIONS TO IMPLEMENT
When these actions are to be conducted by the facility/premises personnel with designated emergency responsibilities, ensure the Chief Fire Warden is informed of their completion.

1. MONITOR BUSHFIRE INFORMATION SOURCES

☐ Be aware of your surroundings:

- High temperatures, wind and low humidity will increase the threat levels of bushfire attack mechanisms and their potential impact.
- Regularly scan the broader landscape in all directions, for any smoke that might indicate the ignition or existence of a bushfire.

If a potential bushfire is noticed and it is not yet been identified by emergency information sources, then report the fire by calling '000'. Refer to the 'Primary Guidance Table' for the relevant procedure to action.

☐ Regularly monitor the applicable 'Emergency Information Sources' for current information regarding Bushfire Warnings, Fire Danger Ratings (FDR), Fire Behaviour Index (FBI), Total Fire Bans (TFB) and Harvest Vehicle Movement Bans (HVMB). For next day forecasts, check after 4.00pm.

Be aware of the relevant 'Procedure Implementation Triggers' in the 'Primary Guidance Table' that incorporates these warnings, ratings and bans.

TFB: A TFB can automatically exists when higher Fire Danger Ratings apply, or they are declared by the Department of Fire and Emergency Services (DFES) on days when fires are most likely to threaten lives and property due to adverse weather conditions or when widespread fires are stretching firefighting resources. During a TFB it is illegal to carry out any activity in the open air likely to cause a fire. Refer to the DFES website for ban details.

HVMB: Harvest and Vehicle Movement Bans are declared by the local Bushfire Control Officer and may impose a ban on the use or operation of engines, vehicles, plant, or machinery. They are imposed to restrict activities that are likely to cause a bush fire or contribute to the spread of a bush fire when the expected weather conditions indicate that if a wildfire was to start, it would be dangerous, destructive and difficult to stop once started. They can be issued for any period during a day and in conjunction with a TFB. Refer to the DFES website for ban details.

2. MAINTAIN BUILDINGS AND FIRE FIGHTING EQUIPMENT

☐ During the bushfire season (October to April), refer to Action List No. 4 in the 'Pre-Season Prepare Procedure' and ensure all actions applicable to management during the bushfire season are implemented.

☐ Ensure the designated Shelter-in-Place Building is stocked with adequate supplies of water.

☐ Ensure all mobile phones and any radio communication devices are fully charged.

3. MAINTAIN ASSET PROTECTION ZONES

☐ During the bushfire season (October to April), refer to Action List No. 5 in the 'Pre-Season Prepare Procedure' and ensure all actions applicable to management during the bushfire season are implemented.

4. MONITOR MOVEMENT OF PERSONS

- ☐ For operations where management is required to use 'persons onsite registers', locate and ensure availability of the 'Occupant/Visitor Register'.

- ☐ Record the onsite/offsite movement of all relevant persons (time in / time out) to ensure there is knowledge of the of the number and type of persons onsite at any time.

8.3. PRE-EMPTIVE

PRE-EMPTIVE PROCEDURE – ACTIONS TO IMPLEMENT
When these actions are to be conducted by the facility/premises personnel with designated emergency responsibilities, ensure the Chief Fire Warden is informed of their completion.

1. INFORM PERSONS ONSITE

☐ Inform all persons onsite of the current / forecast conditions that have triggered the requirement to initiate the Pre-emptive Procedure.

☐ Ensure all staff are aware of the location of Site Emergency Information (Site Emergency Information Map, Evacuation Routes Map and Emergency Information Sources or copies of the Bushfire Emergency Plan).

☐ Locate and have available the 'Occupant/Visitor Register' to facilitate updating and to identify who is on site (for operations where management is required to use person registers).

2. NON ESSENTIAL STAFF AND VISITORS TO BE KEPT AWAY FROM SITE

☐ Ensure that non-essential visitors and contractors are kept away from the site. Cancel all scheduled school/education visits and other non essential visitors to the facility.

☐ Where a Total Fire Ban (TFB) or Harvest and Vehicle Movement Ban (HVMB) have been issued, ensure banned activities are stopped. Refer to the DFES website for ban details.

TFB: A TFB can automatically exists when higher Fire Danger Ratings apply, or they are declared by the Department of Fire and Emergency Services (DFES) on days when fires are most likely to threaten lives and property due to adverse weather conditions or when widespread fires are stretching firefighting resources. During a TFB it is illegal to carry out any activity in the open air likely to cause a fire.

HVMB: Harvest and Vehicle Movement Bans are declared by the local Bushfire Control Officer and may impose a ban on the use or operation of engines, vehicles, plant, or machinery. They are imposed to restrict activities that are likely to cause a bush fire or contribute to the spread of a bush fire when the expected weather conditions indicate that if a wildfire was to start, it would be dangerous, destructive and difficult to stop once started. They can be issued for any period during a day and in conjunction with a TFB.

3. EVACUATE

☐ For all visitors, it has been determined that a pre-emptive evacuation will be the required risk management measure to be applied. Refer to the Safe (Early) Evacuation Procedure detailed on page 24 and complete the relevant actions.

4. STAFF REMAINING ONSITE

☐ Monitor the local environment and the relevant 'Emergency Information Sources' for updated information. If the situation changes, identify from the 'Primary Guidance Table' if the actions of a different 'Procedure' are triggered.

☐ If practicable, and not recently been conducted as part of the 'Monitor and Maintain Procedure', remove from the APZ:

- Accumulated vegetation debris from the land surface within the APZ, including any stored piles of debris.
- Accumulated vegetation debris from on, in and against buildings/structures.

- ☐ Move heavy consequential fire fuels such building materials, packaging materials, firewood, branches, sporting/playground equipment, outdoor furniture, garbage bins and mats at least 6 metres away from buildings/structures and access/egress paths, unless they are enclosed.

- ☐ Move large heavy consequential fire fuels such as vehicles, trailers etc at least 12 metres away from buildings/structures and access/egress paths, unless they are enclosed.

8.4. ELEVATED THREAT

ELEVATED THREAT PROCEDURE – ACTIONS TO IMPLEMENT
When these actions are to be conducted by the facility/premises personnel with designated emergency responsibilities, ensure the Chief Fire Warden is informed of their completion.

BE PREPARED TO MAKE AND CHANGE DECISIONS AS NECESSARY

As a person onsite, you are likely to not always have access to expert guidance during different stages of a bushfire event, if at all. Consequently, you must be prepared to take responsibility and make decisions regarding the actions to take, as best as possible.

A bushfire is a dynamic emergency with many variables. However, you have knowledge of the immediate situation regarding local conditions, how the bushfire is impacting the site and the status of persons onsite. This is important information to apply to 'on the ground' practical decision making.

When a bushfire is close to the facility/premises and/or evacuation routes, exercise greater situational awareness, judgement and caution as the margin of safety is less.

Utilise the information provided in this BEP to assist with your decision making, including **Appendix 6 'Indicative Bushfire** Behaviour To Impact the Facility/Premises'. Prior to the bushfire season, training in the use of this BEP is important preparation for an emergency event.

1. CONTINUALLY RE-EVALUATE THE SITUATION TO ENSURE APPROPRIATE PROCEDURE IS IMPLEMENTED

EVALUATION	RESPONSE	
Evaluation No.1: It remains unknown if a bushfire warning has been issued.	YES	Conduct Evaluation No. 2
	NO	A warning is issued. Refer to the Primary Guidance Table and identify if the trigger to implement a different procedure applies and proceed to implement that procedure.
Evaluation No.2: Is the bushfire relatively close, continuing to develop and you are concerned for the immediate safety of persons onsite?	YES	Refer to the Primary Guidance Table and identify the emergency procedure corresponding to Implementation Trigger A and implement this procedure.
	NO	Continue the Elevated Threat Procedure.

2. INFORM RELEVANT PERSONS OFF-SITE

☐ If you have identified a bushfire but are unaware if a bushfire warning has been issued, check the bushfire warning status from an information source. Refer to Section 4: Emergency Information Sources. If a warning has not been issued, report it by calling triple zero '000'.

☐ Notify the planned providers of evacuation transport of the elevated threat procedure being activated by the facility/premises and the numbers of persons onsite for which transport may be required at short notice.

3. INFORM PERSONS ON-SITE

☐ Inform all persons that a bushfire warning exists for the location (or a bushfire has been identified) and the requirement to initiate the Elevated Threat Procedure. Advise that you will continue to keep persons informed about the situation including if it becomes necessary to activate a different procedure or when the bushfire threat no longer exists.

☐ Make all persons aware of the location of the displayed bushfire emergency information. This may be displayed in prominent areas of the facility/premises and in a 'Guest Bushfire Emergency Guide'. Encourage to read and take any necessary preparatory actions. These include:

- Having belongings ready to move at short notice.
- Know the designated evacuation destinations and shelter in place building or area.

☐ Advise those persons that may be more vulnerable due to health conditions or impaired mobility, to consider relocating as soon as possible to accommodation outside the higher risk area as a precautionary measure.

4. MONITOR THE BUSHFIRE

☐ Try to locate the position of the bushfire on the Evacuation Routes Map (Section 7):

- Be aware of the local wind and the direction it is blowing to, as this will indicate the direction the flame front is likely to be moving. If an internet connection is available, utilise the maps on the Emergency WA and Bushfire IO websites to locate (refer to Section 4: Emergency Information Sources). A bushfire moving directly away from the facility/premises, or an evacuation route presents a lower threat;
- Identify If the fire is moving towards a designated evacuation route and its proximity to the route. This information will be important in making the correct choice of evacuation route should this become necessary.
- Be aware there may be more than one bushfire.

5. MONITOR BUSHFIRE INFORMATION SOURCES

☐ Continue to monitor relevant information sources for updated information. If a Bushfire Warning is issued or the existing Bushfire Warning is changed to a higher level, this may trigger the implementation of a different bushfire emergency procedure – refer to the 'Primary Guidance Table'.

☐ Check the relevant information sources to determine if a Total Fire Ban (TFB) and/or a Harvest Vehicle Movement Ban (HVMB) has been issued. These will restrict the activities that can be conducted or continued onsite (refer to Action List No. 5 below).

6. PRECAUTIONARY EVACUATION

☐ Commence an early precautionary evacuation by applying the 'Safe (Early) Evacuation Procedure' in the following situations:

- No bushfire warning has been issued and no emergency services are present, but the occupants of the premises/facility are concerned about their safety, and it is considered a practical and desirable action for this facility/premises; or
- When an emergency services authority has ordered an evacuation.

7. SITE OPERATIONS

☐ If a Total Fire Ban (TFB) and/or a Harvest Vehicle Movement Ban (HVMB) has been declared, comply with the relevant operation and activity bans. Refer to the DFES website for additional ban details.

TFB: A TFB can automatically exists when higher Fire Danger Ratings apply, or they are declared by the Department of Fire and Emergency Services (DFES) on days when fires are most likely to threaten lives and property due to adverse weather conditions or when widespread fires are stretching firefighting resources. During a TFB it is illegal to carry out any activity in the open air likely to cause a fire.

HVMB: Harvest and Vehicle Movement Bans are declared by the local Bushfire Control Officer and may impose a ban on the use or operation of engines, vehicles, plant, or machinery. They are imposed to restrict activities that are likely to cause a bush fire or contribute to the spread of a bush fire when the expected weather

conditions indicate that if a wildfire was to start, it would be dangerous, destructive and difficult to stop once started. They can be issued for any period during a day and in conjunction with a TFB.

☐ Ensure that non-essential staff, visitors and contractors are kept away from the site.

8. FACILITY/PREMISES PREPAREDNESS

☐ If practicable, and not recently been conducted as part of the 'Monitor and Maintain Procedure', remove from the APZ:

- Accumulated vegetation debris from the land surface within the APZ, including any stored piles of debris.
- Accumulated vegetation debris from on, in and against buildings/structures.

☐ Move heavy consequential fire fuels such building materials, packaging materials, firewood, branches, sporting/playground equipment, outdoor furniture, garbage bins and mats at least 6 metres away from buildings/structures and access/egress paths, unless they are enclosed.

☐ Move large heavy consequential fire fuels such as cars, trailers etc at least 12 metres away from buildings/structures and access/egress paths, unless they are enclosed.

8.5. SAFE (EARLY) EVACUATION

SAFE (EARLY) EVACUATION PROCEDURE – ACTIONS TO IMPLEMENT
When these actions are to be conducted by the facility/premises personnel with designated emergency responsibilities, ensure the Chief Fire Warden is informed of their completion.
DO NOT EVACUATE LATE Analysis of past events identify that most people who die in bushfires are caught in the open, either in vehicles or on foot, because they have left their property too late. Being in vehicles on roads when a bushfire is close is a high risk action. For evacuation to be the safest response, it must be conducted early. Otherwise, sheltering-in-place is likely to provide greater protection to persons than a vehicle, particularly when a suitable onsite shelter building or area has been identified in the Bushfire Emergency Plan.

1. DIFFERENT 'CLASSES' OF PERSONS PRESENT ONSITE REQUIRING DIFFERENT INITIAL PROCEDURES

In developing the Bushfire Emergency Plan for the subject facility/premises, it has been determined that two different classes of persons will exist on the site and require different initial procedures to be implemented.	
'CLASS' OF VULNERABLE PERSONS	PROCEDURE TO IMPLEMENT
Class 1: Highly Dependent. Persons whose health is highly dependent on continuance of the services being provided and/or there are other physical reasons that result in excessive time being required to mobilise for evacuation. Includes those staff essential to the caring of these persons.	Commence the Shelter-in-Place Procedure for these persons and the caretaker staff required to support them. This may be all persons onsite or only some.
Class 2: Less or Not Dependent. Persons who are not medically dependant on services, are easily able to be mobilised for evacuation. Includes those staff who are not essential to the caring of the Class 1 type of persons.	Continue the Safe (Early) Evacuation Procedure for these persons. Be aware that if the continued availability of a safe evacuation route becomes less certain, the evacuation will need to stop, and the Shelter-in-Place Procedure activated for the remaining persons.

2. CONTINUALLY RE-EVALUATE THE SITUATION TO ENSURE APPROPRIATE PROCEDURE IS IMPLEMENTED

EVALUATION	RESPONSE	
Evaluation No.1: Is the controlling agency of the emergency services in contact with you or are emergency services personnel in attendance at your facility/premises?	YES	Conduct Evaluation No.2.
	NO	Conduct Evaluation No.3.
Evaluation No.2: Have the attending emergency services specifically instructed you to either evacuate or shelter in place?	YES	Implement the Procedure they have instructed.
	NO	Conduct Evaluation No.3.
Evaluation No.3: Does a safe evacuation route remain available to use? The route must not be impacted or likely to be imminently impacted by the bushfire, including by smoke. This condition can be met if: • Any effects of the bushfire will be a sufficient distance away from the evacuation route; or • The route will require driving directly away from the existing bushfire; or • The bushfire is moving away from the evacuation route.	YES	Commence the Safe (Early) Evacuation Procedure. Be aware the procedure may have to be stopped for some persons if the continued availability of a safe evacuation route is threatened.
	NO	Commence the Shelter In Place Procedure

3. TRANSPORT - ORGANISE FACILITY/PREMISES AND/OR CONTRACT TRANSPORT

☐ Arrange for the facility/premises onsite vehicles planned to be utilised in evacuation, to be moved near assembly area. Keep all driveways clear for emergency vehicles.

☐ Contact pre-arranged transport operators and instigate the delivery of evacuation vehicles. Refer to Section 5.1 'Evacuation Time and Transport – Persons and Vehicles'.

4. INSTRUCT ALL (OR RELEVANT) PERSONS ON-SITE TO MOVE TO THE DESIGNATED ASSEMBLY AREA

☐ Inform all persons onsite of the conditions (FDR, Bushfire Warning etc.) that exist and have triggered the requirement to initiate the Safe (Early) Evacuation Procedure.

☐ Instruct all persons onsite to move to the Designated Assembly Area (except those with specific bushfire responsibilities). Communicate instructions loud and clearly. Inform that briefing will take place once assembled.

☐ Instruct all persons onsite to bring their vehicles to. Keep all driveways clear for emergency vehicles.

☐ Account for all persons onsite. Do not assume any building on site is empty – check!

5. AT ASSEMBLY AREA - INSTRUCTIONS

☐ Inform persons at the Assembly Area of the possible evacuation routes and that the decision regarding which route/s to use will be made shortly after conducting a current situation check including an assessment of evacuation route continuing availability.

6. CEASE FACILITY/PREMISES OPERATIONS

☐ Cease all indoor and outdoor activities.

Any onsite processing should cease, and employees operating machinery should make their way to the muster point or on site shelter.

☐ Ensure any flammable materials are stored in the dangerous goods store or a designated storage area.

☐ If time permits - check perimeter of all buildings and store inside all combustible, easy to move outdoor mats and furniture otherwise move them well away from buildings.

7. CURRENT SITUATION CHECK

BE PREPARED TO MAKE AND CHANGE DECISIONS AS NECESSARY

As a person onsite, you are likely to not always have access to expert guidance during different stages of a bushfire event, if at all. Consequently, you must be prepared to take responsibility and make decisions regarding the actions to take, as best as possible.

A bushfire is a dynamic emergency with many variables. However, you have knowledge of the immediate situation regarding local conditions, how the bushfire is impacting the site and the status of persons onsite. This is important information to apply to 'on the ground' practical decision making.

When a bushfire is close to the facility/premises and/or evacuation routes, exercise greater situational awareness, judgement and caution as the margin of safety is less.

Utilise the information provided in this BEP to assist with your decision making, including **Appendix 6 'Indicative Bushfire Behaviour To Impact the Facility/Premises'**. Prior to the bushfire season, training in the use of this BEP is important preparation for an emergency event.

☐ Try to locate the position of the bushfire on the Evacuation Routes Map (Section 7):

- Be aware of the local wind and the direction it is blowing to, as this will indicate the direction the flame front is likely to be moving. If an internet connection is available, utilise the maps on the Emergency WA and Bushfire IO websites to locate (refer to Section 4: Emergency Information Sources). A bushfire moving directly away from the facility/premises, or an evacuation route presents a lower threat;
- Identify If the fire is moving towards a designated evacuation route and its proximity to the route. This information will be important in making the correct choice of evacuation route should this become necessary.
- Be aware there may be more than one bushfire.

☐ Confirm the current Bushfire Warning level and its advice, through the relevant bushfire emergency information sources (refer to Section 4).

☐ Consider variations in the facility/premises operational routines that can impact the length of time to initiate and complete the evacuation procedure – including informing and preparing occupants. Refer to Section 5.3 'Evacuation Time and Transport – Persons and Vehicles'.

☐ Consider that you may not have enough time to initiate and fully complete the evacuation procedure, depending on the bushfire's direction and speed of movement and its location relative to the facility/premises and the evacuation routes.

Evacuating a proportion of occupants with the remainder sheltering in place may be a necessary outcome. The decision to evacuate and continuing to evacuate must be continually evaluated.

- ☐ Re-evaluate the correct response procedure to be applying by using Action No. 1 in this list. In particular, Evaluation No.3 - Does a safe evacuation route remain available to use?

- ☐ Follow the specific direction/advice of emergency services personnel if they are present on the site and providing directions.

8. LEAVING THE FACILITY/PREMISES/PREMISES CHECKS

- ☐ Notify emergency services by calling triple zero (000) that the decision has been taken to evacuate the facility/premises. State the intended destination, numbers of persons and the means of transport.

- ☐ If the offsite safer destination is a building, notify relevant persons informing them of impending arrival. State the numbers of persons and the means of transport.

- ☐ Shut down all air conditioning and any mechanical ventilation.

- ☐ If gas is plumbed into the building, turn off at the meter or bottles.

- ☐ Ensure all doors and windows of all buildings are closed but left unlocked. Close fire shutters where installed.

9. AT THE EVACUATION DESTINATION (THE OFFSITE SAFER PLACE)

- ☐ Account for all persons using the persons on site/ visitor register.

- ☐ Call triple zero (dial 000) to notify emergency services of arrival at the evacuation destination and the status of all persons.

8.6. SHELTER IN PLACE

SHELTER IN PLACE PROCEDURE – ACTIONS TO IMPLEMENT	
When these actions are to be conducted by the facility/premises personnel with designated emergency responsibilities, ensure the Chief Fire Warden is informed of their completion.	
DESIGNATED ONSITE SHELTER BUILDING	LOCATION
Office / Crib room	Southern part of lot near workshop (shown on the Site Response Map -Figure 1)

1. CONTINUALLY RE-EVALUATE THE SITUATION TO ENSURE APPROPRIATE PROCEDURE IS IMPLEMENTED

EVALUATION	RESPONSE	
Evaluation No.1: Is the controlling agency of the emergency services in contact with you or are emergency services personnel in attendance at your facility/premises?	YES	Conduct Evaluation No. 2
	NO	Continue the Sheltering-in-Place Procedure.
Evaluation No.2: Have the relevant emergency services specifically instructed you to evacuate despite being made aware that Shelter-in-Place is the designated procedure to implement according to the Implementation Trigger in this Bushfire Emergency Plan?	YES	Commence the Safe (Early) Evacuation Procedure.
	NO	Continue the Shelter-in-Place Procedure.

2. INSTRUCT ALL PERSONS ON-SITE TO MOVE TO THE DESIGNATED ASSEMBLY AREA

☐ Inform all persons onsite of the conditions that have triggered the requirement to initiate the Shelter in Place Procedure.

☐ Instruct all persons onsite to move to the Designated Assembly Area (except those with specific bushfire responsibilities). Communicate instructions loud and clearly. Inform that briefing will take place once assembled.

☐ Assemble on foot- do not bring vehicles or luggage. Only bring mobile phone, other communication devices, required medicines, health/mobility aids and water.

☐ Account for all persons onsite. Do not assume any building on site is empty – check!

3. CEASE FACILITY/PREMISES OPERATIONS

☐ Cease all indoor and outdoor activities. Any onsite processing should cease, and employees operating machinery should make their way to the muster point.

☐ Ensure any flammable materials are stored in the dangerous goods store or the designated storage area.

☐ If time permits - check perimeter of all buildings and store inside all combustible, easy to move outdoor mats and furniture otherwise move them well away from buildings.

4. NOTIFY EMERGENCY SERVICES

- ☐ Notify emergency services by calling triple zero (000), that the decision has been taken to shelter in the designated Shelter-in-Place Building.
- ☐ Describe the designated Shelter-in-Place Building and state its location (street address and site position as relevant).
- ☐ State the number of persons sheltering and if any special needs persons.
- ☐ Describe current bushfire observations – distance / direction / flames / embers / smoke / spot fires.
- ☐ Notify emergency services by calling triple zero (000) if the situation changes regarding conditions being experienced, number of persons sheltering and when the bushfire is no longer presenting a threat.

5. MANAGEMENT OF PERSONS

- ☐ Locate and have available the 'Occupant/Visitor Register' to identify who is on site (for operations where management is required to use person registers).
- ☐ Direct persons with health issues or mobility impairments, to enter the designated shelter-in-place building.

  Inform others that while conditions remain tenable it will likely be more comfortable to assemble in the area near to the building entry but remain outside.
- ☐ When conditions outside the designated shelter-in-place building are no longer tenable, all persons must move inside.
- ☐ Shelter in areas furthest from the fire front but ensure some visibility to what is happening outside is available, that two ways of accessing the outside is available if conditions inside become untenable and if possible, a water supply is available (e.g. laundry).
- ☐ Drink water to avoid becoming dehydrated.
- ☐ Shelter within the building for as long as possible.
- ☐ Once everyone is inside the designated shelter-in-place building, compile a record of persons by using the recording sheets stored within the building. This is to inform emergency services.

6. MANAGEMENT OF THE DESIGNATED SHELTER IN PLACE BUILDING

- ☐ If gas is plumbed into the building, turn off at the meter or bottles.
- ☐ Move furniture/combustible materials as far away from windows as possible. Fill any available containers, (e.g. sinks, baths, bins) with water. Wet materials (e.g. towels, sheets, woollen blankets) and place alongside doors/windows to block any gaps.
- ☐ If an evaporative cooler is installed, keep the water running and turn off the fan if possible
- ☐ If possible, ensure there is access (e.g. ladder) through manhole to monitor the roof space for spot fires.

- ☐ While conditions outside are not subject to excessive radiant heat, embers or smoke (i.e. tenable), keep accessible doors and windows open as necessary to manage internal conditions.

  Close all doors, windows, vents, blinds, curtains and bushfire shutters (if fitted) once all persons are required to be within the designated shelter-in-place building.

- ☐ While conditions outside are still tenable, two persons, if wearing appropriate protection from bushfire, are to make regular exterior inspection for embers and ignition of small local fires and extinguish where possible.

7. MONITOR

- ☐ Continue to monitor the progress of the bushfire through windows. Be aware of what is happening to assist with decision making and informing emergency services.

- ☐ Monitor the relevant Emergency Information Sources for updated information.

- ☐ Monitor the health condition of any 'at risk' persons.

8. AFTER PASSAGE OF THE FIRE FRONT

- ☐ Be aware of any embers or fires starting in materials against or close to the building. Designated onsite responsible persons to use available water supplies to douse the embers/fires if necessary.

- ☐ If necessary, cautiously begin to open windows to maintain tenable conditions inside.

- ☐ If necessary, move to an area that has already burnt if the building catches fire and conditions inside become untenable.

8.7. RECOVERY

RECOVERY PROCEDURE – ACTIONS TO IMPLEMENT
When these actions are to be conducted by the facility/premises personnel with designated emergency responsibilities, ensure the Chief Fire Warden is informed of their completion.

1. FOR PERSONS SHELTERING ONSITE AND THE BUSHIRE IS CONTROLLED OR THE FRONT HAS PASSED

- ☐ Always follow the directions of emergency services personnel.
- ☐ If you have been sheltering in a building and if necessary, cautiously begin to open windows to maintain tenable conditions inside.
- ☐ If the shelter building catches fire and conditions inside become untenable, move to the designated 'Post Fire Front Shelter Area' (or an area that has already burnt).
- ☐ If persons are in discomfort, consider evacuation if a route is available. Seek medical assistance for those requiring it e.g. smoke inhalation.
- ☐ Monitor building/s and surrounds for any ignition of combustible material. Be prepared to initiate the Evacuation Procedure if necessary and an evacuation route is available.
- ☐ Be aware of any embers or fires starting in materials close to the building. Use available water supplies to douse the embers/fires if necessary.

2. FOR PERSONS EVACUATED TO A SAFER OFFSITE DESTINATION

- ☐ Always follow the directions of emergency services personnel.
- ☐ Seek medical assistance for those requiring it.
- ☐ No person is to re-enter any evacuated building or site until advised by the relevant emergency service that it is safe.
- ☐ The facility/premises management is to arrange inspection of the site to ensure a safe environment before return of any persons.
- ☐ The facility/premises Fire Warden (fire emergency manager) is to arrange the movement of occupants back to the facility/premises.
- ☐ Inform emergency services (Dial 000) of the status of persons returning to the facility/premises.
- ☐ All occupants/visitors must be accounted for on their return using the 'occupant/Visitor Register' procedure used by the facility/premises.

APPENDIX 1: BUSHFIRE WARNINGS – WHEN A BUSHFIRE IS IDENTIFIED

APPENDIX 2: FIRE DANGER RATINGS - FORECAST BUSHFIRE RISK

THE HIGHER THE RATING, THE MORE DANGEROUS THE CONDITIONS AND THE GREATER THE CONSEQUENCES IF A FIRE STARTS.

APPENDIX 3: FIRE BEHAVIOUR INDEX - FORECAST BUSHFIRE RISK

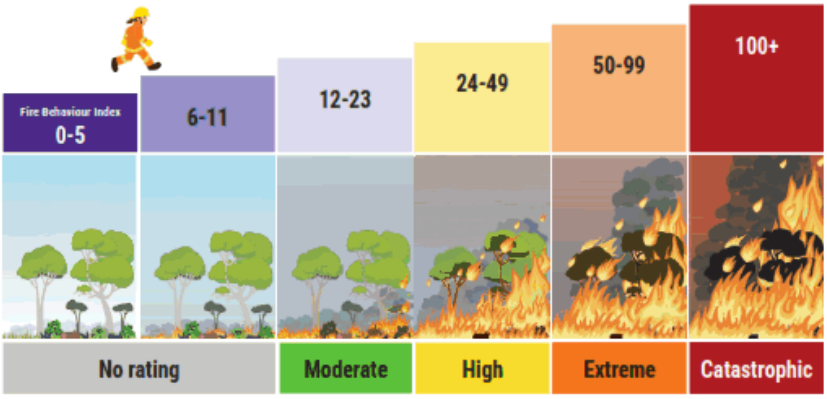
While the AFDRS Fire Danger Ratings are primarily intended for community messaging, the Fire Behaviour Index is intended to support operational fire management decision making.

Features of the FBI:

A Fine Scale of Fire Behaviour	The FBI is expressed in whole numbers from 0 to100+. As the FBI rises, the more dangerous a fire that stars will become.	Takes advantage of decades of improved understanding of fire behaviour, fuels and fire weather.
Stepped Categories	Links transitions in fire behaviour to implications for operational decision making.	Turns the FBI into a powerful operational tool and takes advantage of improved understanding of relationship between fire behaviour, fire spread, suppression and impacts.
Fuel Type Specific	Eight different Fire Behaviour Indexes based on eight different fire behaviour models.	Takes advantage of decades of improved knowledge of fire behaviour in different fuels to produce more specific results.
Nationally Consistent	The index is the same anywhere in Australia.	Supports cross border operations and resource sharing.

The Stepped categories are controlled by tables that define FBI thresholds. The thresholds represent changes in the underlying fire behaviour that have consequences for fire operational decision making, including:

- Indicative fire behaviour and fire weather.
- Implications for prescribed burning.
- Fire suppression and containment strategies that are appropriate.
- Potential for impact on life, property and infrastructure.



For more information visit afac.com.au/initiative/afdrs or email AFDRS@dfes.wa.gov.au

DFES
HOW FIREPROOF IS YOUR PLAN?
AFDRS

APPENDIX 4: BUSHFIRE RISKS AND DANGERS

BUSHFIRE RISKS AND DANGERS

BUSHFIRES HAPPEN EVERY SUMMER; THEY CAN START SUDDENLY AND WITHOUT WARNING.
If you live in or near bushland you need to understand the risks and dangers that bushfires cause.
Remember that flames are not the only risk you face in a bushfire.

EMBER ATTACK

Ember attack occurs before, during and after a fire front passes.

Embers are pieces of burning bark, leaves or twigs that are carried by the wind around the main fire creating spot fires.

Spotting can be carried over half a kilometre from a fire.

Embers can land in areas around your home such as your garden, under or in the gutters of your home and on wooden decks.

If not extinguished, your house could catch fire.

RADIANT HEAT

The hotter, drier and windier the day, the more intense a bushfire will be and the more radiant heat it will generate.

Radiant heat can cause injury and death from burns and cause the body's cooling system to fail, leading to heat exhaustion and possible heart failure.

It is important that you include water and appropriate clothing in your emergency kit and consider where you will shelter during a bushfire to protect yourself from radiant heat.

SMOKE

Lung injuries and suffocation can occur where the body is exposed to smoke and super-heated air.

It is important to seek shelter when heat and smoke are most intense.

Your nose and mouth should be covered with a dust mask, wet towel or scarf.

A special filter mask should be included in your survival kit for people in your family who suffer respiratory conditions such as asthma.

For more information visit
dfes.wa.gov.au/bushfire
or contact DFES Community Preparedness:
Community.Preparedness@dfes.wa.gov.au
or **9395 9816**

September/2020/V1.0

GOVERNMENT OF WESTERN AUSTRALIA
DFES Department of Fire & Emergency Services

HOW FIREPROOF IS YOUR PLAN?

APPENDIX 5: GUIDELINES FOR TRAVELLING IN CARS DURING A BUSHFIRE

TRAVELLING DURING A BUSHFIRE

BUSHFIRES CAN START WITHOUT WARNING. People have been killed or seriously injured during bushfires. If you are travelling or staying near bushland, fire is a real risk to you. **Pack an emergency kit including important items such as woollen blankets, drinking water and protective clothing.**

IF THERE IS A LOT OF SMOKE

- ◯ Slow down as there could be people, vehicles and livestock on the road.
- ◯ Turn your car headlights and hazard lights on.
- ◯ Close the windows and outside vents.
- ◯ If you can't see clearly, pull over and wait until the smoke clears.

For more information visit **dfes.wa.gov.au/bushfire**

or contact DFES Community Preparedness: **Community.Preparedness@dfes.wa.gov.au**

or **9395 9816**

IF YOU BECOME TRAPPED BY A FIRE

Sheltering inside a vehicle is a very high risk strategy. It is unlikely that a person will survive in all but the mildest circumstances.

- ◯ Park the vehicle off the roadway where there is little vegetation, with the vehicle facing towards the oncoming fire front.
- ◯ Turn the engine off.
- ◯ Close the car doors, windows and outside vents, and call 000.
- ◯ Stay in the car until the fire front has passed. Stay as close to the floor as possible and cover your mouth with a damp cloth to avoid inhalation of smoke.
- ◯ Stay covered in woollen blankets, continue to drink water and wait for assistance.
- ◯ Once the front has passed and the temperature has dropped, cautiously exit the vehicle.

IMPORTANT INFORMATION

- ◯ Find the local ABC radio frequency in the area. Stay up to date in a major emergency, when lives and property are at risk, ABC radio will issue broadcast warnings at a quarter to and a quarter past the hour.
- ◯ Main Roads provides updated information on road closures throughout WA. Call 138 138 or www.mainroads.wa.gov.au
- ◯ Check the weather forecast and current fire restrictions. Be aware of the Fire Danger Rating for the area you are travelling to and be prepared to reassess your plans.
- ◯ Download the Bushfire Traveller's Checklist at www.dfes.wa.gov.au

GOVERNMENT OF WESTERN AUSTRALIA

DFES Department of Fire & Emergency Services

HOW FIREPROOF IS YOUR PLAN?

APPENDIX 6: INDICATIVE BUSHFIRE BEHAVIOUR TO IMPACT THE FACILITY/PREMISES

Information Relevance: This information is included in the Bushfire Emergency Plan to inform and assist the decision making of those persons onsite who have the responsibility to manage a bushfire emergency for the subject facility/premises.

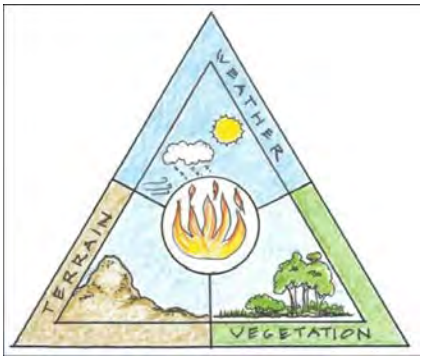
The information establishes the key factors to be considered in understanding the types and scale of key bushfire behaviours that can be expected to impact the facility/premises on a given day. These factors are the type of vegetation that exists on the land surrounding the subject premises/facility, the relevant surrounding terrain, and the forecast Fire Danger Rating (FDR) that applies to the locality.

Information Source: The information is taken from the bushfire behaviour modelling applied within the Australian Fire Danger Rating System (AFDRS). Within this system, eight accepted bushfire behaviour models, describing mathematically the way fire moves and spreads through different vegetation types, are currently available and are applied to twenty two different vegetation types across Australia.

The modelling is used to derive the Fire Behaviour Index (FBI) that assists firefighting operational decision making. From the FBI, Fire Danger Ratings (FDR) are derived which provide the broad categories needed to communicate fire danger to the community. The determination of the daily FDR considers the vegetation types present and the forecast fire weather conditions. The higher the rating, the more dangerous the conditions and the greater the consequences if a fire starts. (Source: AFDRS project led by NSW RFS, Australian Bureau of Meteorology and AFAC).

The Fire Behaviour Triangle

The behaviour of a bushfire, including the types of threats, intensity and how quickly it moves, depends on the three factors of vegetation, weather and terrain.



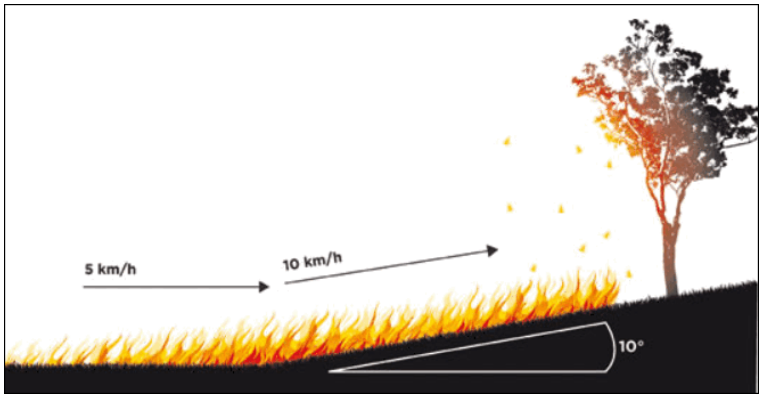
This is known as the fire behaviour triangle – because all three factors combine to shape the characteristics of the bushfire (source: CSIRO 'Bushfire best practice guide' at … research.csiro.au/bushfire/).

The influence of fire weather (FDR) and vegetation types (as per AFDRS) on the potential bushfire impact to the subject facility/premises, can be derived from the tables presented on the following page(s). Greater fuel loads will result in behaviours at the higher end of stated values.

The influence of terrain can be derived by considering the existence and degree of sloping ground and changes in changes in relief (e.g., flat, undulating or rugged land), surrounding the subject facility/premises and particularly under the vegetation.

The Influence of Terrain (topography)

A fire will burn faster uphill. This is because the flames can easily reach more unburnt fuel in front of the fire. Radiant heat pre-heats the fuel in front of the fire, making the fuel even more flammable.



For every 10˚ slope, the fire will double its speed. For example, if a fire is travelling at 5 km per hour along flat ground and it hits a 10˚ slope it will double in speed to 10 km per hour up the hill. By increasing in speed the fire also increases in intensity, becoming even hotter.

The opposite applies to a fire travelling downhill. The flames reach less fuel, and less radiant heat pre-heats the fuel in front of the fire. For every 10˚ of downhill slope, the fire will halve its speed. Fires tend to move more slowly as the slope decreases

(source: Country Fire Authority, Victoria).

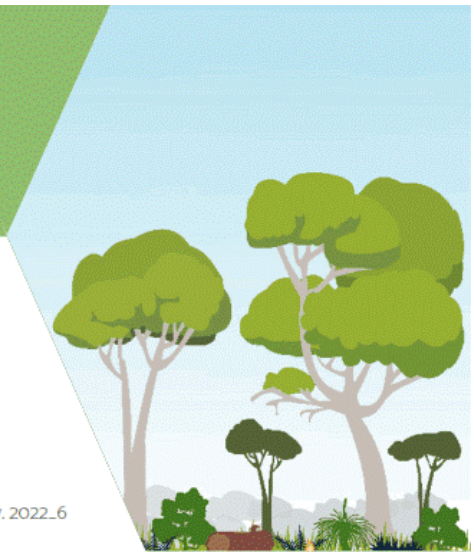
Terrain should be considered for its potential to increase adverse fire behaviour including flame heights, forward rates of spread and ember production (in relevant vegetation i.e., primarily bark fuels). Essentially, where vegetation exists on sloping land near your site, assume that the higher end of adverse fire behaviours is much more likely to apply.

BPP: Identify the relevant fire behaviour models and associated indicative fire behaviour information. Delete non-relevant rows of the table and non-relevant indicative fire behaviour posters.

VEGETATION TYPES IDENTIFIED SURROUNDING THE SUBJECT FACILITY/PREMISES		
As Applied in the AFDRS		Vegetation Location Relative to the Facility/Premises
Fire Behaviour Model (short name)	Fuel Types / Description	
Forest	Dry eucalypt forests, shrubby understorey/litter surface fuel. Forests with high moisture content due to structure, topography or inundation.	Low lying creek areas north of site.
Grassy Woodland (Savanna)	Woodland and shrubland with a continuous grass understorey.	Broader surroundings to the North of the development.
Shrubland	Temperate shrublands and heathlands of varying heights. Includes wet heathlands.	Surrounding the southern facility to the east and west
Grassland	Continuous/tussock grasslands. Modified/native pasture (grazing). Non-irrigated cropping. Low shrublands (wet or arid) with no overstorey.	Surrounding all buildings

FOREST

THE INDICATIVE FIRE BEHAVIOUR CORRESPONDING TO THE FIRE BEHAVIOUR INDEX (0-100) AND THE ASSOCIATED FIRE DANGER RATING (FDR)



Source: AFDRS v. 2022_6

FDR	INDICATIVE BUSHFIRE BEHAVIOUR			
NO RATING	MAX FLAME HEIGHT <1 m	0-5	RATE OF SPREAD 0-40 m/hr	Fire difficult to ignite and sustain. Fires generally unlikely to spread and likely to self-extinguish.	**SPOTTING POTENTIAL** Potential for any spotting is very limited and likely **<150 m**
	<4 m	6-11	20-110 m/hr	Slow spreading fires, typically involving surface and near-surface fuels and sometimes bark and elevated fuels. Spotting is sporadic and limited to short-distances.	Potential for spotting is limited with short distance spotting possible up to **400 m**
MODERATE	2-8 m	12-23	60-600 m/hr	Actively spreading fires typically involving surface, near-surface, elevated and bark fuel layers and occasionally canopy fuels. Low-moderate spotting frequency; isolated medium range spotting can occur.	Short distance spotting occurring with increasing frequency with possible medium distance spotting up to **2 km**
HIGH	7-14 m	24-49	0.3-1 km/hr	Rapidly spreading fires with potential for development into large burn areas within burning period. Fires typically involving most fuel layers. Short-range spotting is prevalent, with possibility of medium range and occasional long-range distance spotting.	Short and medium distance spotting occurring with increasing frequency with possible long distance spotting up to **4 km**
EXTREME	11 m - approx. double forest	50-99	0.7-3 km/hr	Fires likely to quickly transition to crowning. Possibility for fire behaviour to become erratic and plume driven. Strong convective column formation. Wind speed and direction likely to be erratic at times.	High ember density in short and medium range with possible long distance spotting up to **12 km**
CATASTROPHIC	>30 m (approx. double forest height)	100+	>2 km/hr can be expected, possibly >3 km/hr	Fires likely to quickly transition to crowning. Possibility for fire behaviour to become erratic and plume driven. Strong convective column formation. Wind speed and direction likely to be erratic at times.	High ember density in short and medium range with possible long distance spotting occurring **20-30 km** ahead of the main fire front

SAVANNA
(GRASSY WOODLAND)

THE INDICATIVE FIRE BEHAVIOUR CORRESPONDING TO THE FIRE BEHAVIOUR INDEX (0-100) AND THE ASSOCIATED FIRE DANGER RATING (FDR)

Source: AFDRS v. 2022_6

FDR	INDICATIVE BUSHFIRE BEHAVIOUR			
NO RATING	MAX FLAME HEIGHT <0.5 m	0-5	RATE OF SPREAD 0-50 m/hr	Fire difficult to ignite and sustain. Fires generally unlikely to spread and likely to self-extinguish.	**SPOTTING POTENTIAL** Potential for any spotting is extremely limited
	<0.5-1.5 m	6-11	<1.5km/hr	Fire easily sustained. Typically wind driven fires that can spread quickly. Fires mostly only partially consuming fuels, typically creating a mosaic of burnt and unburnt patches (decreasing patchiness with increasing intensity).	Potential for spotting is limited
MODERATE HIGH	1.5-2.5 m	12-49	1-8 km/hr	Wind driven, rapidly spreading fires with potential for development into large fire area/size and with the potential for short distance spotting and long flame lengths. Fires typically consuming all available fuel. Increasing scorch height of tree canopy (up to 20-25 m) and char height (up to 3-4 m).	Possible short distance spotting occurring
EXTREME CATASTROPHIC	>2.5m	50+	>5 and likely >8 km/hr	Extremely rapid fire growth and increasing likelihood of large final fire area/size. Possibility for fire behaviour to become erratic and plume driven. Strong convective column formation. Wind speed and direction likely to be erratic at times. Fires consuming all available fuel.	Likely short distance spotting

SHRUBLAND

THE INDICATIVE FIRE BEHAVIOUR CORRESPONDING TO THE FIRE BEHAVIOUR INDEX (0-100) AND THE ASSOCIATED FIRE DANGER RATING (FDR)

Source: AFDRS v. 2022_6

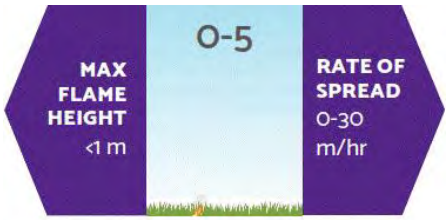
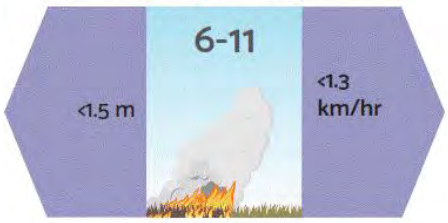
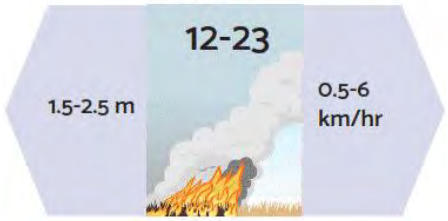
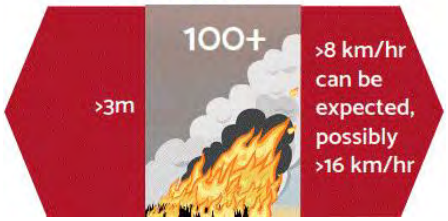
FDR	INDICATIVE BUSHFIRE BEHAVIOUR			
NO RATING	MAX FLAME HEIGHT <0.5 m	0-5	RATE OF SPREAD 0-20 m/hr	Flame dimensions are generally insufficient to breach sparse and discontinuous fuels or inter-hummock gaps.
	<0.5-1.5 m	6-11	20-150 m/hr	Sustained spread of fire.
MODERATE	1-4 m	12-23	150-1300 m/hr	Fast moving, wind-driven fires that are mostly actively crowning.
HIGH	2-8 m	24-49	up to 6.5 km/hr	Fast moving, wind-driven, crown fires with high potential for large fire areas. Mostly complete combustion of fuels and few unburnt patches.
EXTREME	>4m and likely >8m	50+	>1.5 and likely >6.5 km/hr	Rapid fire growth, extremely fast moving, wind-driven fires. High potential for large fire areas with complete combustion of fuels and few unburnt patches.
CATASTROPHIC				

SPOTTING POTENTIAL
Potential for any spotting is extremely limited
Potential for spotting is limited
Potential for spotting is limited except where eucalypt/mallee trees are present where spotting is likely to be minimal and limited
Possible short distance spotting mostly <20 m or where eucalypt/mallee trees are present where spotting is likely to be minimal and limited to short distances (<100 m). Any spot fires are typically overrun by the main head fire
Possible short distance spotting mostly <40 m except where eucalypt/ mallee trees are present where spotting may be up to 200 m with spot fires typically quickly overrun by the main head fire

GRASSLAND

THE INDICATIVE FIRE BEHAVIOUR CORRESPONDING TO THE FIRE BEHAVIOUR INDEX (0-100) AND THE ASSOCIATED FIRE DANGER RATING (FDR)

Source: AFDRS v. 2022_6

FDR	INDICATIVE BUSHFIRE BEHAVIOUR		
NO RATING		Fire difficult to ignite and sustain. Fires generally unlikely to spread and likely to self-extinguish.	**SPOTTING POTENTIAL** Potential for any spotting is very limited.
		Fire easily sustained. Typically wind driven fires that can spread quickly.	Potential for spotting Potential for short distance spotting is limited.
MODERATE		Typically wind driven and rapidly spreading fires with the potential to gain size quickly.	Possible short distance spotting occurring.
HIGH		Wind driven, rapidly spreading fires with potential for development into large fire area/size and with the potential for short distance spotting and long flame lengths.	Short distance spotting occurring with increasing frequency.
EXTREME		Extremely rapid fire growth and increasing likelihood of large final fire area/size. Possibility for fire behaviour to become erratic and plume driven. Strong convective column formation. Wind speed and direction likely to be erratic at times.	Likely short distance spotting occurring with increasing frequency.
CATASTROPHIC		Extremely rapid fire growth and high likelihood of large final fire area/size. Possibility for fire behaviour to become erratic and plume driven. Strong convective column formation. Wind speed and direction likely to be erratic at times.	Likely short distance spotting occurring with increasing frequency.

APPENDIX 7: LANDSCAPING DESIGN & CONSTRUCTION PRINCIPLES TO APPLY

Where initial or renovation landscaping of grounds surrounding the facility/premises is being conducted, apply the directions and principles of the following measures to the greatest extent possible.

For additional guidance, refer to:

- The *Guidelines for Planning in Bushfire Prone Areas within the Explanatory Notes for Element 2 of the Bushfire Protection Criteria and Schedule 1: Standards for Asset Protection Zones (WAPC 2021); and*
- The DFES '*Bushfire Preparation Toolkit'* publication. Website: publications.dfes.wa.gov.au/?hazard=Bushfire

☐ Use of Non-Vegetated Areas and/or Public Open Space:

Reduce the exposure of the facility/premises to the direct and indirect threats of bushfire by incorporating low threat uses of land adjoining the facility/premises and/or the bushfire hazard. These uses create robust and easier managed asset protection zones and include:

- Non-vegetated areas e.g. footpaths, paved areas, roads, driveways, parking, drainage, swimming pools;
- Formally managed areas of vegetation (public open space and other recreation areas), including irrigated areas; and
- Services installed in a common section of non-vegetated land.

☐ Landscaping – Non-Combustible Construction: Ensure non-combustible materials are used for fencing and any other landscaping construction, including retaining walls.

☐ Landscaping – Tree and Plant Species Selection

Utilise trees and plants with characteristics that are more resistant to burning. Refer to *Guidelines for Planning in Bushfire Prone Areas, Appendix 4 'Explanatory Notes E2: Plant Flammability' (WAPC 2021) for initial guidance.*

Avoid planting trees with ribbon or stringy barks (ember/firebrand production). Preference for smooth bark.

☐ Landscaping – Tree and Plant Separation from the Facility/Premises (Location):

Trees (greater than 6 metres in height: Minimise the potential for tree strike damage (falling or blown) to the facility/premises (allowing flame, radiant heat and ember entry to internal spaces), and debris accumulation on, in and around the facility/premise. Principles to apply are:

- Ideally trees will be separated from buildings/structures by a distance of at least 1.5 times the height of the tallest tree;
- As a minimum, trunks at maturity should be at least 6 metres from all elevations of the building, branches at maturity should not touch or overhang a building or powerlines. Mature tree canopies should be separated at least 5m with total canopy cover not exceeding 15% and not connected to tree canopy outside the APZ;
- Species of trees that produce significant quantities of debris (fine fuels) during the bushfire season should be located a sufficient distance away from vulnerable exposed elements to ensure debris cannot drop and accumulate within at least 4m of buildings/structures or be likely to be relocated by wind to closer than 4m to buildings / structures.

Shrubs and scrub (0.5 metres to 6 metres in height):

- Should not be located under trees or within 3 metres of buildings;
- Should not be planted in clumps greater than 5m^2 in area;
- Clumps of shrubs should be separated from each other and any exposed window or door by at least 10

metres (unless they can be classified as low flammability plants); and

- Shrubs greater than 6 metres in height are to be treated as trees.

Ground covers (less than 0.5 metres in height):

- Can be planted under trees but and no closer than two metres from a structure but 3 metres from doors or windows if greater than 100 mm in height; and
- Ground covers greater than 0.5 metres in height are to be treated as shrubs.

Grass: Where possible utilise irrigated perennial species.

Mulches should be non-combustible e.g., stone, gravel and crushed rock. Where wood mulch is used it should be greater than 6mm in thickness.

☐ Separation Between the Facility/Premises and the Consequential Fire Fuels of Stored Flammable Products (Fuels / Other Hazardous Materials):

If applicable. establish sufficient separation distance between the consequential fire fuels and the facility/premises. The required separation distance will be dependent on the fuel and storage type and will need to be determined.

☐ Separation Between the Facility/Premises and the Consequential Fire Fuels of Stored and Constructed Combustible Items:

These consequential fire fuels include:

- Stored Combustible Items - Heavy Fuels (greater than 6mm diameter) e.g. building materials, packaging materials, firewood, branches, sporting/playground equipment, outdoor furniture, garbage bins etc:
- Stored Combustible Items – Large Heavy Fuels e.g. vehicles, caravans, boats, trailers and large quantities of dead vegetation materials stored as part of site use.
- Constructed Combustible Items – Heavy Fuels e.g. landscaping structures including fences, screens, walls, plastic water tanks.
- Constructed Combustible Items – Large Heavy Fuels e.g. adjacent buildings/structures including houses, sheds, garages, carports. (Note: If the adjacent structure is constructed to BAL-29 requirements or greater and can implement a significant number of additional bushfire protection measures associated with reducing exposure and vulnerability, these minimum separation distances could be reduced by 30%).

Apply the rule of thumb "assume flames produced from a consequential fire source will be twice as high as the object itself … where the consequential fire source is a structure, then the maximum eave height is a reasonable measure of maximum height".

Apply the following separation distances from the subject building/structure as a multiple of the height of the consequential fire source and dependent on the bushfire construction standard applied to the building/structure:

- At least six times the height when the facility/premises construction incorporates design and materials that is only intended to resist low levels of radiant heat up to 12.5 kW/m^2 and no flame contact (BAL-12.5);
- Between 4 and 6 six times the height when the facility/premises construction incorporates design and materials intended to resist radiant heat up to 29 kW/m^2 and no flame contact (BAL-29).
- Between 2 and 4 times the height when the facility/premises construction incorporates design and materials intended to resist up to 40kW/m^2 and potential flame contact (BAL-40).
- Less than 2 times the height when the facility/premises construction incorporates design and materials intended to resist extreme levels of radiant heat and flame contact (BAL-FZ).

- Zero separation distance is required if the facility/premises is separated by a non-combustible FRL 60/60/60 rated wall, or the potential consequential fire source is fully enclosed by the facility/premises.

☐ Constructed Barriers to Shield Facility/Premises from Bushfire: Where applicable, install walls, fences and/or landforms to shield the facility/premises (or any identified consequential fire fuels – refer to previous item) from direct and indirect bushfire attack mechanisms and reduce the potential impact of these threats.

These barriers should be constructed using appropriate fire resistant / non-combustible construction materials (e.g. masonry, steel, earthworks). These are to withstand the impact of direct bushfire attack mechanisms for the required period.

☐ Constructed Barriers to Shield Facility/Premises from Consequential Fire: Applicable to all identified consequential fire fuel sources. Install a non-combustible barrier (including complete enclosure when appropriate), of required robustness, that will reduce the exposure of the facility/premises to the threats of consequential fire.

☐ Planted Vegetation Barrier to Shield Facility/Premises: Use appropriate species (lower flammability) of hedges and trees strategically to reduce the facility/premises exposure to radiant heat, to filter/trap embers and firebrands, and to lower wind speeds (prevailing synoptic and/or fire driven).

☐ Shield Non-Structural Essential Elements: These are vulnerable elements essential to the continued operation of the facility/premises which are potentially exposed to the fire attack mechanisms of both bushfire and consequential fire. They include electricity cabling and water plumbing and also applies to any installed firefighting equipment / water storage.

When the use of fire rated materials to the degree necessary is not possible or practical, the application of non-combustible shielding can be applied to reduce exposure to the bushfire threats. Shielding includes underground installation.

☐ Constructed Barrier to Shield Persons on Pathways to Safer Onsite Area/Building: Where possible, alongside the relevant pathways, utilise walls / fences / landforms as shielding structures constructed using fire resistant / non-combustible construction materials (e.g. masonry, steel, earthworks).

These are to withstand the impact of direct bushfire attack mechanisms for the required period and provide the required reduction in threat levels to persons (including firefighters) traversing the pathway.

Carbon Recovery Centre

Traffic Impact Statement

Prepared for C-Wise

31 October 2023

Project Number: TW21124

DOCUMENT CONTROL

Version	Description	Date	Author	Reviewer	Approver
1.0	Issue for client comment	10/10/2023	RF		RF
2.0	Issue as Final	31/10/2023	RF	MH	RF

Approval for Release

Name	Position	File Reference
Richard Farmer	Senior Traffic Engineer	TW21124_C-Wise Recycling Centre_Traffic Impact Statement 2.0
Signature		

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1 Introduction

1.1 Background

C-Wise has engaged Talis Consultants to prepare a Traffic Impact Statement (TIS) to support the proposed Carbon Recovery Facility ('the Site') at 320 Gull Road, Keralup, WA.

This TIS has been prepared in accordance with the Western Australian Planning Commission (WAPC) *Transport Impact Assessment Guidelines for Developments: Volume 4 – Individual Development (2016)* and the checklist is included at Appendix A. This level of assessment was agreed with the Shire prior to collation and submission of this report.

1.2 Existing Site

The Site is located 320 Gull Road in the suburb of Keralup within the Shire of Murray, as shown in Figure 1-1.

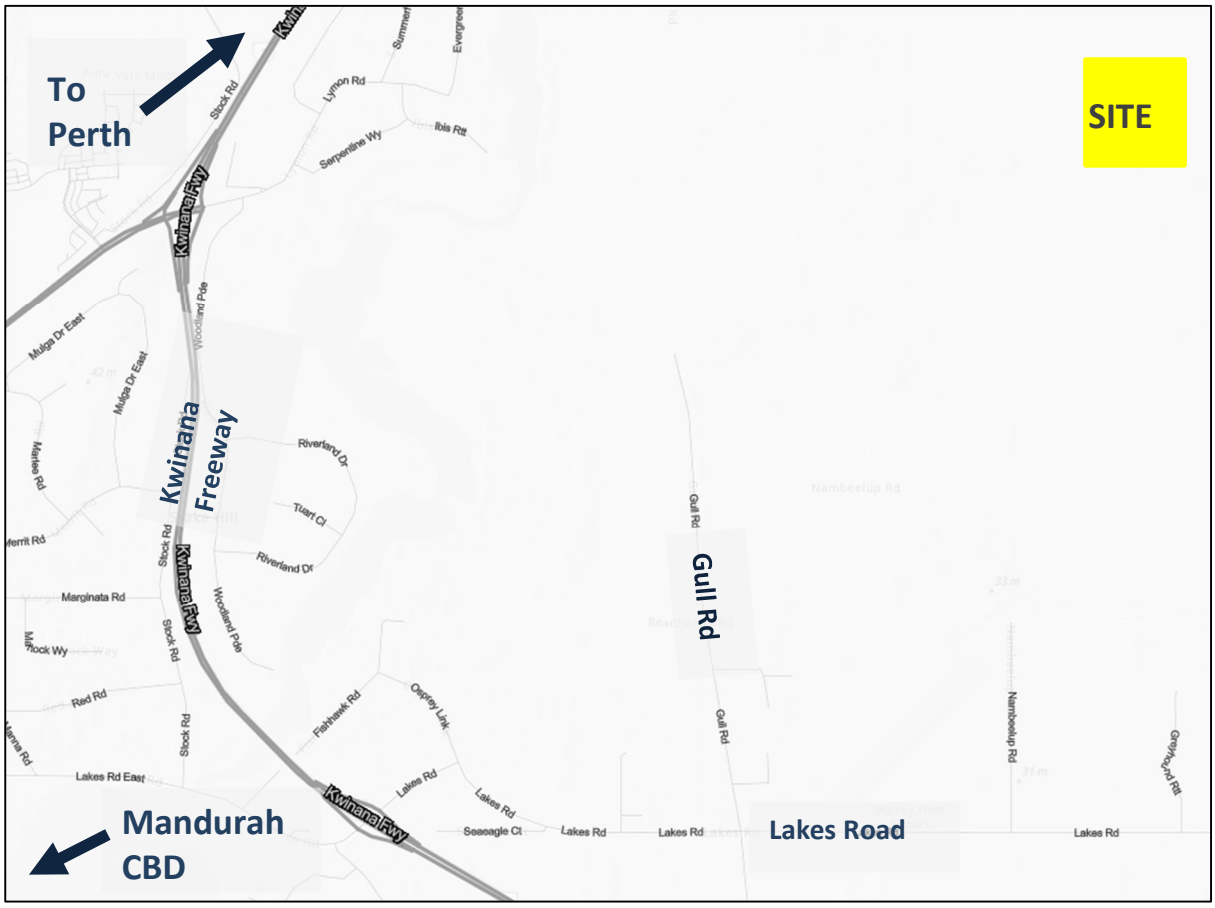


Figure 1-1: Site Location (not to scale)[1]

The Site currently consists of vacant land and as shown in Figure 1-2, the Site is within the Shire of Murray Industrial Planning Scheme zone.

[1] Source – MRWA (2023)

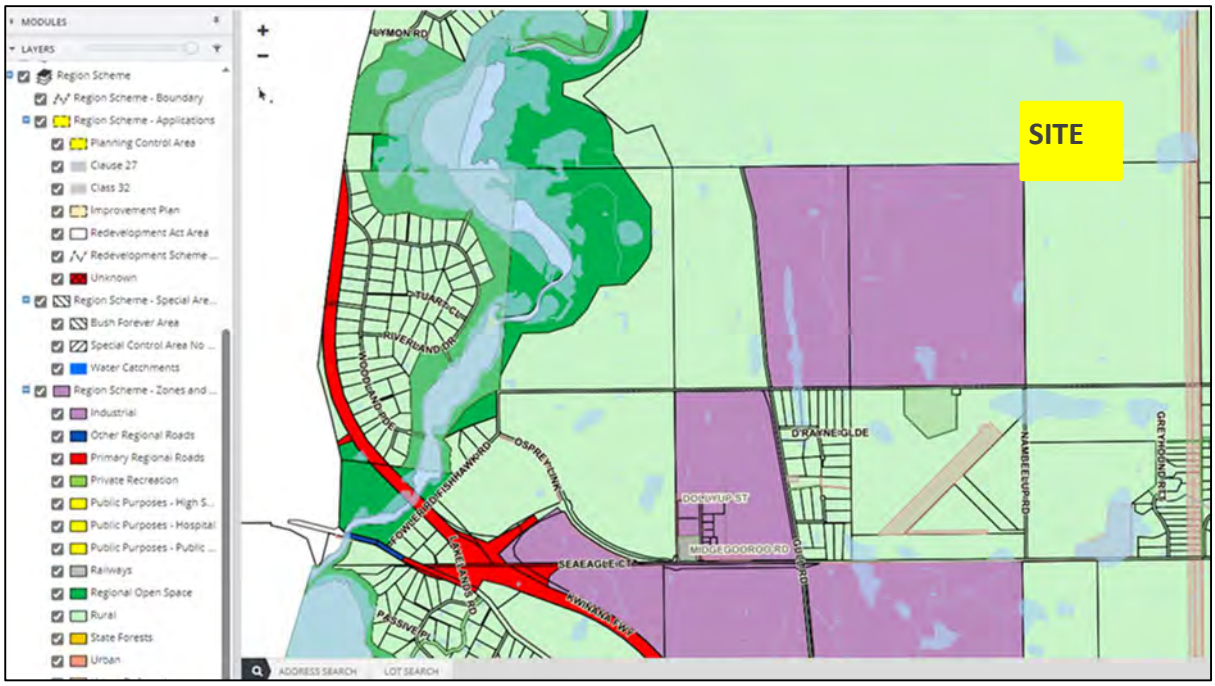


Figure 1-2: LGA Zoning Map

1.3 Nambeelup Industrial Area District Structure Plan

The Shire of Murray's Nambeelup Industrial Area District Structure Plan includes several road plans to cater for the expected increase of traffic, including large proportions of heavy vehicles in the local vicinity. Of these road plans, the following are of particular importance to the Site development.

- The realignment of Readheads Road, west of Gull Road, to connect to the existing Lakes Road intersection at the southern end of Osprey Link with reconfiguration of the intersection. It is understood that this new road connection and Readheads Road through to Gull Road is currently proposed to be constructed as a four-lane dual carriageway.
- The Gull/Patterson Road is proposed to be a north-south connecting regional road, constructed as a four-lane divided carriageway road. At present, this road extension has only been partially carried out but extended to provide connectivity to the Site access road when needed.

Overleaf, in Figure 1-3, is an extract from the Nambeelup Industrial Area District Structure Plan document providing a summary of the proposed major road upgrades associated with this Plan.

Key road proposals within the Nambeelup Industrial Area	Proposed road category	Proposed number of traffic lanes	Recommended road reserve width (ultimate)
Lakes Road (east of Lakelands Road)	Integrator A	4 lane dual carriageway	54-60m
Lakes Road (west of Lakelands Road)	Integrator A	4 lane dual carriageway	47-50m
Readheads Road (west of Gull Road)	Integrator A[1]	4[1] lane dual carriageway	51-54m[1]
Readheads Road (east of Gull Road)	Integrator B	2 lane	46.5-49.5m
Gull/Paterson Road	Integrator A	4 lane dual carriageway	39-42m
Nambeelup Road	Integrator A[1]	4[1] lane dual carriageway	39-42m[1]

Figure 1-3: Summary of Major Road Upgrades

1.4 Existing Road Network

The surrounding Road network is summarised in Table 1-1, with associated mapping information included in Appendix C

Table 1-1: Local Road Network

Road/ Street name	Reserve		Road			Footpaths		Cycling	
	Hierarchy classification (MRWA)	Jurisdiction (LGA etc)	Cross section width (m)	Posted speed. (km/ h)	Number of traffic lanes	Footpaths on Both/ one side?	Average width (m)	Cycle paths on Both/ one side?	Average width (m)
Gull Road	Access Road	Shire of Murray	5.8m	50 km/h in built up areas or 110 km/h	1	No	-	No	-
Lakes Road (west of Gull Rd)	Regional Distributor	Shire of Murray	7.6m	80 km/h	1	No	-	No	-
Lakes Road (east of Gull Rd)	Regional Distributor	Shire of Murray	7.6m	100 km/h	1	No	-	No	-

1.5 Traffic Volumes

Existing traffic volumes were provided by MRWA Traffic Map. This recent data is summarised in Table 1-2

Table 1-2: Summary of Existing Traffic Volumes

Road/ Street name	Source of data	Year	AADT Volume	AM Peak		PM Peak	
				Time	Volume	Time	Volume
Lakes Road (west of Gull Rd)	MRWA Traffic Data	2021	3571	07:00	249 (7%)	15:00	341 (10%)

Although the data was unavailable for Gull Road, it is assumed that the traffic volumes would currently not exceed 50 vehicles per hour, given there are a very small number of residences locally and the extended section of Gull Road is not yet open to public access.

1.6 Heavy Vehicles

Although it is not typically required for this level of assessment for a development, it was agreed with the Shire of Murray to review the likely operational movements of the development on the local public highway. The route is highlighted from the Site to Kwinana Freeway in Figure 1-1 and mapping information relating to local Restricted Access Vehicle road network is included in Appendix C.

As previously mentioned, in Section 1.3 of this report, road upgrades will be provided to cater for the increased development traffic, including heavy vehicles for the planned Nambeelup Industrial Area. Kwinana Freeway will used for heavy vehicle traffic movement to/from the Site and these upgrades facilitate these movements with the upgraded intersection of Gull Road with Lakes Road.

Heavy vehicles operating at the Site will not operate west of the Kwinana Freeway and it is not expected that they will travel east of Gull Road.

It is estimated that the Site will operate 1,400 heavy vehicles per week on public roads, estimated to be an average of 280 per day.

2 Public Transport Facilities

2.1 Bus and Rail Services

There are no existing public transport services to Nambeelup. It is anticipated that bus-based public transport services will be provided in the long-term, when the Nambeelup Industrial Area is of sufficient size and there is a reasonable demand for public transport services. Planning for public transport services will need to consider any relevant outcomes of the finalised South Metropolitan Peel Sub-Regional Planning Framework

2.2 Future Public Transport Facilities

There are currently no new planned changes to the public transport within the Nambeelup Industrial Area District Structure Plan.

3 Active Transport Networks and Facilities

3.1 Existing Networks and Facilities

There are no existing cycling and walking network in the immediate vicinity of the Site. However, there is a bicycle and pedestrian network as a part of District Structure Plan.

3.2 Future Active Transport Networks and Facilities

The Shire of Murray *Draft Cycling Strategy and Plan* aims to provide a strategic framework in developing recreational, sport and commuter cycling facilities in the future. This will provide future dedicated walking and cycling links in the future within the Nambeelup Industrial Area District Structure Plan zone. The Nambeelup Industrial Area Cycleway Plan is shown in Figure 3-1.

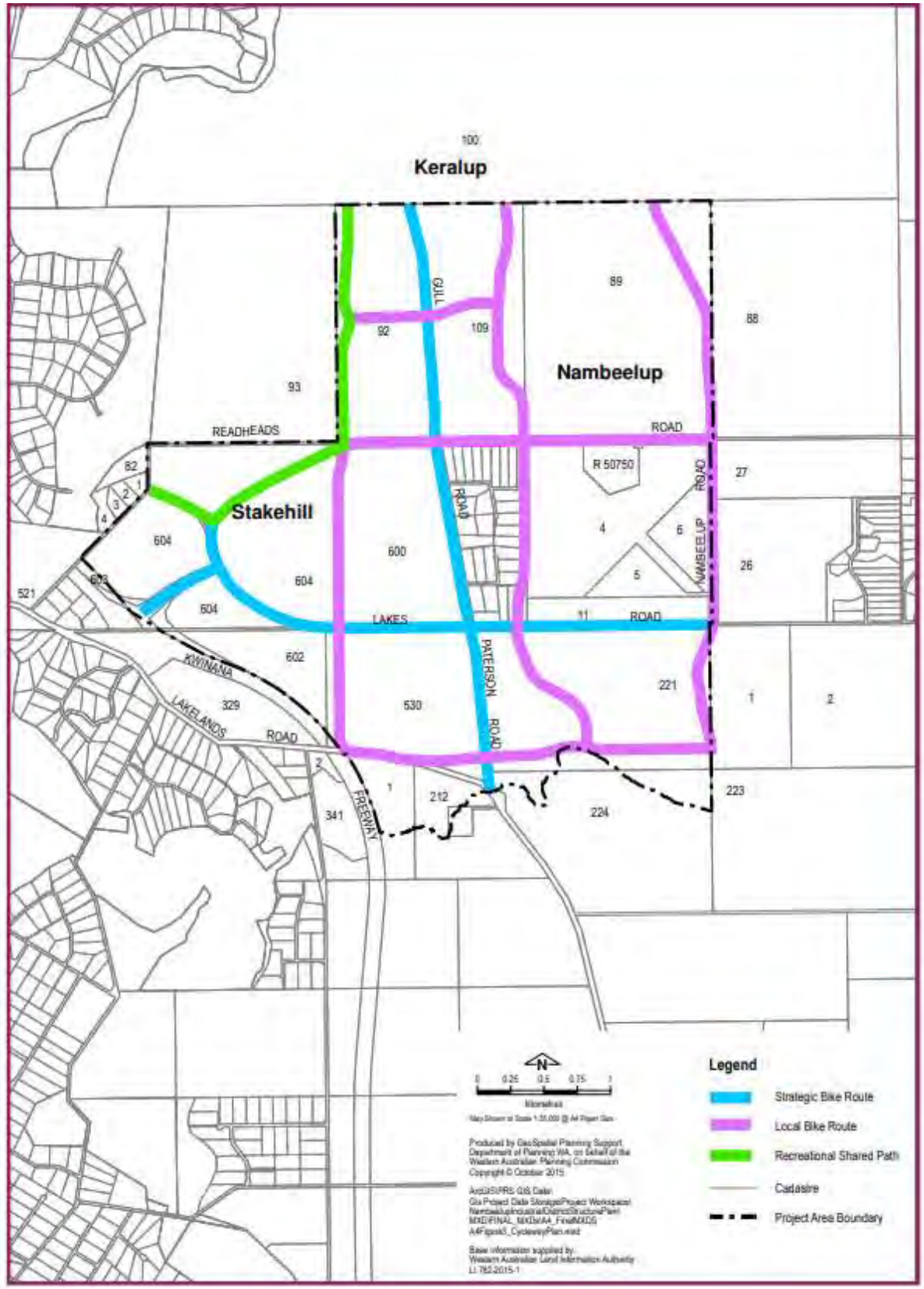


Figure 3-1: Nambeelup Industrial Area – Cycleway Plan

4 Proposed Development

4.1 Proposed Land Uses

The amended Site proposal consists of a Carbon Recycling Facility. When fully operational, it is expected to have a total of approximately 65 staff carrying our operations at the Site. Heavy vehicle traffic operations will be carried out over 12 hours and will transfer material to other sites, accessing the Kwinana Freeway for the major road transport link.

The concept layout plans for the Site are provided in Appendix B.

4.2 Access Arrangements

Vehicular access to the Site will also be from the newly constructed Gull Road, with public limited to the administration building section. Accessibility to the remainder of the Site will be restricted to staff operations only. Figure 4-1 provides layout information for the proposed Site, including the access arrangements.

Due to the remote location of the Site, it is unlikely that there will be staff or visitors accessing the Site as pedestrians or cyclists. There are no current provisions for bicycle parking but there is capacity to include these facilities in the future if there is demand due to increased development locally.

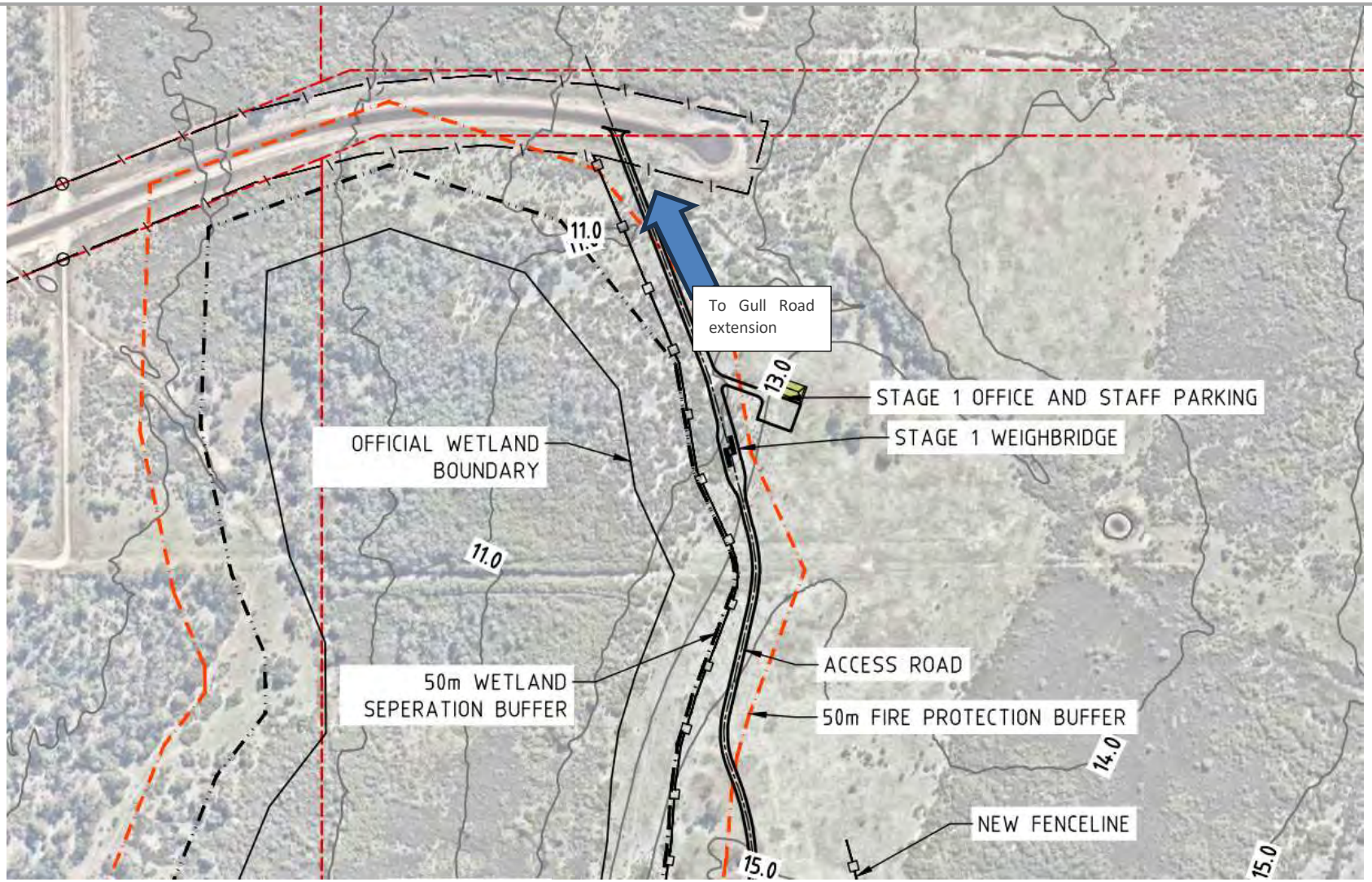


Figure 4-1: Site Access Details of Proposed Site (not to scale)

5 Development Traffic Generation

Trip generation has been calculated for the Site, utilising the breakdown of 28 commercial heavy vehicles (10% of total daily trips) and 85% of staff entering the Site in the am and pm peak hours.

Table 5-1 shows the trip generation rates, Table 5-2 shows the directional distribution and

Table 5-3 presents the resultant potential trip generation of the proposed development.

Table 5-1: Trip Rate Generation – Peak Hour

AM Peak	Heavy Vehicles	PM Peak	Heavy Vehicles
55	28	55	28

Table 5-2: Directional Distribution of Generated Traffic (Small Vehicles Only)

Land Use	AM Peak		PM Peak	
	From Site	To Site	From Site	To Site
Industrial	5%	95%	95%	5%
	03	52	52	03

Table 5-3: Total Trip Generation of Proposed Development

Land Use	AM Peak		PM Peak	
	In	Out	In	Out
Light vehicles	52	03	03	52
Operational heavy vehicles (5% of total trips)	26	02	02	26

The proposed development represents a trip generation of approximately 78 peak hour traffic movements. It should be noted that this trip generation is conservative and actual trip generation will likely be lower due to the expected spread of trips in shift patterns due to the Site operating a 12-hour day for an approximate number of 65 staff.

The Site is proposed to be developed as “Industrial Use”, and the traffic generated will be the largest local vehicle trip generator. However, despite increasing total road volumes, the traffic impact on the surrounding road network will be minimal.

5.1 Development Trip Distribution

Gull Road is the only road connected to the wider surrounding road network that all inbound and outbound traffic will use to access the Site. From Gull Road, a majority of the Site-generated trips are most likely to travel via the west section of Lakes Road from Gull Road.

The trips generated to and from the Site are very low and therefore are expected to have minimal impact to the surrounding road network.

It is expected that most operational heavy vehicles will travel to/from Kwinana Freeway and approximately 70% of staff will also use Kwinana Freeway. This will have a minimal impact on traffic in the Mandurah urban region.

6 Parking

The car parking provision required for the Site is set out in the *WAPC - Car parking requirements for non-residential land uses in Perth and Peel - draft Interim Guidance document*, which are summarised in Table 6-1.

Table 6-1: LGA Parking Requirements.

Land Use	Parking Requirements
Industrial	1.0 spaces per 100m^2 GFA (Gross Floor Area)

Table 6-2 summarises the parking provision and requirements for the Site.

Table 6-2: Parking Bay Requirement and Provision.

Land Use	Number of Bays Required	Proposed Development Provision
Industrial	60	68

The number of parking bays proposed will provide parking for all staff, as well as additional capacity for three visitors and services vehicles to the administration building.

Overall, the proposed parking supply should be sufficient to accommodate the estimated demand.

6.1 Swept Path Assessment

The staff and visitor car park has been designed to allow for bus turning movements if buses require access to the Site. A car park layout design, with a bus template swept path is included in Appendix B. The layout of parking bays and aisles have been designed in accordance with AS2890.1-2004 *Parking facilities: Off-street car parking*.

A car park layout design, with the bus movement swept path is included in Appendix B.

7 Site Specific Issues

As Gull Road has not been made available for public access at present, no crashes were identified on the MRWA Crash Tool database, and the upgrade of the Gull Road/Lakes Road intersection previously discussed should provide suitable accessibility for heavy vehicle and other traffic turning at this intersection to and from the Site.

8 Summary

This Transport Impact Statement outlines the transport aspects of the proposed development focusing on traffic operations, loading vehicle operations, access, and car parking. Discussions regarding public transport and active transport considerations are also provided.

This statement has been prepared in accordance with the *WAPC Transport Assessment Guidelines for Developments: Volume 4 – Individual Developments (2016)*.

The following conclusions are made regarding the proposed development at 320 Gull Road, Keralup:

- There are no current public transport upgrade plans to provide access within walking distance to the Site, however there are plans to provide good active transport accessibility to the Site access, with wide pedestrian footpaths and good shared paths within the surrounding area.
- The Site will generate approximately 55 cars and 28 heavy vehicles during the peak am and pm periods.
- There will be 68 parking bays provided for staff and visitors, meeting the required minimum parking requirements.

APPENDIX A

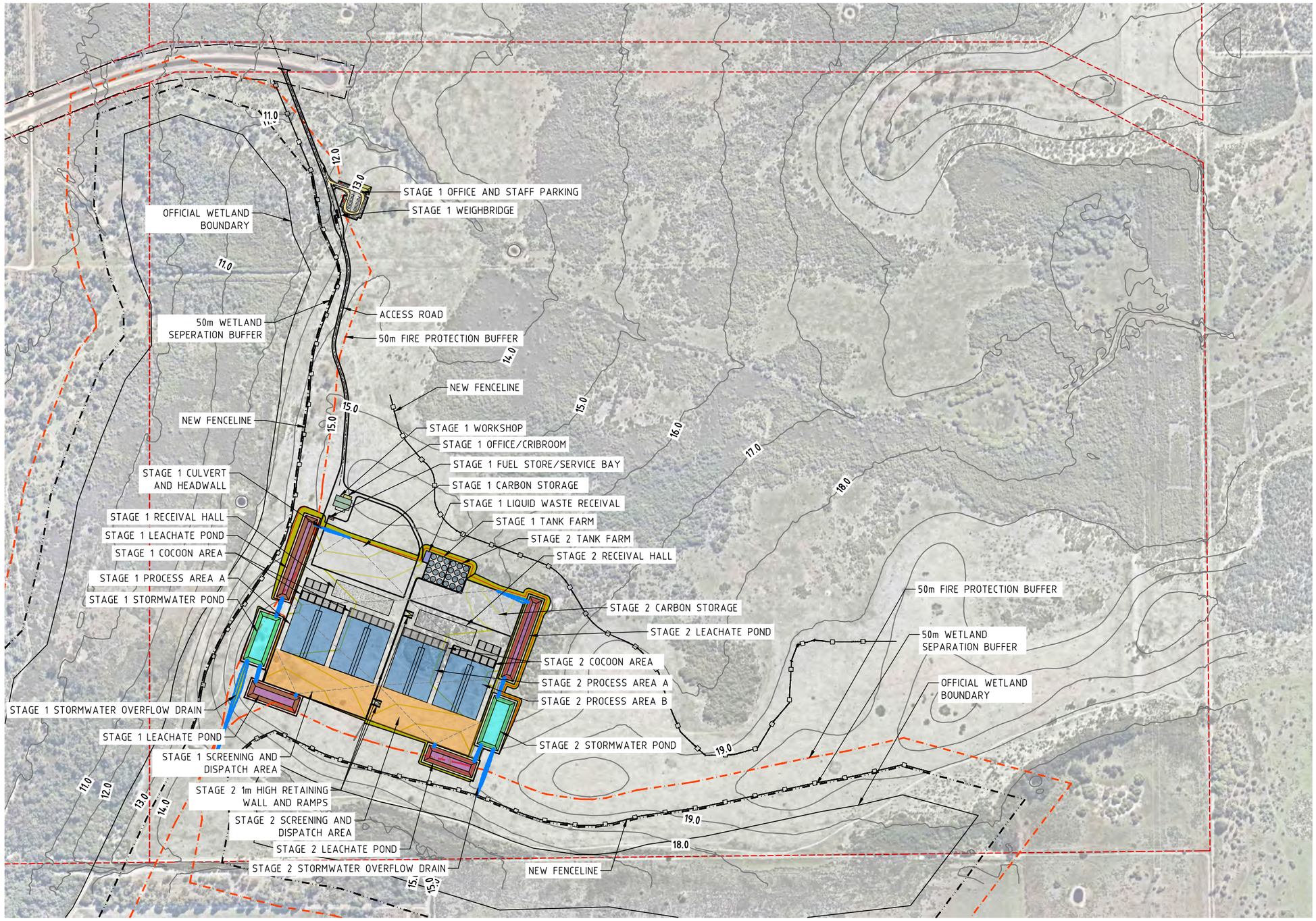
WAPC Transport Statement Checklist for Development

Table A-1: Checklist for a Transport Statement, *Individual Development*

ITEM	TIS SECTION REFERENCE
Development type	
Proposed land use	Section 1
Existing land use	Section 1
Context of Development with surrounds	Section 1
Parking and access Public/ private/ ACROD/ Kiss n Drive Access arrangements	Section 4
Service vehicles Access arrangements Loading facilities Rubbish collection (residential only) Operational hours (non-residential)	Section 4
Traffic volumes All day and/ or peak times classification	Section 1
LATM features – Within frontage	NA
Public transport Bus stops Bus/ Train stations Active transport linkages	Sections 2 and 3
Active transport Existing facilities for walking On site Street frontage Locally on surrounding streets/ roads Existing facilities for cycling/ ETPs On site Street frontage Locally on surrounding streets/ roads	Section 3
Site specific issues	Section 7
Safety issues Remedial measures	NA

APPENDIX B

Proposed Development Layout Plans



LEGEND:

- LEASE BOUNDARY
- OFFICIAL WETLAND BOUNDARY
- 50m WETLAND SEPARATION BUFFER
- 50m FIRE PROTECTION BUFFER
- ACCESS ROAD
- LEACHATE POND
- RECEPTION/OFFICES
- WORKSHOP
- STORMWATER POND
- SCREENING/DISPATCH
- LIQUID WASTE RECEIVAL
- FUEL STORE/SERVICE BAY
- TANK FARM
- RECEIVAL HALL
- COCOON AREA
- CARBON STORAGE
- OPEN DRAIN
- EXISTING FENCELINE
- NEW FENCELINE

PRELIMINARY ONLY
NOT FOR CONSTRUCTION

150m 0m 150m 300m

1:7500 @ A3

VERTICAL DATUM: AUSTRALIAN HEIGHT DATUM
HORIZONTAL DATUM: MGA 94 ZONE 50

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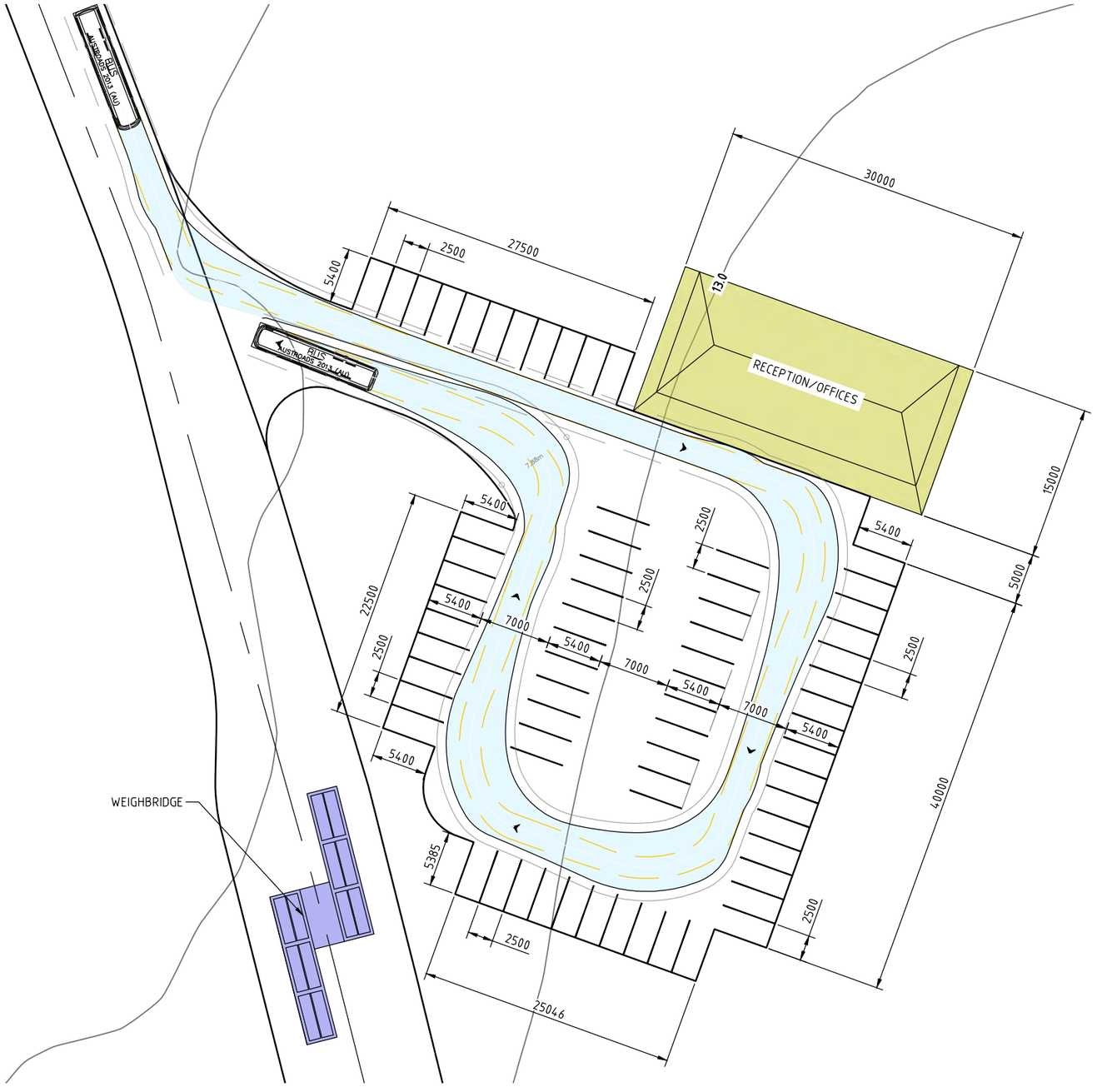
No.	Date	Drwn.	Chk.	Amendment / Issue	App.
F	26.09.2023	YJ	AB	EARTH WORK VOLUME UPDATED	MH
E	10.07.2023	JS	AB	SITE LAYOUT UPDATED	MH
D	16.01.2023	MM	AB	SITE LAYOUT UPDATED	MH
C	15.11.2022	AB	MH	BOUNDARIES UPDATED	MH
B	03.02.2022	YJ	AB	SECTIONS AND ISOPACHYTE LAYOUT ADDED	MH
A	15.11.2021	YJ	AB	PRELIMINARY ISSUE	MH

Project: C-WISE DUE DILIGENCE AND APPROVALS

Title: GENERAL ARRANGEMENT

Scale: 1:7500 @ A3 | Date: 02.03.2022
Drawn: YJ | Checked: AB | Approved: MH
Job No: TW21124 | Drg. No: C-100 | Rev: F
Filename: TW21124-SET.DWG



LEGEND:

- ACCESS ROAD
- RECEPTION/OFFICES
- CAR PARKING BAYS

PRELIMINARY ONLY
NOT FOR CONSTRUCTION

10m 0m 10m 20m

1:500 @ A3

VERTICAL DATUM: AUSTRALIAN HEIGHT DATUM
HORIZONTAL DATUM: MGA 94 ZONE 50

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No.	Date	Drwn.	Chk.	Amendment / Issue	App.
A	19.10.2023	VS	AB	PRELIMINARY ISSUE	MH

Project: C-WISE DUE DILIGENCE AND APPROVALS

Title: CWISE PARKING AREA

Scale: 1:500 @ A3	Date: 02.03.2022	
Drawn: VS	Checked: AB	Approved: MH
Job No: TW21124	Drg. No: C-109	Rev: A
Filename: TW21124-SET.DWG		

APPENDIX C

MRWA Road Mapping Information

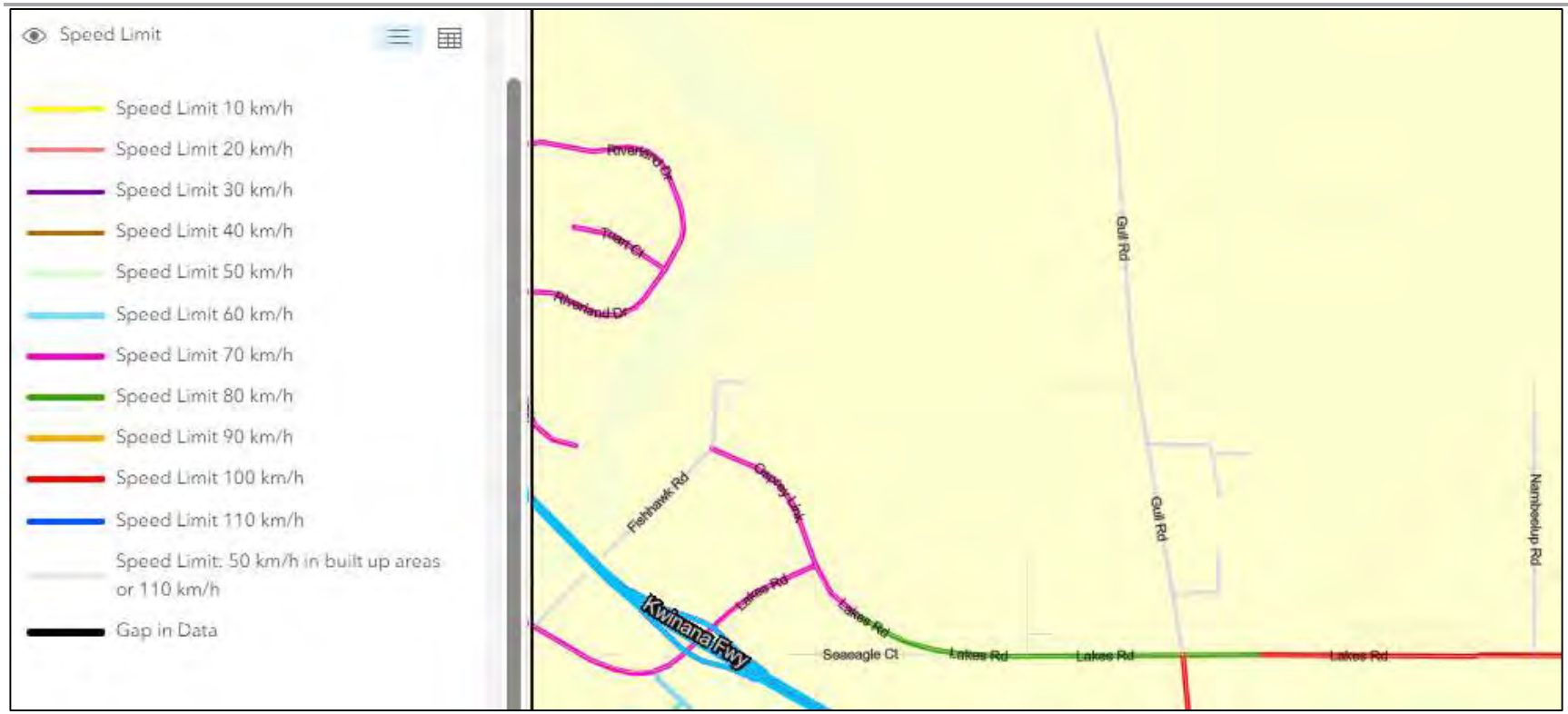

Figure C-1:Posted Speeds

Figure C-2:Current Road Hierarchy

Assets | Engineering | Environment | Noise | Spatial | Waste

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P302/2023 - Submissions Register - Noxious Industry - (Carbon Recycling Facility) - Lot 9500 (320) Gull Road, Keralup

Submission No.	Submittors locality	Submission	Themes
1	Madora Bay	I oppose the development plan, we already struggle with odour control when morning Easterly winds blow and there are several complaints and investigations underway regarding these odours. We do not need an additional facility that will no doubt produce significant odours engulfing the entire meadowsprings, lakelands, Madora bay region	Odour need
2	Madora Bay	I've been made aware of a planning proposal from Altus Planning for a Noxious Industry (Carbon Recycling Facility).I live in Madora Bay and already suffer the smell from Nambeelup with the piggery and fertiliser company that the shire of Murray approved, which are currently under investigation by the Department of Water and Environmental Regulation.I fear this new proposal will only add more disgusting smells into the air in the Peel area.New estates are being built in the karnup, Lakelands, Madora bay areas with families and children living in the areas where these smells are polluting the air. I oppose this planning proposal as it will affect the health and well being of residents in the area. It may also have an adverse effect of reducing house prices due to smell. I know my email and concerns will fall on deaf ears but three noxious companies built in the same council area and within a short drive of each will be an irresponsible decision of council to approve. The peel area will just stink if this proposal gets through.	odour health devaluation
3	Lakelands	We already cop the smell of the current facility when easterlies blow. Expanding the operation will only make this worse affecting our quality of life and the value of all the properties in the area. No real thought seems to have been given to the residents of Lakelands and the huge development in residential housing in the area.	odour devaluation residential enjoyment
4	Lakelands	We have lived in Lakelands 6180 for approx 9 years and have had to live with the disgusting smell that blankets the area regularly from the pig farm and mushroom farm. The carbon plant will nto be accepted by our local community especially if an easterly wind pushes the smell over our suburb, which it will.	odour
5	Stake Hill	I am a resident in Stakehill WA., it is a beautiful place to live ,neighbours are nice,a good sense of community.However, the smell from the composting plant and the piggery is so nasty that we have to retreat inside. not very nice when you are entertaining guests, the smell is so bad at times I have had to turn off my evaporative air conditioning because the smell goes through the house and into the bedrooms. This is the current location in Nambeelup , if the location is changed to Keralup which is even closer I fear the odours from the plant will be even worse making living and entertaining even more unpleasant. and people who are selling in the area may lose the value of their property. We pay a great deal of money for our Rates and in turn Living should be comfortable. and not subjected to Noxious odours. I have chickens, and clean their pens out regularly, out of consideration to neighbours, so as not to have any unpleasant smells or flies I would like to think that the council would also have the same consideration for us. I know we won't generate the same amount of money that big companies do for you. but I feel this should have been considered when Stakehill was developed as a living community I bought this property with the understanding that it is special rural not commercial area. I really hope that you take the consideration of the people who live around the area, as businesses should not impact the comfort of living. Thank you for taking the time to read and consider our point of view. Also it was stated that this was put forward to the communities for discussion. This is the first I have heard of this. There has not been any notifications out out in Stakehill that I am aware of	odour devaluation consultation Residential enjoyment
6	Singleton	Do not allow this to go ahead, we already have issue with stench through this shire and Easterly winds driving that into our homes. This is just adding to the problem.	odour
7	Lakelands	Lakelands already smells like shit on the regular. Years of ignoring the public complaints and no doubt these will be ignored as well. We very very rarely have the chance of nice fresh air. Now yous are going to double the disgusting smell. In result no one will be happy living in a shit smelled suburb.	odour residential enjoyment
8	Meadow Springs	Dear chief executive officer. Please do not allow another business that will effect the quality of the air, the smells that waft into meadow springs form the current business is bad enough . I can't even run my air conditioning on days when it is bad or nights as the smell comes into my house. I also work at a local school in meadow springs. And we can smell It there too	odour residential enjoyment
9	Madora Bay	Absolutely not! We don't need anymore smell, the piggery is bad enough.	odour
10	Lakelands	I disagree that this site should be used for the proposed facility. In Lakelands we already deal with the horrendous foul smell coming from the piggery in Nambeelup, also in the shire of Murray. With the proposed facility there would be no reprieve from offensive odour despite wind direction given that we are in the middle of the two locations. This shire is already under investigation by the Department of Water and Environmental Regulation, it would be irrational to add yet another facility to add to the problem.	odour
11	Meadow Springs	The smell from the pig farm/ fertilising place out in nambeelp is already enough. This would ruin our area more with the easterly breezes	odour
12	Lakelands	Residents of Lakelands, Meadow Springs, and surrounding areas already suffer from the smell that the piggery and fertiliser farm in the area cause. The stench is unbearable. We have to shut the doors, windows and turn off Aircon. We can't use our outdoor area due to the smell we suffer from nauseous, vomiting and headaches. Due to the smell. Adding another fertiliser establishment would make the smell worse than what it already is, and become more of environmental issue. The shore can't even investigate or look into the many complaints given over the past years. Why should multi million dollar companies take our right to live without the horrible stench.	odour health environment residential enjoyment
13	Lakelands	The stench from the existing plant is bad enough. Expansion will only enhance the problem and property prices in the area will plummet	odour devaluation
14	North Dandalup	As a member of this community, I strongly oppose this proposal. The potential negative impact on our neighborhood far outweighs any possible benefits. The creation of unnecessary odors and disturbances will diminish our quality of life and make our community a less desirable place to live. We deserve better than to have our environment compromised by a proposal that offers more negatives than positives. Let's stand together and reject this proposal for the well-being of our community.	odour environment residential enjoyment
15	Lakelands	Reversion of Mandurah to the 1950's, 1960's and 1970's when the stench from the estuary was intense. The dredging of the estuary and the establishment of the canals was supposed to make Mandurah and surrounds a more attractive residential area.	odour
16	North Dandalup	I oppose this proposal due to our environment this is a rural area it will effect wild life,livestock and the smell/ air pollution will affect the local residents.	odour environment
17	Mandurah	The Northern end of Mandurah already has a strong odour which a number of people have already reported as per below which stena from the pig farm and fertilizer plant. "Your reference number for this report is ICMS 73226.The Department of Water and Environmental Regulation is aware of and currently investigating odour complaints received within the Mandurah area. The information has been assessed and recorded for intelligence purposes and may be used in future compliance activities." We do not need waste processing plant shire can't even keep on top of the current odour issues in the area to which this will only add too if it is approved	odour
18	Meadow Springs	I do not want the development of this carbon recycling facility to be built so closely to residential land. We already have a terrible smell that pollutes our suburb often daily, this would make it even worse. I vote against it.	odour location
19	Lakelands	Att CEO I strongly oppose the proposed Expansion/relocation of the C- wise Smell factory.	odour
20	Meadow Springs	I would like to express my strong opposition to the proposed Noxious Industry in our area. Living in close proximity to such a facility raises serious concerns, particularly regarding the potential impact on our quality of life and health.We are already experiencing significant discomfort due to unpleasant odors when the wind blows from the Easterly direction, making it impossible to open doors or windows both in the morning and at night. Introducing a facility that involves the storage and processing of large quantities of organic waste would likely exacerbate these issues, further diminishing our ability to enjoy a healthy and comfortable living environment.Therefore, I urge you to reconsider proceeding with this development. The potential negative consequences on our community's well-being outweigh any perceived benefits. I trust that you will take these concerns into serious consideration when making your decision.	odour health residential enjoyment
21	Meadow Springs	The stink from this new proposal will add to the already foul stench we put up with when easterly winds are blowing. It is impossible to escape the horrid smell that permeates throughout Meadow Springs after hot days, be it from the pig farm or compost/fertiliser farm. It will seriously affect our enjoyment of our home and yards. Please take into consideration how the acrid smell will affect our lives and do not give permission for this kind of commercial premises to be established in this area. Thank you.	odour
22	Nambeelup	I'm all for business expanding/new venture. BUT if we the residents have to put up with more smells, this includes closing the windows of house when wind direction cover our area and the stench is horrific. We have had boarding customers ask why our kennels stink not realising its the piggery. I think the council should be looking at the new kennel area and letting them have the same privileges as the old one, for example, extended kennel license for increasing business in the new area. 20 dog kennel license limit is meaningless. Especially when you board dogs in peak season and have to turn customers away. If this is something the council is willing to negotiate/approve then I would be all for the planning on gull road. If it's something that is not possible I would strongly oppose the new facility	odour
23	Parklands	With the development of a high quality Industry area just a short distance away will have a huge impact to attracting new investors. The location is also amongst semi rural dwellings and not an industrial area.Similar developments have suggested not to be in a windy area that impacts residents. With the large developments across the freeway will cause friction with council and locals. Good luck with that.	location
24	Lakelands	I would like to object to this proposal. We are currently struggling with a foul stench in this area. The smell is from the east of our location. It seems that we are being ignored and our complaints to enviroment pollution are getting nowhere. This plant going ahead is going to cause an outcry. It is rediculous how we are being ignored. The stench currently is sickening.	odour health
	Lakelands	To wohm ot may concern. I would like to lodge my objection please.I am opposed to this as we are already affected by the piggery in this area. This will add to our existing stench. We suffer from headaches due to the stench on calm hot nights.	odour
25	Parklands	The vile aromas already crossing the freeway from the piggery/fertiliser plant are enough. This is absolutely not going to bode well as an addition to the assault on our nostrils.	odour
26	Lakelands	Strongly oppose this proposal. The current situation with smell and air pollution in Lakelands is already nauseating and any additional planning or development of such sites would make living in the area unbearable. The smell affects Lakelands and Meadow Springs residents widely and I have no idea about the wider community. As is evident over months of residents complaints and voicing of dissatisfied on social media. These grievances will go the the press and local MPs. Odour Report complaint lodged with Pollution Watch ICMS 72547 Nov 2023.	odour health

27	Stake Hill	Att Dean Unsworth Dean, Please find this letter in strong opposition to the planning proposal development application for a Noxious Industry (Carbon Recycling Facility) at Lot 9500 (320) Gull Road, Keralup. C-Wise. The current facility at 139 Nambeelup Rd, Nambeelup, has had a huge impact to my family's quality of life since moving to what we thought was our forever home 5 years ago.The foul odour that emanates when weather conditions permit, is not what you would reasonably have to endure in a residential neighbourhood. It can be smelt in Stake Hill, Lakelands and even to Madora bay and singleton on the coast.On hot days, my family relies on my homes evaporative aircon for relief, and the smell often fills our house to the point that we have to turn it off. Not ideal for my 10 month old son's sleep, or any of us for that matter. I fear that an expansion to the capacity that C-Wise is allowed to process, can only increase the odour and make our small community unlivable. I look forward to hearing from you.	odour health residential enjoyment
28	Lakelands	Object to expansion, we already suffer enough with toxic smells	odour
29	Stake Hill	We think the shire of Murray should consider not letting this go ahead. We have real concerns for odour. We already can't open our doors and windows on days that there is terrible odour from what we've been told is the piggery, the lake and the tip. It's a shame to buy a property in this area only to have the air polluted. This is such a beautiful part of the murray region please don't ruin it 🙏🏻	odour residential enjoyment
30	Stake Hill	I am strongly against the development and have not been advised of any prior public consultation opportunities. The noxious odours from the existing facilities are horrendous, and I have lodged multiple complaints via the Pollution Watch online form. The smell is constant, to the point where we cannot go outside and need to close all doors and windows. On extremely hot and windy days we cannot use our evaporative air conditioner as it draws the smell into the house, and we regularly suffer from symptoms such as headaches and nausea due to the noxious odours.The addition of another noxious odour generating facility is ridiculous, when the existing facilities are already an environmental nuisance and are severely impacting residents. In summary and as a ratepayer in the Shire of Murray, I strongly object to the proposed development	consultation odour health residential enjoyment
31	North Dandalup	If it creates jobs and there is a discount on compost for local residents then I support it. The discount should be a must for locals as it's an incentive to put up with the occasional smells which we currently get from the piggery	odour employment
32	Lakelands	I strongly suppose this development due to the potential smell that will be a byproduct of the process. We already have to deal with the horrendous stench that comes from the piggery along Lakes Rd when the winfs are unfavorable. Some days when you walk out of the house you just feal like instantly vomiting because it is that bad. Please we do need to add to that.	odour health residential enjoyment
33	Meadow Springs	As a home owner at Meadow Springs, I am strongly opposed to the above mentioned development , primarily due to the hot odour this will produce in our residential area.I feel it has potential to lower our quality of living - particularly outdoors and may even reduce our home resale values and prospects.	odour devaluation residential enjoyment
34	Madora Bay	My concern is the smell that could possibly waft over surrounding suburbs	odour
35	Lakelands	Please make sure there is no odour as at the moment we are continually getting an odour throughout Lakelands. Thank you.	odour
36	Greenfields	I vote against this project as the stench and smell will be horrendous and the waste is bad for the environment.	odour environment
37	Meadow Springs	No to this….Meadow springs already cops a horrible smell from some sort of farm this will make it so much worse. Please reconsider putting it somewhere not so close to houses	odour location
38	San Remo	Please don't approve any businesses that add to the bad odorus we already have to live with.	odour
39	Stake Hill	I am concerned as a rate payer and owner of a property in Stake Hill that this proposal will affect us. The smell from this facility will blow on to our property, as it is we have a noxious smell that blows over from other facilities in that area. Can you please assure us that this will not be the case regards the pending facility proposed. I am also concerned about the Environmental impact, should there be any spillages or leaks from such a noxious business. Thank you I hope you take this submission into consideration when deciding to give approval.	odour environment
40	Meadow Springs	I vote No to this development.	
41	Stake Hill	Attn: Dean Unsworth Good morning, I am writing in response to the news of the proposed C-wise facility expansion/relocation. I was informed of this proposal yesterday 30/01/24 with all concerns to be voiced in way of written submissions by the 14/02/24. Please take this email as a formal objection to the proposal. Should this plan go ahead this may force my family to sell our property in fear of our health and wellbeing, not to mention our discomfort in our own home. I also have concerns of the impact to the quality of our groundwater. The approval of this project will likely make a impact on our property prices which will be devastating should we be forced to sell and move out of the area.The smell is already unbearable when outside or if we have any windows open when the wind direction blows the stench across our property, I fear the relocation and expansion of this facility will worsen the impact it has on our community. I have spent some time this morning reading up about the proposal and attached a map from the public notice which shows my property in both the average and maximum odour impact zones.The proposal also states that C-wise have consulted residents in the affected areas and held an open day on 14/11/23 to voice concerns. To my knowledge, Nobody in the adjacent properties have heard about this proposal until Monday 29/01/24. Please feel free to respond should you wish to share with me any further information.	health devaluation odour consultation residential enjoyment
42	Lakelands	Good Morning, I happened to see this development of carbon recycling facility and would like to submit my concerns as below.a) As a nearby resident ,we are regularly facing foul smell day and night due to already existing carbon recycling facility. b) We are not able to go for morning/evening walks due to this foul smell. c) We have raised our concerns to Pollution control DWER as well-details attached. Allowing further expansion will be a big problems for residents living nearby. Kind request to acknowledge our concerns and don't allow such facilities which will impact daily life of people.	odour residential enjoyment
43	No address given	Dean Unsworth - Chief Executive Officer Very concerned about the planning proposal at Lot 9500 (320) Gull Road, Keralup. Residents have been subject to strong odours from this property for the longest time. A significant proportion of the community has complained (and continues to complain) about this facility, yet nothing has been done. This whole property should be shutdown and the proposal to further develop the area is a slap in the face to Murray and Mandurah residents. I am assuming you don't live in the affected areas!	odour
44	Lakelands	The smell already is overwhelming, please do do expand this area.	odour
45	Barragup	Absolutely no way should this go ahead, we ve for the last 2 months been living with the most putrid smell coming from nambellup settlement ponds to the point we had to leave the home for 3 days	odour residential enjoyment
46	Barrangup	Don't want it! We have enough putrid smell in the area as it is now!	odour
47	Lakelands	My area is already haunted by an awful smell which I believe is from a local pig farm, having another farm which could add to the terrible smells. It's not nice when you ahev a family home and want to be outside with the family. Also having the possibility of negatively impacting the valuation of our properties.	odour devaluation residential enjoyment
48	Barragup	Considering we in Barragup North are having to put up with a putrid smell that is emulating from Black Lake and the nearby piggery, I think another Noxious Industry in its area would not be welcomed. Or, not until the current smell problem has been addressed. If the Gull St drain were to increase its flow into Black Lake it just might help ease the current smell problem. But, this might not be possible.	odour
49	Meadow Springs	To whom it may concern. I would like to express my strong opposition to the proposed Noxious Industry in our area. Living in close proximity to such a facility raises serious concerns, particularly regarding the potential impact on our quality of life and health.We are already experiencing significant discomfort due to unpleasant odors when the wind blows from the Easterly direction, making it impossible to open doors or windows both in the morning and at night. Introducing a facility that involves the storage and processing of large quantities of organic waste would likely exacerbate these issues, further diminishing our ability to enjoy a healthy and comfortable living environment.Therefore, I urge you to reconsider proceeding with this development. The potential negative consequences on our community's well-being outweigh any perceived benefits. I trust that you will take these concerns into serious consideration when making your decision.	health odour residential enjoyment
50	Lakelands	Please consider the residents in this beautiful area, as a rates payer and home owner in the area, this build would directly affect a lot of people. 👎👎👎👎👎👎👎 it's a no from us.	
51	Barragup	We already experience toxic smells which can mean that we are "imprisoned" in our homes, can't open windows and certainly can't sit outside or have BBQ's. The smell from this facility together with the smell from the Barragup lakes system is horrendous so I am questioning whether this move is going to improve the odour situation or make it worse?	odour residential enjoyment
52	Stake Hill	The smell already is unbearable some days don't think we need to add to that especially when you have a state of the art industrial area just taking off	odour
53	Barragup	Absolutely against this proposal due to the smell already created by the existing plant	odour
54	Stake Hill	Dear sir, I am lodging my objection to the expansion of this facility. The reasons for my objection are as follows. In 1979 I asked the then plant manager of the Alcoa refinery, why no buffer zone was implemented around the Wagerup refinery site. The answer given was that it would be the most advanced refinery in the world and no noise or smell would be generated from the site. I had recently purchased 7 acres of land south of the proposed site and based on that discussion, proceeded to build a new home. When Alcoa expanded the site in the late nineties the noise and smell created led to Alcoa buying out most of the community of Yarloop and Wagerup. I fought with them for about 3 years and in the end, it nearly cost me my marriage and certainly cost me financially as I was paid market value for my property that was determined by Alcoa and not independent reviews. Please do not believe the guarantees of the corporate world as they are only interested in the bottom dollar, and not the community. CEO's and senior management people do not live in these communities effected by their decisions. The current smell generated by the C - wise factory affects us mainly through the summer months when we have prevailing east / southeast winds and causes us to lock up the house to avoid the smell. Any increase in the situation is unacceptable. I do not wish to have to go through the whole scenario again of fighting with a company, arguing with family and putting stress on everyone concerned. I believe the shire has a responsibility to listen and act with rate payers' interest and concerns and not just look out for the financial benefit that can be gained by an expansion approval. I am going to have my property valued because if approval is given our land value will certainly decrease. On a positive note, then I suppose our rates will then decrease. (sure) In conclusion any impact on Stakehill will certainly flow over to the new subdivision of Lakelands and so the thousands of people over there will be affected, along with the Mandurah Shire. Moving up to this area has been one of my better life decisions and as a rate payer for over 20 years to the Murray Shire I certainly hope the decision made will focus on the community and not the profits of a company. Thank you for taking the time to read my correspondence.	odour health devaluation residential enjoyment
55	Barragup	With respect to the propposed Compost facility expanding to 320 Gull road, Keralup, this facility will have an environmental impact on the surrounding suburbs of Nambellup, Barragup, Parklands and Stakehill due to the odours that are produced .At present during the North Easterly / Easterly winds the residents of Barragup and surrounding areas are impacted by the odours coming from both the compost and piggery facilities.Shifting this compost facility closer and increasing its capacity will do nothing but increase the issue causing further issues between the Facilities Operator, Residents and Murray Shire. Before this is looked at, has the operator developed a Environmental Management Plan for the operation and what are the conditions placed on them by the Environmental Regulator. If so where can the residents get a copy of the document for review. Please remeber that shire councillors are elected in and can be elected out.	odour EMP
56	Meadow Springs	Peel already has an issue with the smell in this area. We frequently wake up to foul smells with children literally vomitting on my drive way from the smell on the way to school. It is not enjoyable to live in mandurah due to this. Please do not add to the problem	odour health residential enjoyment
57	Keysbrook	The smell would effect us hughely as we are in line with a direct sea breeze for the smell.	odour

58	Lakelands	it already stinks in lakelands, move them out where there is no suburbs	odour location
59	Lakelands	Please take notice of people who live in Lakelands that have been complaining about the odour and smells in Lakelands at the moment all our complaints are falling on deaf ears. I've lived here for 5 years when i built my house I've been to contact everyone but no one listens they tell me to just keep sending emails. But lots of people are doing this but still nothing is done. So please take this into consideration because the smell is unacceptable.	odour
60	Singleton	I strongly oppose this development. The air quality in Singleton is grossly affected as it stands. DWER are currently investigating this company and I believe no development should be granted as they are unable/unwilling to control air pollution.There is a public health issue and under no circumstances should they be allowed to expand.	environment health
61	Singleton	I'm completely against this. The odours we've been experiencing in the most recent summer have been the worst I've noticed over 10 years of living in singleton. They have no control over the odour and allowing them to expand to next door, is just stupidity. They proved they have no control, they proved they don't care for the odour pollution and I'm completely against giving them a license. It should be stripped from them make them use the money to move way fucking away from residential areas, they certainly shouldn't be up wind of anyone within 25km.	odour location
62	Lakelands	The foul odours & smell from the current facility affects our quality of life, it is a mix of compost and feces and is so bad you cannot go outside or leave the windows open. It is when the wind is blowing from the direction of the compost plant. Lakelands and the new development around the train station is very affected by this smell, i cannot believe you now want to expand this operation. It will be directly affecting thousands of residents. I do not believe for a second that an expanded operation will produce less smell. this needs to be stopped and the current facility fully investigated and the noxious smell dealt with!	odour residential enjoyment
63	Lakelands	Waste smell in Lakelands is so bad we have to close our house and tape all vents. It gets that bad that you feel like your eating the stench.	odour residential enjoyment
64	Stake Hill	Hi Dean, I want to voice my strong concerns over the expansion of the C-Wise facility. To give you some context, the C-Wise facility sits almost directly east from my property at **REMOVED**, Stake Hill. When the wind blows from the east, or south-east, my property is enveloped with an overwhelming stench of animal manure, so thick that it almost makes me vomit. There are some days that I cannot go outside to enjoy my own property due to the stench in the air. This is upsetting to say the least. My partner and I sold up in inner city Perth nearly two years ago now to move to Stake Hill. We wanted some property to be able to grow our own food in a fresh, clean environment, with fresh air and no big city pollution. I don't know what the health implications are, or will be, with our breathing in the stench from the C-Wise factory, but I know that is has severely diminished our enjoyment of living on our property when the breeze is blowing from the facility towards our place. I only found out about this notice of public advertisement through someone on our Stake Hill community page, otherwise I would have missed having a chance to say anything about this proposal. I have read the community engagement report produced by Talis Consultants. In it they refer to a community engagement period, which commenced with a letter drop within a radius of 2.5km's of the facility. This is tokenistic and deceptive. The wind takes the stench from the facility a lot further than 2.5km's and being where it is located, most residential properties sit outside this 2.5km radius also - so the people who are most affected were deliberately not notified of this expansion. I understand that this expansion is required to deal with the increase in volumes from the FOGO program. Until moving south I worked at the City of Fremantle and realise the importance of the FOGO program and recycling the FOGO products into compost. Being an avid gardener and environmentalist, I understand the importance of recycling organic matter and keeping it out of land-fill. On the other hand, I now understand the impact the processing of this organic matter has on the enjoyment of people's private land, particularly if the company processing the waste have no concern or consideration of the surrounding properties that may be affected by the odour's coming from the facility. I have two worries around the expansion of the C-Wise facility. The first is the likely increase in odour output will further degrade the enjoyment of my own property. As well as the increase in the size of the processing facility, the increase in the number and size of open-air leaching ponds will further increase the odours emitted. There is mention of the controls there will be in place to address the odour impact, in an Odour Impact Assessment prepared by Environmental and Air Quality, however, if this is as tokenistic as the community engagement undertaken by Talis, then I don't put any trust in this document. How do you mitigate odours emitted from an open-air leaching pond? Can you personally assure me that the odour will not increase following the expansion of this facility, and further reduce the quality of life on my own land? Can you also assure me that the odour currently emanating from the facility will be addressed and reduced, so I can enjoy my property year-round, no matter what the wind direction is? My second concern is the potential of wastes leaching into the ground and potentially infiltrating and further polluting the nearby Serpentine River. With the proposed increase in leaching ponds, sumps and so on, has the proximity to the water table been considered? Are these ponds going to be fully contained? There will be no chance of anything leaking into the water table? What about as the ponds degrade over time, will they be continually inspected to ensure that they don't leak or overflow? How can they be inspected if they are always full? Are you satisfied this expansion satisfies the DWER guidelines for this type of facility? Having voiced my serious concerns over the expansion of this facility, and outlined the current issues I experience with the odour emitted by the facility, I want to ask you one important question. If this was your property, and your enjoyment of it was affected so much by the odour being emitted, would you be happy approving the expansion of this facility? Having worked in local government for many years, I appreciate how busy you are. I do hope that you will still find the time to seriously consider my concerns.	odour health consultation environment residential enjoyment
65	Stake Hill	I am writing to in relation to the proposed development application for a Noxious Industry at Gull Road Keralup. As a previous resident of the Stake Hill area and just moving into the area in February 2024, this proposed development is extremely concerning, and I am urging the Shire of Murray to decline this application. The Stake Hill area is already heavily affected by Odour Pollution via the Piggery and two composting businesses on Nambeelup Road. At the current levels of output these business operators have already had scrutiny from the Department of Environmental Regulation due to the odour output, affecting multiple areas within the Shire, many with a high density of population. The odour management has been on-going issue of concern for Shire of Murray and Department of Environment Regulation as multiple complaints are being made to various departments, with no outcomes being achieved over a sustained number of years and this proposed expansion of C-wise will multiply and intensify the odour issues rerom the public notice which shows my property in both the average and maximum odour impact zones.The proposal also states that C-wise have consulted residents in the affected areas and held an open day on 14/11/23 to voice concerns. To my knowledge, Nobody in the adjacent properties have heard about this proposal until Monday 29/01/24. Please feel free to respond should you wish to share with me any further information.fort of living. Thank you for taking the time to read and consider our point of view. Also it was stated that this was put forward to the communities for discussion. This is the first I have heard of this. There has not been any notifications out out in Stakehill that I am aware	odour consulation modelling
66	Golden Bay	This facility has not adequately addressed odour issues over the years. It continues to produce, along with the piggery, a nuance odour that affect thousands of homes all the way to the coast in a south east or easterly direction. Please check the EPA complaints hotline before you approve more discomfort for the suburbs of karnup, golden bay, secret harbour, Madora bay and those surrounding.	odour
67	Golden Bay	The fact the place stinks as far as we are away from it is good enough reason they shouldn't be able to extend the facility... you'd be stupid to believe the, oh but if we extend we will fix it so it doesn't stink as much... if that's the case they should of and would of fixed it already...Surely the local members live in the area and stink this sespit?	odour
68	Singleton	Before approving and expansion applications, might be an idea to review what they are currently doing about the current smell wafting through singleton. Very unpleasant. Had to close all the windows and doors tonight. Thank you.	odour residential enjoyment
69	Singleton	No smell in this area lots of young families with kids keep this area safe	odour
70	Singleton	I think this is a terrible idea. Our whole community in Singleton smells like poo every afternoon and night. This would make it even worse. I say no to the new proposal.	odour
71	Stake Hill	Attention Chief Executive Officer I would like to raise my concerns about the proposed new/expanded C-Wise facility in Keralup. I feel it would have a direct odour impact on my residence, as the existing plant already does weather depending. There is also the potential impact of land values being in such close proximity to an even larger waste facility. The lack of community consultation in this process I find amazing. I did not know anything about this project until I received your letter in the mail on the 29/1/24, giving basically given two weeks to offer any response. Yet in this time all the environment impacts & assessments have already been submitted & you've given C-Wise a clearing permit for the land already. After researching the proposal, apparently a in-depth community consultation was carried out, with open days & letter drops to potentially affected people. This didn't happen as far as I'm concerned. I believe my property is one the locations marked on the Odour Impact Assessment, yet I received nothing during this process. Very poor form, which leads me to question the other information provided. If you can't deliver a letter to a clearly marked & accessible mailbox, or tell people about this without adequate appeal time, what else are they trying to hide in this submission. Please consider this my formal objection to this proposed development. More needs to be done to engage the effected community.	odour devaluation consultation
72	Secret Harbour	The Smell coming from the facility is horrendous. From lakelands, singleton, Golden Bay and secret harbour it can be smelt and is affecting our quality of life. At times windows can't be left open lest the odour gets in the house.	odour residential enjoyment
73	Nambeelup	See D24/5616 Submission prepared by Element on behalf of George Weston Foods	
74	Golden Bay	As a resident we shouldn't have to tolerate a constant odour that is present in my home on several consecutive nights from the 11-13 February. It is not the pond as suggested. To suggest that we do not know the difference between pond scum and pig shit is insulting. I do not support the application of the extension of the processing plant	odour
75	Golden Bay	I am very concerned on the increased smell that this facility will/could emit. There is already issues in this area from organic waste causing bed smells that impact people lives to be spread a lot further out from the location as the wind blows. While the area may be in a proposed industrial area this development should not proceed due to the wind being able to carry the smell out of the industrial zone and causing issues for residential areas. I would like feedback on how the smell will be fully contained and never smelt by others.	odour location
76	Singleton	Several complaints have been submitted about he smell emitted by the existing C-wise facility to the state government. I do not live in the shire but the smell coming from it seems to be getting stronger over the years on a strong ne'ly breeze.	odour
77	Singleton	Just would like to oppose for the expansion of this facility due to the ongoing air pollution currently under investigation. I think this facility is contributing to the smell which is causing problems for the residents or singleton and surrounding areas and this would further increase the problem.	odour

78	San Remo	want to anymore. So, I argue against the development application for a Noxious Industry (Carbon Recycling Facility) facility at Lot 3500 (320) Gull Road Keralup and for any increase in its capacity to process waste. First, I contend that the process of dissemination of information has been narrow in its scope and timeframe. Second, the effects of the stench on people who are affected by the putrid emissions from the current facility have been inadequately surveyed and documented. Third, I believe the horrible stench from the C-Wise facility in Keralup to be in breach of the Occupational Health and Safety Act WA (1984).Firstly, it is my contention that the process of dissemination of information of both the existing facility and its further development at Lot 3500 (320) Gull Road Keralup has been narrow int its scope and timeframe. The only way I found out what was causing the putrid stench at my home and its surrounding area was through reading an article published in the Mandurah Times on Wednesday 7 February 2024. This article described the C-Wise increased waste processing capacity proposal and the call for objections. That has given me one week to respond which I consider to be insufficient. The article stated that C-Wise had surveyed residents within a 2.5 km radius from its facility without getting any response. Wikipedia lists the population of Keralup as 0. I believe the 2.5 km radius of the facility at best would have a miniscule population. No one asked me to contribute to that survey, despite being affected. I therefore ask for affected residents, such as myself, to be identified and resurveyed. In addition, the discovery process about the source of the putrid stench has been a difficult one for me, let alone for others similarly affected. Since moving to San Remo in October 2023 I have written numerous complaints to the City of Mandurah about the stench. Just prior to Christmas 2023 I got a reply which directed me to place future complaints with Pollution Watch, which I did. It was only when I read the 7 February newspaper article that I realised the source of the smell was the C-Wise site. Since then, I have been in contact with my Member of Parliament.I further note that when I first started smelling the stench in late October/early November 2023 it was mainly early evening to midnight. Since I began complaining, the stench times moved to the middle of the night: 2am-5am approximately, when most folk are asleep.Since 7 February 2024 I have contacted the Shires of Murray, Rockingham, Mandurah and Serpentine-Jarrahdale. The Shire of Murray was the sole Shire to have any information available to the public about Lot 3500 (320) Gull Road, Keralup. I consider this isn't good enough, considering I, and many other non-Shire of Murray residents are affected by the stench form that property.It is of further note that since the publication of that article, the stench has abated. On just two occasions of a small waft of it in the week since 7 February. I assume C-Wise has been lying low 7-14 February to avoid more complaints that may work to the detriment of its Keralup proposal. I assume the trucks that dump the waste have been instructed to reduce their frequency until after the call for submissions closes today. Secondly, the effects of the stench on people who are affected by the putrid emissions from the current facility have been inadequately surveyed and documented. I am affected and I haven't been surveyed. My only opportunity has been to submit this objection and to complete a short online survey on a bitly link to C-Wise, which I have done. The latter was I consider a ridiculous survey due to the way it was structured. The first question asked me for a values judgement: of course, participant will agree. By the time I got to the third question I felt hopelessly inadequate due to the level of knowledge required to answer questions two and three. Goodness knows how less educated people felt. Most people just want to state the issue. Residents of Shires of Murray, Rockingham, Mandurah and Serpentine-Jarrahdale need to be surveyed equally. Their health and wellbeing and the effects of C-Wise on it need to be included in future surveys. Thirdly, I believe the horrible stench from the C-Wise facility in Keralup to be in breach of the Occupational Health and Safety Act WA (1984). The stench has been waking me up during the night and has been making me feel ill. I live approximately 15 minutes' drive due west from C-Wise. There's a lot of people in between and to the north, south and east of my home who are no doubt affected by the stench too. It is my contention that current and new residents have the right to be informed of the stench from the C-Wise facility. If I had been informed by the real estate company prior to purchasing my San Remo residence of the stench, I may have reconsidered the purchase. I believe that real estate agents, private sellers and developers such as Satterly need be forced to disclose to all prospective purchasers in affected suburbs of the awful stench. There is a huge future population planned for the affected area. They all have the right to know. In conclusion, I argue against the development application for a Noxious Industry (Carbon Recycling Facility) facility at Lot 3500 (320) Gull Road Keralup and for any increase in its capacity to process waste. As stated in the Mandurah Times on Wednesday 7 February 2024 this development application will potentially reduce the stench, not stop it. I want the stench from C-Wise to stop. Therefore, the waste disposal activities on Lot 3500 (320) Gull	odour consultation health residential enjoyment
79	Singleton	This site does not need to be expanded. It is impacting people's heatlh and lifestyle. The stench is dreadful	health residential
80	Golden Bay	The odour coming from the piggery , mushroom farm . Is utterly disgusting and extremely unfair for people who live here have live in golden bay for 6 years and never experience the smell so bad since this summer windows of the house can't be opened for a breeze to come through aircon have to be used more because of this as a ratepayer it's a disgrace to our community who would want to live here and endure that. Some thing has changed for the smell to become unlivable whatever it is needs to be rectified this is a plea for help and change	odour residential enjoyment
81	Golden Bay	Foul smeel that wafts over golden bay. It's unbearbly putrid making me gag and almost vomite from walking 20 metres from my car to my front door. This is a health issue and it needs to be rectified	odour health
82	Singleton	Pungent smell, becoming very frequent, X2-3 times Per week	odour
83	Stake Hill	Objection to Proposed Development of Carbon Recycling Facility at 320 Gull Road, Keralup. I am writing to formally object to the planned development of the noxious carbon recycling facility at the above address. The proposed relocation of the facility from Nambeelup to Keralup raises significant concerns regarding its proximity to growing urban residential areas, particularly Stake Hill/Lakelands. With prevailing north easterly winds, there is a grave risk that odours emanating from the facility will permeate the nearby residential communities, severely compromising their amenity and quality of life for both current and future generations. Furthermore, the relocation poses a significant environmental threat as the new site is situated within a water catchment area. This presents the potential for pollution and nutrient outflow into the water catchment area and estuary, endangering natural ecosystems and aquatic life. Nutrient outflow can lead to invasive weed growth, disrupting aquatic habitats, destroying natural ecosystems, and exacerbating mosquito populations .I object to this development on the grounds that all residents, including numerous young families and visitors to our area, have the fundamental right to breathe clean air, lead healthy lives, and continue to enjoy the unique geological landscape, waterways, and environmental assets that define our region's appeal. I strongly advocate for the relocation of the facility further east, away from the residential growth corridor of the City of Mandurah. This alternative location would better mitigate the adverse impacts on nearby communities and safeguard our environment for generations to come. Thank you for considering my objection to this development proposal.	location odour environment residential enjoyment

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16 April 2024

Shire of Murray
PO Box 21
PINJARRA WA 6208

Attention: Luke Cervi

Via email: luke.cervi@murray.wa.gov.au

Dear Luke,

Proposed Noxious Industry (Carbon Recycling Facility) – Lot 9500 (No. 320) Gull Road, Keralup – Response and Addendum

On behalf of C-Wise Holdings Pty Ltd (**Applicant**), Altus Planning submits the following submission in response to the City's request for further information dated 6 March 2024 regarding a Development Application (**Application**) for a 'Noxious Industry' (**proposed development** or **proposal**) at Lot 9500 (No. 320) Gull Road, Keralup (**subject land** or **site**)

This submission, together with all the attachments provided, should be considered as an official addendum to the lodged Application. It has a number of components which are detailed under the various heading below.

1.0 Response to Public Submissions

The Shire of Murray (**Shire**), have provided a Schedule of Submissions to Altus Planning which outline the submissions received from the Public during the advertising process of the Application.

From the advertisement period, there were a total of 83 submissions received by the Shire. Altus Planning, with the assistance of the Shire, have concluded that of the 83

submissions, there were a variety of themes that were discussed. These themes have been categorised and addressed in Table 1, below.

Table 1: Response to Schedule of Public Submissions provided by the Shire.

Response to Schedule of Submissions		
Item	**No. of Submissions**	**Applicant Response**
Odour	79	The number of submissions that raise odour concerns is acknowledged. However, the current source of odour in most instances is not clear and furthermore, they relate to the locality of the current site (230 Gull Road) and other odour generators, not the proposed development site. A majority of the submissions received regarding odour concerns largely relate to existing odour issues and not of the proposed development creating any odour concerns. It is important that any existing concerns with odour are not conflated with the current proposal which will be an improved facility incorporating the latest technology developed in accordance with better practice industry guidelines. An Odour Impact Assessment (**OIA**) was prepared by Environmental & Air Quality Consulting Pty Ltd (**EAQ Consulting**), a suitably qualified and experienced odour consultant. This OIA has also recently been amended at the request of the Shire, as discussed further within this submission and as seen as at Attachment 1. In summary, the OIA has concluded that although there is a large odour footprint, with the high-level upgrades that are proposed at the Facility, coupled with the large separation distances surrounding the proposed development, it should not only be acceptable but, in addition, desirable. Additionally, the separation distances are considered generous noting that the primary odour emissions from the development will be confined to the receival

		building and composting cocoons, as well as no leachate ponds and/or treatment ponds for leachate generated during the composting process being required.
Health	17	Submitters have raised concerns regarding health considerations as a result of odours impacting surrounding residences. Similar to the above, speculation on health impacts are borne of existing concerns, and not necessarily what is proposed. The OIA and supplemental reporting has concluded that there will be no adverse health impacts from odour generated from the development to the residential areas and sensitive land uses. This point is punctuated by the fact that the Department of Health were provided an opportunity to comment on the application. As discussed within section 2.3 of this submission, the Department of Health have not advised of any Health concerns.
Property Values	9	Perceived negative impacts on property values is recognised as not a relevant planning matter to be considered, pursuant to subclause 67(2) of the Deemed Provisions.
Environment	8	The general consensus from the environmental concerns held by the eight submitters were that the development has the potential to negatively impact the environment due to contaminants leaching into the ground and ground water. An Environmental Assessment and Management Plan, including specialist studies for Surface Water and Leachate Management, and Groundwater, has been prepared by Talis Consultants to outline the proposed environmental management measures to mitigate potential environmental impacts from the development. The findings in this regard have been incorporated to the current design of the proposed development.

		It is therefore submitted that the development, subject to appropriate and ongoing management, will not have any adverse environmental impacts.
Consultation	7	Seven submitters raised concerns relating to the preliminary consultation that C-Wise undertook. It is noted that a significant portion of the submissions are over 2km from the subject lot, and over 5km from the development itself. Though C-Wise attempted to conduct a preliminary consultation session, it is not a standard planning requirement to do so. The formal consultation process was undertaken by the Shire, to which the submitters have been able to respond to. It should also be noted that some of these submissions appear to be from well outside of the Shire's advertising area, highlighting the fact that submitters are basing their concerns with odour from other sources within the area.
Location	7	Seven submitters raised concerns relating to the location of the property – both not in keeping with the intent of the area and the proximity to residential dwellings. As discussed within the submitted planning justification report, the following sections discuss the relationship of the proposed development with the development's proposed location. • 4.2: Shire of Murray Nambeelup – North Dandalup Local Rural Strategy (**Local Rural Strategy** or **the Strategy**); • 4.7: State Planning Policy 2.5 – Rural Planning (**SPP2.5**); and • 4.11: State Planning Policy 4.1 – Industrial Interface (**SPP4.11**). In summary, these sections have determined that there is a strong relationship between SPP2.5 and SPP4.11 as the development is generally considered to be a mixture of a rural and industrial land use.

		In addition to the above, the Nambeelup Industrial Area District Structure Plan 2016 (**DSP**) is applicable to adjacent properties to the south of the subject site. This DSP consists of an Industrial zoning throughout the DSP area. This is also discussed further on within this submission pursuant to section 4.2. Furthermore, pursuant to section 4.5 of the Local Rural Strategy, the Strategy distinguishes composting operations as acceptable, subject to relevant management plans, within the Rural area. It is therefore submitted that considering all the above, the proposed development is in an appropriate location. The development is a mixture of Rural and Industrial land uses and is located in an area which is arguable as transitional between these two zonings.
Management Plans	2	It is noted that 2 submitters were requesting for the Applicant to provide Management Plans for the development – particularly relating to dust, environment, and odour. It is submitted that the Attachment 3 – Environmental Assessment and Management Plan (**EAMP**) of the originally submitted development application is an overarching management plan, with dust, environmental and odour management all appropriately addressed. This EAMP is in addition to all other reporting, such as the Bushfire Management Plan and the amended Odour Impact Assessment.
Development Potential	1	One submitter raised concerns regarding the development potential of their land due to buffers required from the proposed development and any future sensitive land use on the submitters land. Pursuant to section 4.3 of the EAMP, it stipulates that the recommended (emphasis added) separation distance varies between 500m and 1km. Whilst the submitters properties (Lot 89 and Lot 109 Gull Road, Keralup (**submitter's properties**)) are separated from the subject development by a minimum

		of 142m, it is considered an acceptable separation for a number of reasons below. The DSP is applicable only to the submitter's properties and not to the proposed development site at 320 Gull Road. The DSP has zoned the submitter's properties as 'Industrial'. Whilst it is noted that a 'Shop' and a 'Restaurant/Café' are discretionary land uses within the Industrial zone, pursuant to the Shire's Local Planning Scheme No. 4, it is considered onerous for an industrial development to cater for a sensitive land use in an industrial area – particularly when such developments are based on those potentially considered and not existing or proposed. Further discussion of the potential for land use conflict is addressed in section 4.2 of this submission.
Dust	1	The management of 'dust' has been considered and addressed within the EAMP of the development application package – as previously discussed in this Table. A relatively standard condition of approval is for the development to be in accordance with the EAMP for the duration of the development, to the satisfaction of the Shire. The applicant will be agreeable to such a condition imposed on any approval.
Employment	1	One submitter partially supports the proposal. Whilst on one hand, they believe odour is a concern, the submitter offered some support on the basis for the creation of new jobs in the area that the proposed development creates. It is agreed that the proposal allows for the creation of jobs due to becoming a larger operational facility, as well as the construction phase of the development itself.

Modelling	1	One submitter raised the concerns that the modelling is only a prediction, and not a result. This then underpins their argument on possible non-compliance. The odour modelling is well detailed and justified throughout many communications with the Shire and the amended OIA as at Attachment 1. The approach is commonplace for the assessment and consideration of similar proposals.
Need	1	One submitter recommended that the development was not needed on the basis that there would be increased odour in the locality. The need for and/or the existing number of particular developments within an area is not a relevant planning matter to be considered, pursuant to subclause 67(2) of the Deemed Provisions.
Scale	1	One submitter has a concern that due to the scale of the proposed development being larger than the existing operations at 230 Gull Road, it will lead to larger odour and dust impacts. It is submitted that the proposed will be designed in general accordance with better practice industry guidelines and specifications, and will in fact result in considerably less dust and odour emission compared to the existing operation. It is noted that this submission is based on concerns with the existing development.

2.0 Response to External Agency Submissions

The Shire have provided the external agency responses to the Application. The following agencies were contacted by the Shire in relation to the proposal:

- Department of Energy, Mines, Industry Regulation and Safety (**DEMIRS**)
- Department of Fire and Emergency Services (**DFES**)
- Department of Health (**WA Health**)

- Department of Primary Industries and Regional Development (**DPRID**)
- Department of Planning, Lands and Heritage (**DPLH**)
- Department of Water and Environmental Regulation (**DWER**)
- Environmental Protection Authority (**EPA**)

The Shire has advised that all agencies have provided comment pertaining to the Application, with the exception of the EPA. A summary of the advice/comments made by the agencies, and the response to this by Altus Planning, is provided in the below subsections.

2.1 DEMIRS Comments

Agency Comment:

- *A 10.85% encroachment on the pending exploration tenement E 70/6287 held by Keysbrook Leucoxene Pty Ltd that hosts a Titanium – Zirconium resource. The tenement holder was consulted, and their response 5 March 2024 indicated they had no concerns with the impact of this development on any potential future exploration and mining.*

- *While the pending tenement holder has no concerns, the attached map indicates the location is over a Ti-Zr resource. If there was scope to relocate the project, DEMIRS preference would be that the development is moved outside of the resource envelope (see attached map). Due to the nature of the development not being a sensitive land use, location within the notification zone to the resource would also be acceptable.*

- *There is a minor encroachment on geothermal exploration permit GEP 48 held by Good Earth Energy Corporation Pty Ltd. The tenement holder was not contacted at this time due to the initial assessment stage, however the impact from this proposal would be considered negligible and exploration could continue.*

While it is our preference that the potential Ti-Zr resource is not impacted, DEMIRS lodges no objections to the above development application.

Applicant Response:

In principle, DEMIRS does not object to the proposed development. Due to site constraints (including wetlands, bushfire and the lease area), the development is situated on the outer edge of the Ti-Zr deposit (**deposit**) to limit any potential impacts the development may have to the deposit, whilst also respecting other existing site constraints.

On balance, the DEMIRS submit the development is considered acceptable in this regard, and therefore, no amendments are considered necessary.

2.2 DFES Comments

An assessment by the Applicant's bushfire consultant, Bushfire Prone Planning, against DFES's comments relating to the proposal can be found as at Attachment 2.

In addition to the above, it is noted that a meeting dated 10 August 2023 was held between the Shire's Manager Planning and Environment Services, Greg Delahunty; the Applicant; Bushfire Prone Planning; and Talis Consultants. At this meeting, it was agreed that a dedicated bushfire bunker (Shelter in Place) would be a reasonable alternative for the non-compliance of the acceptable solution for vehicular access. Accordingly, there are no outstanding bushfire issues.

2.3 WA Health Comments

WA Health have provided generalised and universal information in relation to water supply, wastewater disposal, and chemical hazards. A brief summary of these items is that WA Health have identified these as potential concerns, however, all can be managed through the relevant approval and licencing processes.

These comments are noted, however do not necessarily need addressing with further justification or amended plans, for the purposes of a planning approval.

Advice was also made regarding mosquito management. These comments were aimed as advice for the Shire and not relevant to this application. Furthermore, the Shire has a dedicated Local Planning Policy – Mosquitoes (**Mosquitoes LPP**). As the proposed development is not residential in nature, nor is the development a sensitive land use in the aspect of mosquitoes, the Mosquitoes LPP is not applicable.

It is further noted within the advice received by WA Health that there was no mention of any odour concerns.

2.4 DPIRD Comments

DPIRD, in principle, does not object to the proposed development. Most of the comments made are only for noting, however, a response in respect to 2 points by DPIRD is considered necessary and is provided in Table 4, overleaf.

Table 4: Response to DPIRD comments.

Response to DPIRD comments	
DPIRD Comment (Summary)	**Applicant Response**
DPIRD recommends a minimum separation of 2 metres to groundwater for all waste containment infrastructure irrespective of the time of year. If a 2m separation is not achievable additional engineering controls are required. The proponent will implement groundwater control methods designed by FSG Geotechnics to increase the separation distance between the infrastructure and groundwater. DPIRD is not able to comment on the suitability of these groundwater control methods and if the use of a single liner under the compost hardstand is appropriate.	Noted. Groundwater Control is designed to ensure minimum 1.5m separation is maintained, even during seasonal high groundwater levels. DPIRD have advised that a 2m separation is recommended, or additional engineering controls if that separation cannot be achieved. The Applicant accepts this approach where a 2m separation is not possible.
Documentation provided specifies a designed minimum separation of 1.5m from the base of the leachate ponds to the controlled groundwater level. While this is less than 2m there are additional engineering controls proposed to protect groundwater resources from the risk of leaching. These controls include the use of multiple liners for the leachate ponds.	Noted.

2.5 DPLH Comments

Peel Region Scheme:

In summary, DPLH reaffirmed the Applicant's position that due to the nature of the development, the development is considered to be a mixture of a rural and industrial land use, and therefore meeting the intent of the Rural zone under the Peel Region Scheme.

*South Metropolitan and Peel Sub-Regional Planning Framework (**Framework**):*

DPLH provided comment to the Shire regarding the proposal and its potential impact on the Framework.

> *The Framework also identifies a 'Proposed Regional Road' which appears to traverse the development site. The proposed development could prejudice more detailed planning required for this alignment, the development should avoid or account for this alignment.*

Upon review of the Block and Site Plans, the future extension of the Mandjoogoordap Drive (**Regional Road**) appears to follow the east-west path of the existing extension of Gull Road. Therefore, the proposed Regional Road extension will be north of the development site as it will strategically run along the northern edge of the lease boundary. The proposal therefore does not impact the future Regional Road extension.

The main consideration is the east-west link for Regional Road extension (as discussed above). The north-south roads would be subject to further investigations and are considered premature in nature, particularly when the subject land is located in an area for future investigations into non-urban land uses, pursuant to the Framework.

It is therefore considered that the development will not prejudice future planning of the locality, pursuant to the Framework.

Environmental Considerations:

DPLH have also recommended that the proposal be assessed against State Planning Policy 2.1 – Peel Harvey Coastal Plain Catchment, State Planning Policy 2.9 – Water Resources and Draft State Planning Policy 2.9 – Planning for Water.

It is submitted that all three of State Planning Policies as listed by DPLH have been addressed with the submitted planning justification report, and that no further commentary on this is required.

2.6 DWER Comments

DWER, in principle, appear to not object to the proposal after three (3) separate responses were sent to the Shire in March 2024. Most of the comments made are only worth noting as they describe the proposal or they simply provide generalised advice, however detailed responses have been provided where necessary in Table 5, overleaf.

Table 5: Response to all DWER comments.

Response to DWER comments	
DWER Comment (Summary)	**Applicant Response**
Comments dated 1 March 2024 from Andrew Miller – Senior Manager Contaminated Sites	
The site was reported, along with other nearby land parcels, on the basis of suspected groundwater contamination associated with a piggery located adjacent to the site. The site has not yet been classified under the CS Act. Based on a review of available groundwater data, it is unlikely that the identified groundwater contamination (from the piggery and other sites) is migrating in a northerly direction to affect Lot 9500.	Noted. DWER is monitoring this situation and does not adversely impact the proposed development.
The site is considered suitable for the proposal. Therefore, the department has no objection to the proposed development of the site and recommends that the approval should not include a contamination condition or advice note.	Noted and agreed.
Acid sulfate soil risk mapping shows that the site lies primarily within an area identified as having a moderate to low risk of acid sulfate soils occurring within three metres of the natural soil surface, but high to moderate risk of acid sulfate soils beyond three metres below the natural soil surface.	Noted and addressed in the EAMP.

As the proposed works have the potential to disturb acid sulfate soils the department recommends that the following advice: *"Acid sulfate soils (ASS) risk mapping indicates that the site is located primarily within an area identified as representing a moderate to low risk of ASS occurring within 3 metres of the natural soil surface. Please refer to Department of Water and Environmental Regulation's acid sulfate soil guidelines for information to assist with the management of ground and/or groundwater disturbing works.*	Noted and addressed in the EAMP.
Comments dated 1 March 2024 from Jane Sturgess – Acting Program Manager – Planning Advice	
In principle, the DWER does not object to the proposal.	Noted.
The proposed clearing is not exempt, and a clearing permit is required. DWER received a Clearing Permit application CPS 10386/1 on 20/10/2023 from C-Wise Holdings to clear 6.55 hectares of native vegetation at this location for the proposed development. This application is currently waiting on information from the applicant. The extent of clearing specified in the clearing permit application appears to be consistent with the clearing proposed in the Development Application.	Noted. A response to the Request for Further Information (RFI) was provided to the DWER on 1 March 2024, and the clearing permit is now with the Department.
Stormwater runoff should be managed in accordance with the Stormwater Management Manual for Western Australia (DWER, 2022) and Decision Process for Stormwater Management in Western Australia (DWER, 2017). Given the presence of nearby conservation category wetlands and high local groundwater the Department recommends that the driveway/access road and future	The Applicant is agreeable to this as a condition of approval as it will, in any event, be addressed in the detailed designs for the construction phase of the development.

staff carpark be designed to ensure that the first 15 mm of stormwater runoff undergo water quality treatment via biofiltration through rain gardens or vegetated swales.	
Advice note: *In accordance with the Government Sewerage Policy (Government of Western Australia, 2019), the subject land is located within a sewage sensitive area. As this land is not connected to the reticulated sewerage infrastructure, future development on the lot must adhere to the Policy including the requirement for a secondary treatment system with nutrient removal for the proposed office and amenities buildings and the required separation distance from the maximum groundwater level and significant wetlands for the on-site sewage system discharge/irrigation area.*	Noted. Government Sewerage Policy has been addressed within the Planning Justification report as already submitted to the Shire.
The Environmental Protection Act 1986 (**EP Act**) makes it an offence to undertake any work which causes a premises to become, or become capable of being, a Prescribed Premises unless the work is undertaken in accordance with a works approval. It is also an offence under the EP Act to alter the nature and/or volume of any emissions, unless done so in accordance with a works approval or licence or a registration (for operation) is held for the premises. DWER has received and is currently assessing the Works Approval application for this proposal.	Noted. Non-compliance with items such as odour emissions are controlled under different legislation and will be managed for compliance by DWER, creating little risk for the Shire as a potential compliance issue relating to development approval.
The applicant has a pending licence application to amend the licence GWL166732 to add this new site. DWER is currently awaiting submission of demonstration of legal access and planning and environmental approvals.	These are matters which the Applicant is dealing directly with DWER as part of an updated licence and the granting a Work approval. These considerations should not have any bearing on the determination of a planning approval.

DWER is also awaiting further information on location of bores and volumes to be abstracted at this new site so that it can be determine if a level of hydrogeological investigation and revised operating strategy is required.	
Advice note: *The proponent is to be advised that the proposal is located within the Peel-Harvey coastal plain catchment and the provision of the Environmental Protection (Peel Inlet – Harvey Estuary) Policy 1992, the State Planning Policy No 2.1, Peel-Harvey Coastal Plain Catchment (SPP 2.1) and the Draft State Planning Policy 2.9 Planning for Water (SPP 2.9) shall apply.*	Noted. The State Planning Policies mentioned have already been assessed under the Planning Justification report already submitted to the Shire.
Comments dated 27 March 2024 from Hayden Nebel – Senior Industry Regulation Officer	
DWER is still assessing the works approval application for constructing the new facility under the EP Act.	Noted. As stated above, this is a matter separate to planning approval.
The primary area of potential concern is odour impacts from the operations. C-Wise and the Nambeelup precinct is currently experiencing odour issues from its operations and concerns that this may occur at the new facility.	The existing facility at 230 Gull Road (**existing facility**) should not be used as a reference as the property is located on a different site and was developed decades prior. The proposed development is using better practice designs to assist in minimising potential odour impacts. Further, this new development is proposed to address the current concerns at the existing facility via best practice designs and moving the operations to the new (proposed) site.
The predictive odour modelling provided is inconclusive and does not fully meet the requirements of DWER Guidelines: Odour Emissions (Jun 2019); therefore, the modelling of the odour footprint of the operations cannot be solely relied on.	The amended OIA as at Attachment 1 has provided updated modelling.

DWER is not able to provide air quality technical advice as this is for internal assessments only.	Noted. This is considered relevant as the required licensing/approvals for odour is conducted under separate legislation. The Applicant would not receive the relevant licenses/approvals needed to operate the facility if DWER were not satisfied that the development meets all the relevant environmental requirements.
Odour controls for the proposed new composting operations appear to be improved compared to existing operations, particularly for the liquid waste management, the unloading and first composting stages. It is expected that this will reduce emissions from the composting component of existing C-Wise operations once Stage 2 of commissioning is completed.	Noted. The significant improvements are why the proposal should not be conflated with the complaints that have occurred in respect to other odour producing properties or from the existing facility.
DWER acknowledges that the new facility will install better odour treatment technology and aeration systems, and seem to meet the requirements of the Guideline - Better practice organics recycling.	As above.
As part of the risk assessment of the works approval application DWER will refer to the odour guidelines as part of the assessment.	Noted. The Works approvals is distinct to the planning approval.
Shire of Murray discussed the option that the proponent compares the odour modelling criteria under Section 3 of the NSW Technical Notes - Assessment and management of odour from stationary sources. DWER does not have a position on utilising another State's assessing criteria.	Noted and discussed throughout the amended OIA. Refer to section 3.0 of this submission in relation to a peer review.
DWER can only assess an application based the current constraints and could not consider possible future encroachment (changes in land use and sensitive receptors) as part of the assessment. This is beyond the remit of our guidelines for risk assessments.	The modelling provided was at the request of the Shire only. Further, revised modelling has been completed, also at the request of the Shire.

Shire of Murray needs to be satisfied that the Development Application is consistent with its own policy and statutory requirements.	The proposed development is considered to meet all of the relevant requirements of the local planning framework. It is noted that the Shire has no policy or statutory requirements relating to odour.
DWER is responsible for any works approval or licences that may be issued as a result of its assessment in accordance with its guidelines for Industry Regulation and procedures and general compliance under the EP Act i.e. unreasonable emission.	It is again noted that any unreasonable odour emissions arising from non-compliances with approved operational management, will be dealt with by DWER.

3.0 Request for Odour Peer Review

We do not support the request for an odour peer review, at this stage, for the following reasons:

1. The number of submissions that raise odour concerns is acknowledged. However, as we have detailed in Table 1, the current source of odour in most instances is not clear and furthermore, they relate to the locality of the current site, not the proposed development.

   It is important that any existing concerns with odour are not conflated with the current proposal which will be an improved facility incorporating the latest technology developed in accordance with better practice industry guidelines.

2. It is appreciated that Shire does not have the inhouse expertise to deal with technical matters and the science that underpins odour emissions. It is for this reason that others such as the DWER and the Department of Health are better placed to provide such technical advice.

3. Finally, we understand that the Manager Environmental Health, Phil Stevens, at the Shire has been communicating directly with John Hurley from EAQ Consulting, our odour consultant, and we attach a copy of this response to points that have been raised as at Attachment 3. In conjunction, the Applicant has made amendments and has provided more detailed information with the amended OIA as at Attachment 1.

4.0 Planning Assessment Comments

The Shire, in response to their assessment and receival of comments from public advertising and public consultation, have requested the following further information in relation to the proposed development. For ease of reference, this has been separated into relevant subsections.

4.1 Expanding the Operational Odour Analysis

The items, as quoted below, were requested by the Shire in relation to the Operational Odour Analysis (**Odour Analysis**).

- *include all existing and proposed operations (eg assessment includes one existing pond not all ponds);*
- *include abnormal conditions eg when ponds 'turn', which we have seen does happen from time to time;*

- *include cumulative effects of nearby Nambeelup businesses (piggery and mushroom compost), although not part of the application will contribute to community odour impacts;*

- *Comment on how often in practice (eg percentage of time), odour impacts are expected to be average versus maximum, and is this based purely on meteorological conditions;*

The above items have been addressed through the amended OIA as at Attachment 1 and the email from John Hurley – EAQ Consulting to the Shire dated 10 April 2024 (**justification email**).

4.2 Expanding the Location Review

The items, as quoted below, were requested by the Shire in relation to the expansion of the location review.

- *Include odour impacts on FIPWA and other premises in the Peel Business Park, acknowledging this industrial area has food manufacturing focus and is planned to expand to the southern boundary of the project site over time;*

- *Include impacts on Murrayfield Airport, noting the masterplan for future planned expansion of this facility over*

time to include elements such as pilot training and short term accommodation, hangars etc;

- *Include impacts on the kennel estate including Sunshine Place, Nambeelup;*

- *Include impacts on special rural lots in Stakehill, and the proposed special rural lots south of Lakes Road;*

- *Include impacts on suburbs of Lakelands, Meadow Springs and Madora Bay in the impacts contour plots, and note that there have been significant numbers of complaints from these suburbs.*

Following the request from the Shire, the above items were addressed through the amended OIA and the justification email. Additional commentary has also been provided below for the potential impacts on food manufacturing.

Impacts on Food Manufacturing:

The Structure Plan makes no reference to any form of food industries whatsoever. Section 3.2 of the Structure Plan delineates possible land use precincts in the Structure Plan area; however, this will only be completed via the creation of a Local Structure Plan, such is the case with the Lot 600, Lakes Road Nambeelup Structure Plan for the Peel Business Park.

It is acknowledged that the Lot 600, Lakes Road Nambeelup Structure Plan area consists of food industries, where part of the intent of the relevant zoning (Nambeelup Industrial zone) under LPS4 is to minimise negative impacts of land uses including noise, dust and odour.

However, unless a formal structure plan/s (which is a document of due regard only) is prepared for the rest of the Structure Plan area, in accordance with section 3.2 of the Structure Plan, due regard for food manufacturing is to be held for the Lot 600, Lakes Road Nambeelup Structure Plan area only.

It is noted that the Peel Development Commission's Strategic Plan (2023-2025) view the agri-innovation and food production sectors as a priority for the Peel Region. This view is largely based off the 'Planning for the Peel Food Zone' study conducted by DPIRD in 2020.

It is further noted that this position above has no bearing on matters for due regard, pursuant to clause 67(2) of the Deemed Provision. Interestingly, the Planning for the Peel Food Zone was not referenced at all by DPIRD's comments to the Shire, as acknowledged within section 2.4 of this submission.

4.3 Model Projection Contour Maps

The items, as quoted below, were requested by the Shire in relation to the Model Projection Contour Maps (**Contour Maps**).

- *Include in addition to average projections the dispersion modelling for realistic, maximum, cumulative effects;*

- *In addition to contour maps for the existing operation, include additional maps for the future operations of:*

  - *Stage 1 + Existing operations co-existing; and*

  - *Stage 1 + Stage 2 operating (existing closed);*

- *Comment on ou.m3 shown in the model projections in relation to what levels would be acceptable, without causing complaints from receiving premises;*

- *Comment on contour maps in the context of the NSW odour framework, which shows 7ou.m3 as the nuisance criteria for a single rural residence, 5ou.m3 in special rural and 2 ou.m3 for urban areas of more than 2000 people (eg Lakelands), what criterion would apply to the Peel Business Park/airport;*

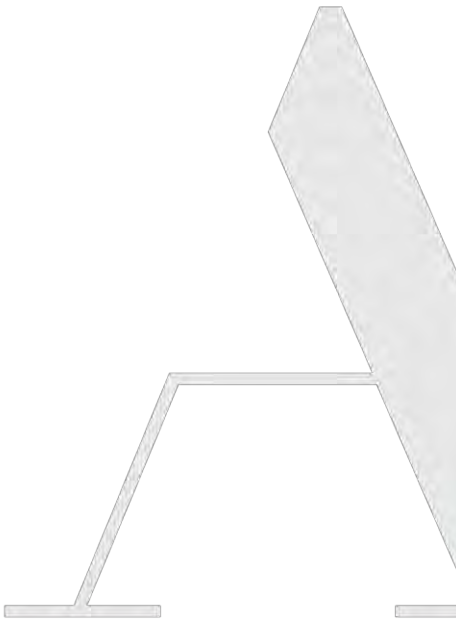
These items have all been addressed through the amended OIA (Attachment 1) and the justification email (Attachment 3).

5.0 Conclusion

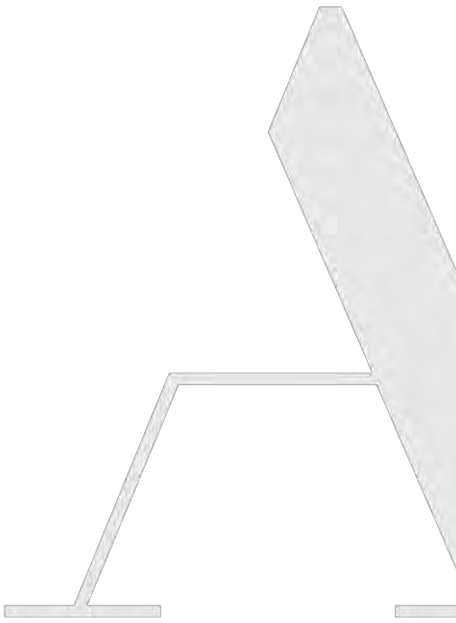
For the reasons outlined in this response and the further information provided, it is considered that the proposal is suitable for the site and is consistent with both the applicable local and state planning framework, and compatible with the existing rural (and future industrial) activities within the locality. The proposal will not have an adverse impact on the character or the amenity of the locality and accordingly, it is submitted that the proposal warrants approval.

We trust that this information is to your satisfaction and welcome the opportunity to review a draft suite of recommended conditions of approval. We otherwise look forward to your prompt and favourable recommendation to the Regional Development Assessment Panel.

Altus Planning



Attachment 1 – Amended Odour Impact Assessment



Attachment 2 – Bushfire Prone Planning Response to DFES Comments

Attachment 3 – Justification Email to the Shire of Murray

From: Jas Lapinski <Jas.Lapinski@dplh.wa.gov.au>
Sent: Thursday, 18 January 2024 11:31 AM
To: Luke Cervi <luke.cervi@murray.wa.gov.au>
Subject: RE: Dual Approval - JDAP - 320 Gull Rd, Keralup

OFFICIAL

Hi Luke

Thanks for the opportunity to discuss this proposal and consider:

a) Whether or not PRS approval is required; and
b) Whether the WAPC has delegated its authority to determine the application to the local government.

Please note this is Departmental advice, rather than a WAPC decision.

PRS approval

We note your interpretation below in relation to the purpose of the Rural zone. However, please also consider the following:

a) Noxious industry is a permissible use (SA) under the Shire of Murray Local Planning Scheme. If this use may be permitted in the rural zone under the local scheme it would *not* suggest an inconsistency with the purpose of the zone under the PRS.

b) It is possible that the facility could be related to agriculture as incomings listed include forestry and feedstocks.

c) State Planning Policy 2.5 defines a "Rural Land Use as: *"Land uses that are rural in nature and that support and are associated with primary production, basic raw material extraction, biodiversity conservation, natural resource management, public purposes (eg. prisons, cemeteries, public utilities and waste management facilities) and protection of landscapes and views"*

We do not agree that the proposed use is of State or Regional significance. The proposal is a commercial enterprise which could service local governments, as well as other private commercial customers.

In any case, if it is the opinion of the Shire that either of these elements would trigger PRS approval, approval would be required under Cl. 21 of the PRS.

Delegation

DEL 2022/05 *Powers of Local Governments (PRS)* delegates local governments power to determine applications set out in Schedules 1 and 2 of the notice. Schedule 2 applies, being zoned land. The headline in Schedule 2 states:

"Development on zoned land delegated to local governments except in respect of public works undertaken by public authorities". In this case the development proponent is a private entity (C-Wise Holdings) therefore is not applicable under Schedule 2.

On this basis, should the local government deem the use requires approval under Cl. 21 of the PRS, the application would remain a dual approval and the responsible authority would be the Shire of Murray in regard to both the LPS and PRS.

Please do not hesitate to contact me should you wish to discuss.

Regards

Jas Lapinski
A/Principal Planning Officer | Land Use Planning
Department of Planning, Lands and Heritage
140 William Street, Perth WA 6000
wa.gov.au/dplh | 6551 9563 | |

The Department acknowledges the Aboriginal people of Western Australia as the traditional custodians of this land, and we pay our respects to their Elders, past and present.

From: Luke Cervi <luke.cervi@murray.wa.gov.au>
Sent: Tuesday, 16 January 2024 2:45 PM
To: Jas Lapinski <Jas.Lapinski@dplh.wa.gov.au>
Subject: RE: Dual Approval - JDAP - 320 Gull Rd, Keralup
Importance: High

Hi Jas

Further to previous discussions, this has now come to the Shire for our view from the applicant. Before responding to the applicant, I would like to have a united position with WAPC. In this regard I submit as follows:

In accordance with RES 2014/02 being a resolution made under clause 21 of the Peel Region Scheme regarding development on zoned land requiring approval, Schedule 1 identifies development on zoned land requiring approval. This includes the following that I consider may be relevant to this proposal:

> *1. Development of State or Regional Significance*
> *Development of state or regional significance and development called in by or referred to the WAPC, in the following circumstances—*
> *(a) Development in respect of which the WAPC, by notice in writing in each case, advises the local government that the development is of state or regional significance or that, in the*

public interest, the development should be the subject of an application determined by the WAPC.
(b) Development, in the opinion of the local government, which is of state or regional significance or for which an application should be determined by the WAPC by the WAPC in the public interest.

6. Development in the rural zone
Development in the rural zone, other than for a poultry farm, which in the opinion of the WAPC or the local government may not be consistent with the purposes of the rural zone stated in clause 12(e) of the PRS.

Given that the proposal is for a 'Noxious Industry' within the rural zone and the purpose of the Rural zone is:

(e) Rural — to provide for the sustainable use of land for agriculture, assist in the conservation and wise use of natural resources including water, flora, fauna and minerals, provide a distinctive rural landscape setting for the urban areas and accommodate carefully planned rural living developments;

It is my opinion that the proposal may be inconsistent with the Rural zone and therefore requires approval under the PRS. Furthermore, it is my view that the proposal is of regional and state significance in that it is critical infrastructure required to facilitate FOGO collection which is a 'State vision' and has obtained State and Federal funding to facilitate achieving this FOGO outcome.

In accordance with Del 2022/05 being Powers of Local Governments (PRS), whilst the Shire does have delegation to consider an application required within the rural zone, we do not have delegation to determine an application required due to being regional or state significant development under clause 21 of the Peel Region Scheme.

Given the above can you please confirm that WAPC agrees with the Shire in this regard and subsequently that approval under the PRS is required and WAPC would be the determining authority.

Regards

Luke Cervi | Coordinator Planning Services

luke.cervi@murray.wa.gov.au
P: +61 8 9531 7738
www.murray.wa.gov.au

Shire of Murray

PO Box 21 • Pinjarra • WA • 6208 •

How are we doing? 

We are a Gold Waterwise Council

From: Jayden Pope | Altus Planning <jayden@altusplan.com.au>
Sent: Tuesday, 16 January 2024 11:06 AM
To: Luke Cervi <luke.cervi@murray.wa.gov.au>
Subject: Dual Approval - JDAP - 320 Gull Rd, Keralup

Hi Luke,

I just received a phone call from Jas at DPLH wondering why the JDAP is dual approval. For reference, Altus provided the PRS Form 1 as a standard requirement and not to reference the need for WAPC approval.

It appears that the Shire has marked the application as a dual approval. Would you please advise if the Shire is of the belief that the WAPC approval **is/is not** required in accordance with SPP2.5 and clause 6 of Schedule 2 under *Del 2022/05. Powers of Local Governments (PRS)* – Gazette 46 of 2022 (www.wa.gov.au)?

Kind regards,

Jayden Pope
SENIOR TOWN PLANNER
BA(URP)

ALTUS PLANNING

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jayden@altusplan.com.au
www.altusplan.com.au

TOWN PLANNING | MEDIATION | ADVOCACY

Government of Western Australia
Department of Water and Environmental Regulation

Your ref: P302/2023
Our ref: PA60990, RF131-17
Enquiries: Mark Hingston, Ph 9550 4209

Chief Executive Officer
Shire of Murray
PO Box 21
Pinjarra WA 6208

Dear Chief Executive Officer

RE: LOT 9500 GULL ROAD, KERALUP – CARBON RECYCLING FACILITY

Thank you for providing the application for the Carbon Recycling Facility at Lot 9500 Gull Road, Keralup received on 22 December 2023 for the Department of Water and Environmental Regulation (the Department) to consider.

The Department has identified that the Carbon Recycling Facility at Lot 9500 Gull Road, Keralup has the potential for impacts on environment and water resource management. In principle the Department does not object to the proposal however key issues, recommendations and advice are provided below and these matters should be addressed.

Issue
Native Vegetation Regulation

Advice
Under section 51C of the *Environmental Protection Act 1986* (EP Act), clearing of native vegetation is an offence unless:

- it is undertaken under the authority of a clearing permit
- it is done after the person has received notice under Section 51DA(5) that a clearing permit is not required
- the clearing is subject to an exemption

Exemptions for clearing that are a requirement of written law, or authorised under certain statutory processes, are contained in Schedule 6 of the EP Act. Exemptions for low impact routine land management practices outside of environmentally sensitive areas (ESAs) are contained in the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* (the Clearing Regulations).

Kwinana Peel Region
107 Breakwater Parade Mandurah Ocean Marina Mandurah Western Australia 6210
PO Box 332 Mandurah Western Australia 6210
Telephone: 08 9550 4222 Facsimile: 08 9581 4560
www.dwer.wa.gov.au

Based on the information provided, the proposed clearing is not exempt and a clearing permit is required

The Department received a Clearing Permit application CPS 10386/1 on 20/10/2023 from C-Wise Holdings to clear 6.55 hectares of native vegetation at this location for the purposes of a Carbon Recycling Facility and ancillary uses. This application is currently waiting on information from the applicant.

The extent of clearing specified in the clearing permit application appears to be consistent with the clearing proposed in the Development Application.

For additional advice relating to the assessment of this application please contact Alyse Burden on 6364 6663.

If further clarification is required, please contact the Department's Native Vegetation Regulation section by email (admin.nvp@dwer.wa.gov.au) or by telephone (6364 7098).

Issue
Stormwater Management

Advice
Stormwater runoff should be managed in accordance with the S*tormwater Management Manual for Western Australia* (DWER, 2022) and *Decision Process for Stormwater Management in Western Australia* (DWER, 2017).

Given the presence of nearby conservation category wetlands and high local groundwater the Department recommends that the driveway/access road and future staff carpark be designed to ensure that the first 15 mm of stormwater runoff undergo water quality treatment via biofiltration through rain gardens or vegetated swales.

Issue
Sewerage Sensitive Area

Advice
In accordance with the *Government Sewerage Policy* (Government of Western Australia, 2019), the subject land is located within a sewage sensitive area. As this land is not connected to the reticulated sewerage infrastructure, future development on the lot must adhere to the Policy including the requirement for a secondary treatment system with nutrient removal for the proposed office and amenities buildings and the required separation distance from the maximum groundwater level and significant wetlands for the on-site sewage system discharge/irrigation area.

Issue
Industrial Regulation

Advice
The Department regulates emissions and discharges from the construction and operation of prescribed premises through a works approval and licensing process, under Part V, Division 3 of the *Environmental Protection Act 1986* (EP Act).

The categories of prescribed premises are outlined in Schedule 1 of the *Environmental Protection Regulations 1987*.

The EP Act requires a works approval to be obtained before constructing a prescribed premises and makes it an offence to cause an emission or discharge from an existing prescribed premises unless they are the holder of a works approval or licence (or registration) and the emission is in accordance with any conditions to which the licence or works approval is subject.

The provided development application request was reviewed in relation to works approval and licence requirements under Part V Division 3 of the EP Act.

Based on the information provided, the Department can advise that the information is consistent with a works approval application submitted to the Department in respect to the following category as per Schedule 1 of the *Environmental Protection Regulations 1987*:

Category	Category description	Production or design capacity
67A	Compost manufacturing and soil blending: premises on which organic material (excluding silage) or waste is stored pending processing, mixing, drying or composting to produce commercial quantities of compost or blended soils.	200,000 tonnes per annum
61	Liquid waste facility: premises on which liquid waste produced on other premises (other than sewerage waste) is stored, reprocessed, treated or irrigated.	60,000 tonnes per annum

The *Environmental Protection Act 1986* makes it an offence to undertake any work which causes a premises to become, or become capable of being, a Prescribed Premises unless the work is undertaken in accordance with a works approval. It is also an offence under the EP Act to alter the nature and/or volume of any emissions, unless done so in accordance with a works approval or licence or a registration (for operation) is held for the premises.

The Department has received and is currently assessing the Works Approval application for this proposal.

Please note that this advice is provided based on the information provided. Should this information change, a works approval or licensing requirements may also change. Applicants are encouraged to contact the Department at the above contact details to clarify requirements, should there be changes to the development proposal.

Issue
Contaminated Sites

Advice
Lot 9500 Gull Road, Keralup is classified as ‘awaiting classification’ under the *Contaminated Sites Act 2003.* Please refer to the separately attached section 58(6)(b) letter of advice from the Department’s Contaminated Sites Branch dated 1 March 2024.

Issue
Groundwater Licence

Advice
The subject area is located in the Murray groundwater area (Nambeelup subarea) as proclaimed under the Rights in Water and Irrigation Act 1914. Any groundwater abstraction in this proclaimed area for purposes other than domestic use and/or non-intensive stock watering taken from the superficial aquifer, is subject to licensing by the Department.

The applicant has a pending licence application to amend the licence GWL166732 to add this new site. The Department is currently awaiting submission of demonstration of legal access and planning and environmental approvals. The Department is also awaiting further information on location of bores and volumes to be abstracted at this new site so that it can be determine if a level of hydrogeological investigation and revised operating strategy is required.

Issue
Peel Harvey Coastal Plain Catchment

Advice
The proponent is to be advised that the proposal is located within the Peel-Harvey coastal plain catchment and the provision of the *Environmental Protection (Peel Inlet – Harvey Estuary) Policy 1992*, the *State Planning Policy No 2.1, Peel-Harvey Coastal Plain Catchment* (SPP 2.1) and the Draft *State Planning Policy 2.9 Planning for Water* (SPP 2.9) shall apply.

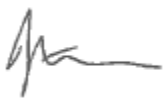
Where the Department has a statutory role, planning applications should be considered prior to the Department issuing any relevant permits, licenses and/or approvals.

In the event that the applicant determines that a works approval or licence application is required under Part V of the *Environmental Protection Act 1986* (EP Act), the advice provided in this communication does not prejudice and must not be considered to infer the outcome of the EP Act licence and works approval process.

In the event there are modifications to the proposal that may have implications on aspects of environment and/or water management, the Department should be notified to enable the implications to be assessed.

Should you require any further information on the comments please contact Mark Hingston on 9550 4209.

Yours sincerely



Jane Sturgess
Acting Program Manager – Planning Advice
Kwinana Peel Region
01 / 03 / 2024

Government of Western Australia
Department of Water and Environmental Regulation

Your ref: P302/2023
Our ref: DMO 2004
Enquiries: Mariesa Greenwood, Ph 6364 7194
Email: mariesa.greenwood@dwer.wa.gov.au

Chief Executive Officer
Shire of Murray
1915 Pinjarra Road
PINJARRA WA 6208

By email mailbag@murray.wa.gov.au & luke.cervi@murray.wa.gov.au

Dear Chief Executive Officer

DEVELOPMENT APPLICATION REFERENCE P302/2023 – LOT 9500 (NO. 320) GULL ROAD, KERALUP

I refer to your email dated 22 December 2023 to the Department of Water and Environmental Regulation (the department) regarding an application to the Shire of Murray for the proposed development of the above-mentioned lot.

As per the requirements under section 58(6)(b) of the *Contaminated Sites Act 2003* (CS Act), advice is required as to the suitability of the land for the proposed development. The department understands that the development comprises construction of a carbon recycling facility which will accept and process solid and liquid organic wastes to produce compost and similar products.

Land at Lot 9500 on Deposited Plan 414516 (the site) was reported as a known or suspected contaminated site under section 11 of the *Contaminated Sites Act 2003* (CS Act) on 22 May 2007. However, the site has not yet been classified under the CS Act. Lot 9500 was reported, along with other nearby land parcels, on the basis of suspected groundwater contamination associated with a piggery located adjacent to Lot 9500.

The department has not received any information in relation to soil and groundwater quality and it is unknown if soil and groundwater quality have been investigated at the site.

However, the department holds information relating to the assessment of contamination at adjoining land occupied by the piggery and subject to other potentially contaminating activities. Groundwater investigations at Lots 89 and 109 to the south of the site have identified a plume of nutrient, pathogen and per- and poly-fluoroalkyl substances (PFAS) impacted groundwater that appears to be migrating to the west, in the direction of regional groundwater flow. Based on a review of available groundwater data, it is unlikely that the identified groundwater contamination is migrating in a northerly direction to affect Lot 9500.

A review of available historical aerial imagery and other information available to the department indicates that historical and current land uses at Lot 9500 appear to be limited to general agricultural purposes, including livestock grazing. As there is no information suggesting possible contamination, Lot 9500 is likely to be classified as *report not substantiated* under the CS Act in due course.

Based on available information, and consistent with previous advice from the department, the site is considered suitable for the proposed development. Therefore, the department has no objection to the proposed development of the site and recommends that the approval should not include a contamination condition or advice note.

Acid sulfate soil risk mapping shows that the site lies primarily within an area identified as having a moderate to low risk of acid sulfate soils occurring within three metres of the natural soil surface, but high to moderate risk of acid sulfate soils beyond three metres below the natural soil surface.

Based on supplied plans, deep excavation and dewatering are not required for the development of the site.

However, as the proposed development works have the potential to disturb acid sulfate soils the department recommends that the following advice note be applied to any approval granted by the Shire of Murray.

Advice

> Acid sulfate soils (ASS) risk mapping indicates that the site is located primarily within an area identified as representing a moderate to low risk of ASS occurring within 3 metres of the natural soil surface. Please refer to Department of Water and Environmental Regulation's acid sulfate soil guidelines for information to assist with the management of ground and/or groundwater disturbing works. https://www.der.wa.gov.au/your-environment/acid-sulfate-soils/69-acidsulfatesoils-guidelines

Please note that this advice relates to potential contamination and acid sulfate soil issues only. You may receive additional advice from other areas within the department.

If you have any queries in relation to the above, please contact Environmental Officer, Mariesa Greenwood, on 6364 7194.

Yours sincerely

Andrew Miller
SENIOR MANAGER
CONTAMINATED SITES
Delegated Officer under section 91
of the *Contaminated Sites Act 2003*

1 March 2024

388,000 mE
390,000 mE
392,000 mE
6,410,000 mN
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32°26'30"S
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Shire of Murray - Development Application - Joint Development Assessment Panel - Noxious Industry Carbon Recycling Facility - Lot 9500 320 Gull Road Stake Hill - P302/2023 - DMS14742/2023

- Development site
- Lot 9500 Gull Road, Stake Hill
- Mining tenements — pending
- Ti-Zr Deposit
- 500m buffer
- Exploration
- Petroleum pipelines - current
- Geothermal tenement

Area of interest

Scale of map 1:20,000 @A3

0 0.2 0.4 0.6 0.8 1

Kilometres

Coordinate System: GDA 1994 MGA Zone 50

Department of **Energy, Mines, Industry Regulation and Safety**
Resource and Environmental Regulation

GOVERNMENT OF WESTERN AUSTRALIA

Author: Steven Batty Date: 19/02/2024

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Department of Energy, Mines, Industry Regulation and Safety
Resource and Environmental Regulation
GOVERNMENT OF WESTERN AUSTRALIA

Your ref	P302/2023
Our ref	DMS14742/2023
Enquiries	Steven Batty — 9222 3104 Steven.BATTY@dmirs.wa.gov.au

Luke Cerv
Planning Co-ordinator
Shire of Murray
Sent by Email — luke.cervi@murray.wa.gov.au; mailbag@murray.wa.gov.au
PO Box 21 Pinjarra WA 6208

Dear Luke Cervi

SHIRE OF MURRAY - DEVELOPMENT APPLICATION - JOINT DEVELOPMENT ASSESSMENT PANEL - NOXIOUS INDUSTRY CARBON RECYCLING FACILITY - LOT 9500 320 GULL ROAD STAKE HILL - P302/2023

Thank you for your letter dated 22/12/2023 inviting comment on the e development application - Joint Development Assessment Panel - Noxious Industry Carbon Recycling Facility - Lot 9500 (No 320) Gull Road, Stake Hill.

The Department of Energy, Mines, Industry Regulation and Safety (DEMIRS) has assessed this proposal with respect to mineral and petroleum resources, geothermal energy, and basic raw materials and makes the following comments.

- There is a 10.85% encroachment on the pending exploration tenement E 70/6287 held by Keysbrook Leucoxene Pty Ltd that hosts a Titanium – Zirconium resource. The tenement holder was consulted, and their response 5 March 2024 indicated they had no concerns with the impact of this development on any potential future exploration and mining.
- While the pending tenement holder has no concerns, the attached map indicates the location is over a Ti-Zr resource. If there was scope to relocate the project, DEMIRS preference would be that the development is moved outside of the resource envelope (see attached map). Due to the nature of the development not being a sensitive land use, location within the notification zone to the resource would also be acceptable.
- There is a minor encroachment on geothermal exploration permit GEP 48 held by Good Earth Energy Corporation Pty Ltd. The tenement holder was not contacted at this time due to the initial assessment stage, however the impact from this proposal would be considered negligible and exploration could continue.

While it is our preference that the potential Ti-Zr resource is not impacted, DEMIRS lodges no objections to the above development application.

Yours sincerely

Steven Batty | Senior Geologist
Mineral and Energy Resources Directorate
06 March 2024

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Our Ref: D32723
Your Ref: P302/2023

Luke Cervi
Shire of Murray
mailbag@murray.wa.gov.au

Dear Mr Cervi

RE: HIGH RISK LAND USE - LOT 9500 (320) GULL ROAD, KERALUP – NOXIOUS INDUSTRY (CARBON RECYCLING FACILITY) – DEVELOPMENT APPLICATION

I refer to your email dated 22 December 2023 regarding the submission of a Bushfire Management Plan (BMP) (Version 1.3), prepared by Bushfire Prone Planning and dated 15 December 2023, for the above development application. The BMP is accompanied by a 'Development Justification Report' from the proponent dated 14 December 2023 for the above development application (DA).

This advice relates only to *State Planning Policy 3.7: Planning in Bushfire Prone Areas* (SPP 3.7) and the *Guidelines for Planning in Bushfire Prone Areas* (Guidelines). It is the responsibility of the proponent to ensure the proposal complies with relevant planning policies and building regulations where necessary. This advice does not exempt the applicant/proponent from obtaining approvals that apply to the proposal including planning, building, health or any other approvals required by a relevant authority under written laws.

Assessment

- The BMP has assessed the development against Elements 1 – 4 as a high risk land use and Element 5 as a tourism day use. The occasional school visit is ancillary to the standard business operation and does not warrant the land use being classed as a vulnerable tourism land use or an assessment under Element 5 of the Guidelines.

1. Policy Measure 6.5 a) (ii) Preparation of a BAL contour map

Issue	Assessment	Action
Method 2 not validated	The Method 2 has not been validated. There are a number of inconsistencies in the BMP relating to the Method 2. • Table 3.2 which provides the inputs for the BAL Contour Map provides no detail on the Method 2 and instead states only a Method 1 has been used. • The flame temperature used to calculate the area of 10KW/m^2 is inconsistent in the BMP, section 5.8 states in different mitigation measures that either 1090K or 1200K has been	Modification to the BMP is required.

	used. 1200K should be consistently referenced throughout the BMP. • The area of 10KW/m^2 is shown around the office / cribroom. This building is attached to a workshop which is situated in BAL-19. An onsite shelter should be located in an area of 10kW/m^2 and would be compromised by the workshop in BAL-19. As per AS3959 the BAL of a building is calculated using the highest calculated BAL on any elevation unless the provisions in section 3.2.3 have been applied. The area of 10KW/m^2 should be expanded to include the workshop and office/cribroom should the use of an onsite shelter be acceptable to the decision maker. It is acknowledged there is a Method 2 calculation at the end of the BMP, however, given the use of a tourism day use acceptable solution does not address the performance principle for vehicular access it has not been validated. The occasional school visit is ancillary to the standard business operation and does not warrant the land use being classed as vulnerable tourism and assessment under Element 5.	

2. Policy Measure 6.5 c) Compliance with the Bushfire Protection Criteria

Element	Assessment	Action
Vehicular Access	**A3.1 – not demonstrated** Gull Road is an existing gazetted dead-end public road which has recently been extended. Parts ofhe road appears to be unsealed and it is not clear if it is maintained by the local government. The road should meet the technical requirements of Table 6 column 1 of the Guidelines.	Modifications to the BMP is required. Decision maker to be satisfied that Gull Road meets the standard of a public road.
Vehicular Access	**A3.2a and P3i – does not comply** Gull Road is an existing gazetted public road maintained by the local government; however, it is ultimately a single access road to the proposed recycling facility. Access in two different directions to two different destinations, in accordance with the acceptable solution, is not available until Lakes Road approximately 6 kilometres from the development site. This exceeds the acceptable maximum length of 200 metres for a dead-end road. The BMP correctly states that compliance cannot be achieved for multiple vehicle access routes. However, it does not attempt to address the performance principle but instead states that *an onsite shelter building will be provided for occupants as an alternative solution.* An alternative solution is a performance principle-based	Does not comply. Modifications to the BMP is required. Please demonstrate compliance or proposes a performance principle-based solution.

	solution. As per section 4.5.2 of the Guidelines for a proposal to be considered compliant with the intent and objectives of SPP 3.7 the intent of each element of the bushfire protection criteria must be satisfied. The 'intent' of Element 3: Vehicular Access can be satisfied using either the acceptable solutions or demonstration of compliance to the performance principle. The BMP states that it has addressed Element 1-5 of the Guidelines, however, Element 5 is not applicable to high-risk land uses. The addressing of A5.14 and stating compliance with the acceptable solution for vehicle access is misleading as the proposal is not for a vulnerable tourism day use. The BMP should be updated to remove the assessment against A5.13 – A5.15 and propose a performance principle-based solution. The BMP has not addressed how an onsite shelter meets the *design and capacity of vehicular access and egress to provide for the community to evacuate to a suitable destination before a bushfire arrives at the site, allowing emergency services personnel to attend the site and/or hazard vegetation*. Sheltering onsite does not address this and on that basis the alternative solution is not accepted. The BMP should either acknowledge non-compliance or provide a performance principle-based solution in accordance with the Guidelines. An onsite refuge is not a substitute for two access routes which provides safe and efficient access and egress for the community, while simultaneously providing a safe operational environment for emergency services personnel. The BMP should acknowledge non-compliance with the acceptable solution and either propose a PPBS or the decision maker may need to apply a discretionary approach if approval is considered.	
Water	**A4.2 – comment only** The BMP has demonstrated compliance to A4.2 through the provision of a 50,000L water tank for firefighting purposes. The BMP states in section 5.8 that there is a hydrant / sprinkler system onsite. It is unclear if this is being fed from additional tanks as 50,000L is unlikely to be sufficient. It is noted that the 50,000L would address compliance with SPP 3.7 but that additional water may be required to address structural firefighting requirement, which will be considered at building stages.	Comment only.
Consultation	DFES Land Use Planning have referred this application to DFES Special Operations Unit and the Regional Office for advice. Due to operational commitments this advice has	Comment only.

	not yet been received. Any advice received will be forwarded to the Shire as an addendum to this letter. The DFES District Officer responsible for this region and the local fire and emergency services should be consulted during the development, construction and leading up to the commissioning of the facility, should it be approved. It is critical for the local fire and emergency services to understand the hazards present in the facility and the measures required to ensure the safety of fire-fighting crews when working in or around different parts of the facility. This may impact on how the crews respond to a fire in the facility, which may in turn have ramifications in regard to the optimal number and location of water supplies.	

Recommendation – not compliant with performance principle (PP)

The development application is not compliant as it does not meet the intent of Element 3: Vehicular Access. The proposal is intensifying land use in a bushfire prone area with only one point of access and egress.

As this planning decision is to be made by a Joint Development Assessment Panel please forward notification of the decision to DFES for our records.

If you require further information, please contact me on telephone number 9395 9703.

Yours sincerely

Sasha De Brito
SENIOR LAND USE PLANNING OFFICER

8 March 2024

CC luke.cervi@murray.wa.gov.au.

Department of
Primary Industries and
Regional Development

GOVERNMENT OF
WESTERN AUSTRALIA

Your reference: P302/2023
Our reference: LUP 1780
Enquiries: Leon van Wyk

Chief Executive Officer
Shire of Murray
PO Box 21
Pinjarra WA 6208
mailbag@murray.wa.gov.au

26 February 2024

Dear Sir/Madam

COMMENT: JDAP application for Noxious Industry (Carbon Recycling Facility) - Lot 9500 (320) Gull Road Stake Hill

Thank you for the opportunity to comment on the proposed Noxious Industry (Carbon Recycling Facility) at Lot 9500 Gull Road, Stake Hill.

The Department of Primary Industries and Regional Development (DPIRD) in principle does not object to the proposed Noxious Industry (Carbon Recycling Facility - Compost) at the abovementioned lot and would like to provide the following comments:

- The facility will be classified as a Prescribed Premises under Part V of the *Environmental Protection Act 1986* (EP Act) and therefore requires approval from the Department of Water and Environmental Regulation (DWER).
- The proposed facility will be adequately separated from sensitive land uses as it will be 2.56km from the closest sensitive receptors.
- The proposed composting facility has been sited and designed to ensure a minimum 50m separation distance between the infrastructure and the mapped Conservation Category Wetlands.
- Low risk feedstocks such as green waste, forestry residues and cereal waste will be stored in the carbon storage area. The carbon storage area will consist of limestone hardstand with a minimum 300mm thickness and compacted to achieve an effective permeability of 2.8×10^{-8}m/s. Any leachate generated at the carbon storage area will free flow across the surface of the hardstand towards the bunded edges that will direct the leachate towards a pond.

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- High risk feedstocks such as FOGO will be delivered to the receival building that will be enclosed and roofed to eliminate the risk of clean stormwater coming into contact with waste materials and then generating high-risk leachate. The floor of the receival building will consist of a cement hardstand.
- All processing of the compost will occur on a cement hardstand under a roofed area to eliminate the generation of rainfed leachate. All leachate generated in the feedstock storage and processing areas will be directed towards drains and then pumped into the liquid storage tanks.
- Liquid waste will be accepted at the liquid waste receival area for blending into compost products. The liquid waste receival area will be bunded to minimise the risk of liquid waste entering the environment in the event of a spill or leak.
- DPIRD recommends a minimum separation of two metres to groundwater for all waste containment infrastructure irrespective of the time of year. If a 2m separation is not achievable additional engineering controls are required. The proponent will implement groundwater control methods designed by *FSG Geotechnics* to increase the separation distance between the infrastructure and groundwater. DPIRD is not able to comment on the suitability of these groundwater control methods and if the use of a single liner under the compost hardstand is appropriate.
- The documentation provided specifies a designed minimum separation of 1.5m from the base of the leachate ponds to the controlled groundwater level. While this is less than 2m there are additional engineering controls proposed to protect groundwater resources from the risk of leaching. These controls include the use of multiple liners for the leachate ponds.

If you have any queries regarding the comments, please contact Leon van Wyk at (08) 9780 6171 or leon.vanwyk@dpird.wa.gov.au.

Yours sincerely

Tim Overheu
Acting Director Agriculture Resource Management Assessment
Sustainability and Biosecurity

Government of Western Australia
Department of Health

Your Ref: P302/2023
Our Ref: F-AA-90497-4/D-AA-24/40435
Contact: System Performance 9222 2000

Mr Dean Unsworth
Chief Executive Officer
Shire of Murray
1915 Pinjarra Road
PINJARRA WA 6208

Via email: mailbag@murray.wa.gov.au

Dear Mr Unsworth

PROPOSED JDAP APPLICATION FOR NOXIOUS INDUSTRY (CARBON RECYCLING FACILITY) – LOT 9500 (320) GULL ROAD STAKE HILL

Thank you for your email dated 22 December 2023, requesting comment from the Department of Health (DoH) on the above proposal. The DoH provides the following comment:

1. Water Supply and Wastewater Disposal

Disposal of wastewater generated onsite is required to comply with the *Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974*. All drinking water provided onsite must meet the health-related requirements of the Australian Drinking Water Quality Guidelines 2011.

Any non-drinking water (i.e., water that is not intended or suitable for drinking) must be managed to ensure it cannot be confused with or contaminate the drinking water supply. This requires satisfactory labelling of non-drinking water taps and, depending on system configuration and suitable backflow prevention arrangements in accordance with Australian/New Zealand Standards AS3500 – Plumbing and Drainage.

2. Chemical Hazards

It is noted that this facility will be regulated by Department of Water and Environmental Regulation (DWER) under the *Environmental Protection Act 1986* – Part IV operating licence and is not currently classified as a contaminated site, even though it is likely to be classified at the conclusion of operations, it does represent a *potentially contaminating land-use* as set out in DWER's 'Assessment and management of contaminated sites' (DWER Nov 2021) Appendix B.

It is located immediately north of a wastewater treatment facility (DMO 18729) which has been reported under the *Contaminated Sites Act 2003* following the identification of heavy metal (mercury, cadmium, copper, zinc), pathogens, nutrients and petroleum hydrocarbons in underlying soils and groundwater at levels that represent a risk to public health. The site was classified as *Contaminated – Restricted Use* allowing the continued use of the site as a wastewater treatment plant but prohibiting the use of the site for any more sensitive land-uses such as residential, schools or recreational uses. Although contaminated groundwater from this site is likely to be flowing to the south-southwest away from the proposed development, if groundwater is to be abstracted for use as part of the composting process, it should be tested to determine its suitability for that use.

The site lies close to the Serpentine River floodplain and the impacts and public health risks from flooding, now and into the future, will need to be assessed and managed through prospective planning.

3. Medical Entomology

The subject land is within 3km of mosquito dispersal distance from saltmarsh mosquito breeding sites along the Serpentine River and is in a region that regularly experiences significant problems with nuisance and disease carrying mosquitoes. These mosquitoes can disperse several kilometres from breeding sites and are known carriers of Ross River (RRV) and Barmah Forest (BFV) viruses. Human cases of RRV and BFV diseases occur annually in this general locality.

It is the recommendation of the DoH that:

- the proponent works with the Shire of Murray to ensure effective mosquito management is further developed and adequately funded for the locality
- the proponent works with the Shire of Murray to determine the extent of risk from mosquitoes and mosquito-borne disease and if that risk is considered medium or high by the Shire, a Mosquito Management Plan be established
- the Shire of Murray ensures they have sufficient resources to continue mosquito management for the future of the development

Should you have any queries or require further information, please contact System Performance Team on 9222 2000 or eh.eSubmissions@health.wa.gov.au.

Yours sincerely

Dr Michael Lindsay
EXECUTIVE DIRECTOR
ENVIRONMENTAL HEALTH DIRECTORATE

11 March 2024

Environment | Air Quality

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15 May 2024

Luke Cervi
Coordinator Planning Services
Shire of Murray
PO Box 21
Pinjarra, WA 6208

By email: luke.cervi@murray.wa.gov.au

[EAQ Project: 24007]

C-Wise: EAQ23024-C-Wise-OdourImpactAssessment-Finalv3 [ADDENDUM]

Dear Luke,

As has been discussed, and following Environmental and Air Quality Consulting Pty Ltd's (EAQ) Odour Impact Assessment (OIA) Report (EAQ23024-C-Wise-OdourImpactAssessment-Finalv3), this Addendum provides additional details to support the OIA Report, specifically; the detail in reference to C-Wise's proposed Carbon Recycling Facility.

C-Wise proposes to construct and operate a modern, best-practice Carbon Recycling Facility (the Facility) to be located approximately 1.5 kilometres (kms) north, northeast of C-Wise's current Nambeelup composting operations.

The Facility proposes to receive FOGO wastes for composting, whilst also transferring its existing operations of solid organic wastes and leachates to the Facility. Construction will be in two main stages, with stage 1 representing FOGO receivals and composting, and stage 2 being the transfer of existing operations to the new Facility.

At the conclusion of stage 2, the existing operations will no longer operate, and the existing site will be released back to the lessor.

The Facility (stage 1) will incorporate the following key infrastructure and process steps:

- Leachate receivals and holding tanks;
- Receivals building, to include:
    - FOGO waste receivals building;
    - FOGO decontamination area; and
    - Mixing of FOGO with leachates (mixing area).
- 15 x Aerated composting cocoons (enclosures) – 12 normal + 3 surge;
- Secondary composting area for Maturation and Final Screening;
- Process leachate collection drains and storage/transfer pond;
- Stormwater runoff pond/s;
- Carbon storage area for clean greenwastes; and
- Despatch area.

At stage 2 the above infrastructure and processes will be mirrored, and the FOGO waste stream replaced with the existing C-Wise waste stream.

Excluding the leachates tank farm, the carbon storage area, stormwater ponds and despatch area, the receivals building and cocoons will be fully enclosed, and the secondary composting processes under a main roof.

The enclosed receivals building and cocoons will have dedicated odour capture to include odour treatment of vapours from the receivals mixing area and the cocoons via a purpose designed biofilter.

The primary receivals area and decontamination sectors of the receivals building will have vapour capture and ventilation i.e., not odour treatment. However, if the ventilated odour vapours are shown to cause any downwind odour nuisance, the biofilter will be expanded to receive this additional odorous air.

Odour Control System (OCS)

The OCS will be dedicated capture and treatment of odorous air from primary processes. The mixing area within the receivals building will incorporate the decontaminated FOGO wastes with primary leachates from the leachate tank farm.

This process will take place within a building void of dimensions 40 metres (m) x 30 m x 8.5 m high for a total air volume of 10,200 m^3. Given the location of the proposed Facility is 'remote' with respect to nearby sensitive receptors, and future industrial/commercial receptors, the proposed air changes for this section of the OCS are proposed at 2 per hour. This provides a total air extraction volume of **20,400 m^3/hr (**5.7 m^3/s) of odorous air.

The composting cocoons will have a headspace volume of process air of approximately 440 m^3 (175 m^2 x 2.5 m high). There are a total of 15 cocoons for stages 1 and 2 respectively. Again, the cocoons (at each stage) are proposed to have 2 air changes per hour for the OCS which totals **13,200 m^3/hr** (3.7 m^3/s) of odorous air extracted and treated by the biofilter.

Additionally, each cocoon will have a further 1,000 m^3 of air per hour pushed into them using sub-floor aeration thus giving an additional **15,000 m^3/hr** of air to capture and treat. The aeration is an intermittent

process designed to provide oxygenated air to the composting pile inside the cocoon which will alleviate the need to manually turn the compost piles in regular intervals. This is an important step in the proposed Facility's processes which will markedly reduce the release of malodours from the composting processes and hence reduce the loss of process odours to the receiving environment.

The combined odorous air to be captured and removed from the cocoons via the OCS is therefore 28,200 m^3/hr (7.83 m^3/s). Based on this:

- The OCS biofilter capacity design is 48,600 m3/hr (13.5 m^3/s);
- The footprint of the biofilter based on this airflow is 325 m^2 at a treatment depth of 1.6 m;
    - The final biofilter area is proposed to be up to 400 m^2 to provide refurbishment contingency, although this design consideration is not yet finalised.
- The OCS biofilter will be a 2-cell design enabling each cell to be taken offline for refurbishment whilst ensuring ongoing capture and treatment;
- The OCS biofilter will be designed to be expanded to a 3rd cell should additional treatment capacity be required;
- The OCS biofilter will be mirrored for stage 2 i.e., there will be 2 x biofilters at the Facility upon construction completion; and
- Capturing the odorous process air from the receival mixing area and that of the aerated cocoons will ensure that all primary odour emitting processes are controlled and treated.

The receivals' building areas where FOGO is incoming and decontaminated represents 'fresh' raw process odours. Typically, conventional FOGO waste transfer stations have only extraction and ventilation via roof exhaust stacks, although this may require further controls if sensitive receptors are adjacent to the activity.

- Given the Facility's proposed location, the need for capture and treatment is not envisaged, although the ability to expand the OCS biofilter is planned for in the Facility's design;
- The total volume of air to be extracted and ventilated from the receivals and decontamination areas is 17,850 m^3/hr (70 m x 30 m x 8.5 m high);
- Based on 4 x air changes per hour from these process areas, the total volume of air to be ventilated is 71,400 m^3/hr (19.83 m^3/s);
- EAQ's odour sampling and testing from FOGO transfer stations in the Perth Metropolitan area typically show average odour concentrations of 2,000 odour units per cubic metre of air (ou.m^3);
- Based on this concentration the total odour emission rate from the ventilation of the FOGO receivals area is up to 40,000 ou/s; and
- Ventilation of captured odours will occur through exhaust stacks of 3 m high above the receival building roofline, and at an exit velocity of 10 m/s or more.

Figures 1 and 2 illustrate the Facility's design, to include the receivals building.

For the purposes of predicting the odour footprint from normal Facility operations, dispersion modelling of odour emissions based on the proposed biofilters footprint (2 of), and that of the receivals buildings' emissions have been assessed.

Figure 3 illustrates the odour footprint based on the criterions of:

- 99.5th percentile, with 1-hour averaging times, and:
  - 5 odour units for commercial/industrial receptors; and
  - 2.5 odour units for residential receptors.

Figure 3 assumes that the odour footprint represents observable odours at ground level, however; the biofilter odours are not considered to be 'malodour' albeit they are included in the modelling assessment.

Figure 3 represents a total odour emission rate from all biofilters of 13,500 ou/s of treated, clean biofilter air, of which:

- Is based on a surface odour concentration from the biofilters of 500 ou which is the treated odour concentration from odours capture and treatment of the cocoons and receivals mixing area;
- Includes the ventilated odour emissions from the receivals buildings of 40,000 ou/s; and
- Thus gives a total odour emission rate from the Facility of 53,500 ou/s

Based on the modelling criterion predictions of **Figure 3**, the likelihood of any malodour impacting existing or future sensitive receptors is low.

The criterion modelling in **Figure 3** shows that odour impacts are not predicted from the proposed Facility at the nearest sensitive receptor.

The detail provided in the current OIA shows that for Scenario 6 (Figure 9-6) there is a worst-case odour impact based on a 30% loss of raw odours from the aeration composting process (i.e., MAF composting).

With the proposed controls in place, the Facility will not have a malodour loss, and furthermore the Facility has sufficient contingency built into the design to ensure any need to up scale the OCS can be readily achieved.

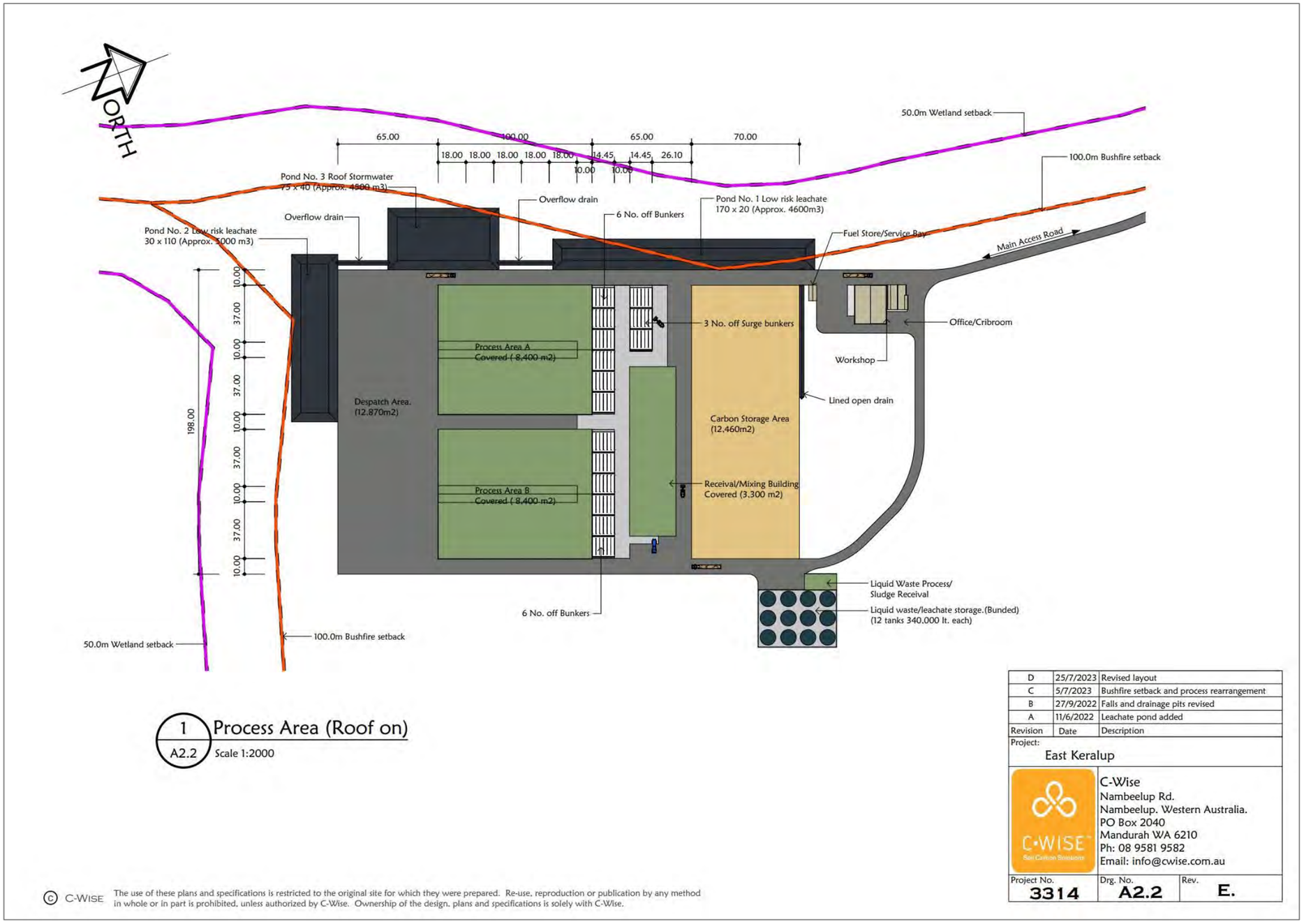

Figure 1: Facility Design Layout

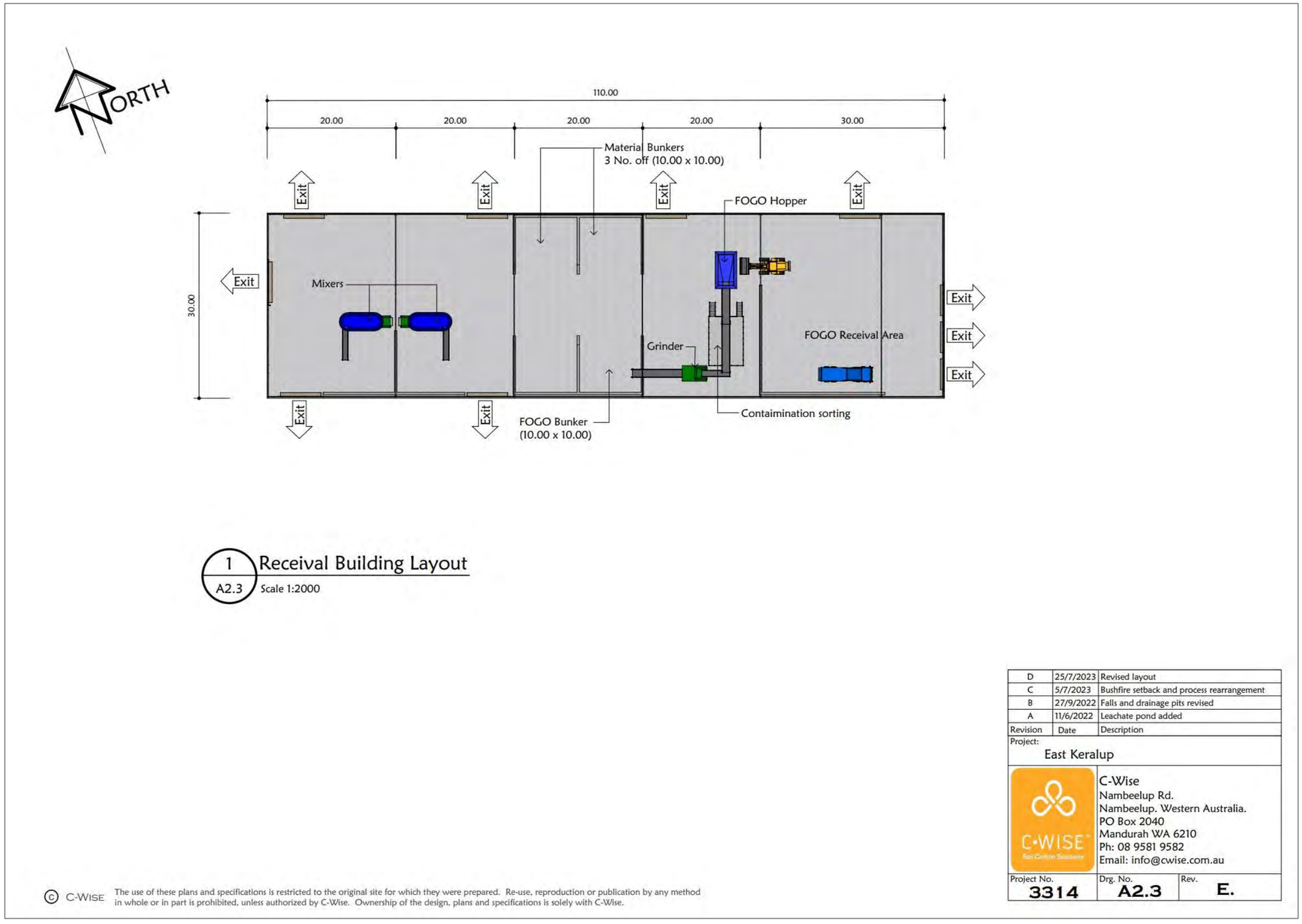

Figure 2: Receivals Building Design Layout

Figure 3: Facility Biofilters & Receivals Buildings' Odour Footprint

Closing

Should you have any queries, clarifications or discussion points on the detail above please don't hesitate to get in touch as required.

Yours sincerely,

John Hurley (B.Sc, CAQP)
Director | Principal Air Quality Consultant
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jhurley@eaqconsulting.com.au

Memorandum

To:	Luke Cervi Coordinator Planning Services
Cc:	
From:	Geordie Galvin
Re:	R C-Wise: EAQ23024-C-Wise-OdourImpactAssessment-Finalv3 [ADDENDUM]

Document Control

Version	Date	Author	Reviewer	Comments
M2-1	20/05/24	G. Galvin	G. Galvin	

1 INTRODUCTION

This short memorandum summarises a review of the report prepared by EAQ Consulting (EAQ) titled **R C-Wise: EAQ23024-C-Wise-OdourImpactAssessment-Finalv3 [ADDENDUM]** ("the report").

2 REVIEW

The report in simple terms, is different from the earlier iterations of reports prepared for EAQ consulting for a portion of Lot 9500 on Deposited Plan 414516 in that this assessment focuses on the proposed odour control options for the proposed composting operation.

Comments regarding the report are provided below.

2.1 Understanding

Previously there was uncertainty with regard to how the site would be operated form an odour perspective, in particular how air would move between the cocoons and the MAFs, and also whether odour control would be included.

The odour control (OC) will treat odour emissions from the sources identified as primary sources by EAQ. The mixing area and cocoons have been identified as major sources of odour and will be treated. The various sources identified by EAQ are summarised below in Table 2-1. The report refers to contingency built into the design to ensure any need to upscale of the OC can be achieved.

Table 2-1: Odour Sources

Source	Primary	Comment
Receivals building (receival, sorting, decontamination)	No	Air emitted via stack 3 m above roofline at ≥ 10 m/s. Can be vented to biofilters at a latter date if required.
Receivals building (mixing)	Yes	Odour control
Cocoons	Yes	Odour control
Tank Farm	No	Not assessed, risk will be linked to materials coming in and air exchange rates.
Leachate Ponds	No	Not expected to have runoff of volatile material as sources are under cover. If problematic can be managed.
Carbon Storage	No	Clean green wastes are not expected to generate offensive odours
Dispatch area	No	Final product should not emit offensive odour
Biofilter	No	Will have character of media and will not smell like input odour (i.e. inoffensive). 500 ou concentration.

2.2 Modelling

Model results have been provided as Figure 3 in the report, however no details of the model setup have been provided. This review relies on the modelling being competently performed by EAQ.

2.3 Emissions

Emissions have been based on a concentration of 500 ou and the airflows dictated in the report. EAQ state biofilter emissions of 13,500 ou/s, which when back calculated gives a airflow of 27 m3/s, which is consistent with the flows stated in the report.

I note that the odour emitted from a properly managing biofilter should achieve a upper concentration of 500 ou, and be inoffensive in character, especially when compared to the input odours. The specific design noted by EAQ appears appropriate, however any condition put in place should reflect that the design of the biofilter should emit inoffensive odour with 500 ou as a benchmark.

The receival building emissions of 40,000 ou/s is based on a concentration of 2,000 ou at 20 m^3/s which is consistent with the airflows stated in the report.

2.4 Odour Criteria

The odour criteria noted in the report are:

- $C_{99.5\ 1hr}$ = 5 ou (commercial); and
- $C_{99.5\ 1hr}$ = 2.5 ou (commercial).

These were previously discussed with Mr Hurley. And for clarity, the use of the 99.5th 1 hour concentrations is consistent with the comparative modelling methodology in DWER (2019). 2.5 ou is the criteria in use in Queensland (DEHP, 2021) for a wake effected source or ground level source. As 3 m above the roofline is likely to be wake affected, 2.5 ou is considered appropriate for residential receptors.

The use of 5 ou as discussed with Mr Hurley, was agreed in principle for use in industrial areas, in transition zones between residential zones and sites such as the composting operation.

2.5 Results

The results as shown as Figure 3 in the report are reproduced below as Figure 2-1 and show compliance with the 2.5 ou criterion at the site boundary, assuming the odour controls detailed in Table 2-1 above. The results below, are a function of the stack and biofilter emissions as the other potential sources were not modelled.

Figure 2-1: Results from report

The results should be looked at having regard to Table 2-1 above in particular the tank farm, and leachate ponds which have not been modelled.

Realistically the leachate ponds should get very little inflow as the site is covered. If they do cause an issue, they could be managed to avoid nuisance (e.g. aeration) so can be conditioned to retrofit if required.

Regarding the tank farm, this is an unknown, as the tanks can emit odour when being filled. Again as above, this can be conditions to make them retrofittable so that OC can be installed at a latter date if required.

2.6 Conditions

Compared to the earlier odour assessment reports, the report details odour controls expected on site, and has provided updated modelling which demonstrated compliance with the notional odour criterion of 2.5 ou at the boundary.

Regarding conditions, these should reflect what is contained in the report and could include general concepts such as:

- Odour control units (biofilter or similar) should be installed on site to treat odorous air from:
    - Receival building mixing area;
    - Proposed cocoon system;
- Odour control units and their duct work should be constructed in a way that allows expansion or modification of the system if the need arises;
- Odour control units should be designed and operated in a way that does not emit offensive odour and not exceed 500 ou at the biofilter surface;
- The receival building should be enclosed and:
    - Treat air from the mixing area via one or more of the odour control units
    - Discharge air from the remainder of the building via a dedicated stack with a velocity of at least 10 m/s at least 3 m above the highest point of the shed.
    - Odour concentration from the stack should not exceed 2,000 ou, or a concentration that is required to avoid offsite nuisance.
- Fresh air should be used in the cocoons and MAF systems. If required, the MAF system should be able to be operated in a way to add odour control.
- The receival building should be cleaned frequently to avoid the generation of excessive odour;
- Leachate ponds should be managed in a way to avoid the generation of offensive odour.
- The tank farm is to be designed and managed to avoid the generation of odours which would lead to offsite impacts. The farm should be retrofittable to the odour control system if required.

3 REFERENCES

DEHP, 2021. *Guideline: Odour Impact Assessment from Developments,* Brisbane: Department of Environment and Heritage Protection.

DWER, 2019. *Guideline: Odour Emissions,* Perth, WA: Department of Water and Environmental Regulation .

Bushfire management plan/Statement addressing the Bushfire Protection Criteria coversheet

Site address: Lot 9500 320 Gull Road Keralup

Site visit: Yes ☑ No ☐

Date of site visit (if applicable): Day 15 Month 09 Year 2022

Report author or reviewer: Kathy Nastov

WA BPAD accreditation level (please circle):

Not accredited ☐ Level 1 BAL assessor ☐ Level 2 practitioner ☐ Level 3 practitioner ☑

If accredited please provide the following.

BPAD accreditation number: 27794 Accreditation expiry: Month August Year 2024

Bushfire management plan version number: 1.2

Bushfire management plan date: Day 14 Month March Year 2024

Client/business name: C-Wise

	Yes	No
Has the BAL been calculated by a method other than method 1 as outlined in AS3959 (tick no if AS3959 method 1 has been used to calculate the BAL)?		✔
Have any of the bushfire protection criteria elements been addressed through the use of a performance principle (tick no if only acceptable solutions have been used to address all of the bushfire protection criteria elements)?		✔

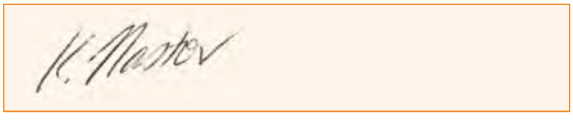
Is the proposal any of the following (see SPP 3.7 for definitions)?	Yes	No
Unavoidable development (in BAL-40 or BAL-FZ)		✔
Strategic planning proposal (including rezoning applications)		✔
High risk land-use	✔	
Vulnerable land-use		✔

None of the above ☐

Note: Only if one (or more) of the above answers in the tables is yes should the decision maker (e.g. local government or the WAPC) refer the proposal to DFES for comment.

Why has it been given one of the above listed classifications (E.g. Considered vulnerable land-use as the development is for accommodation of the elderly, etc.)?

The information provided within this bushfire management plan to the best of my knowledge is true and correct:

Signature of report author or reviewer 

Date 25/03/2023

FOGO Facility Keralup

Bushfire Management Plan (BMP)

Produced to meet the relevant requirements of STATE PLANNING POLICY 3.7 Planning in Bushfire Prone Areas & Guidelines

320 Gull Road, Keralup

Shire of Murray

Development Application

14 March 2024

Job Reference No: 220666

BPP GROUP PTY LTD T/A BUSHFIRE PRONE PLANNING

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DOCUMENT CONTROL

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Version	Details	Date
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1.1	Addressing client comments	17 October 2023
1.2	Addition of Executive Summary	25 October 2023
1.3	Additional recommendations	15 December 2023
1.4	Addressing DFES Comms	14 March 2024

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		1.1	1	☐	☒
		1.2	1	☐	☒
		1.3	1	☐	☒
		1.4	1	☐	☒

Limitations: The protection measures that will be implemented based on information presented in this Bushfire Management Plan are minimum requirements and they do not guarantee that buildings or infrastructure will not be damaged in a bushfire, persons injured, or fatalities occur either on the subject site or off the site while evacuating.

This is substantially due to the unpredictable nature and behaviour of fire and fire weather conditions. Additionally, the correct implementation of the required protection measures (including bushfire resistant construction) and any other required or recommended measures, will depend upon, among other things, the ongoing actions of the landowners and/or operators over which Bushfire Prone Planning has no control.

All surveys, forecasts, projections and recommendations made in this report associated with the proposed development are made in good faith based on information available to Bushfire Prone Planning at the time. All maps included herein are indicative in nature and are not to be used for accurate calculations.

Notwithstanding anything contained therein, Bushfire Prone Planning will not, except as the law may require, be liable for any loss or other consequences whether or not due to the negligence of their consultants, their servants or agents, arising out of the services provided by their consultants.

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EXECUTIVE SUMMARY

In July of 2022 Bushfire Prone Planning were commissioned by Talis Consulting (on behalf of C-Wise) to undertake a Bushfire Management Plan for the proposed FOGO Facility located at Lot 9500 320 Gull Road Keralup. A site visit was conducted in September 2022. During the assessment photos of the vegetation surrounding the development were photographed and then classified in accordance with AS3959:2018. The vegetation and their distances to the building determine the BAL (Bushfire Attack Level) rating which inform the developers what building materials to use. The development was also assessed against 4 elements of bushfire protection criteria in the Guidelines for Planning in Bushfire Prone Areas (Version 1.4). These are Location, Siting and Design, Vehicular Access and Water.

The vegetation immediately surrounding the lot was found to be predominantly scrub and grassland. This will be managed to a low threat state in perpetuity. Nearby wetland vegetation has received a buffer and will be allowed to revegetate within it. The office near the weighbridge has been given an indicative BAL-29 rating. The workshop has been given an indicative rating of BAL-19. Note these are indicative ratings and lower BAL ratings (such as BAL12.5) can be achieved with the appropriate management of the surrounding vegetation. Lower BAL ratings can only be given during the compliance check prior to the construction of any buildings. A tension fabric roof cover can be installed on the plant, but it cannot be within 6m of a habitable building.

During this assessment it was found that the development would be non-compliant with Vehicular Access. Due to site constraints the nearest two-way access road is 4km from the lot boundary. This is longer than the maximum distance of 200m set by the Guidelines. An acceptable solution of an onsite shelter was proposed. Discussions with the Shire of Murray (on 10/08/23) concluded that as this is the first development in this Lot, vehicular access would be non compliant and an onsite shelter would be required. The onsite shelter will be integrated into the crib room, workshop and office area. In the event of a bushfire where early evacuation is not possible the onsite shelter can be used to house up to 65 people. This building can only be subject to 10kW/m^2 (at 1200K) and a larger asset protection zone will be installed around it. It will be constructed using NASH Standard to BAL-29. A 10kW/m^2 buffer around all buildings has been recommended by this report and the subsequent risk report.

The BMP also established the need for water tanks exclusive for firefighting to be installed on site. The proposed private driveways will be two-way and complaint with public road standards. They will need to be slashed to 3m as required on road verges.

Due to the land use being classed as "High Risk", a Bushfire Emergency Plan and a Bushfire Risk Management Plan have been developed to be used in conjunction with this report.

SUMMARY STATEMENTS

THIS DOCUMENT – STATEMENT OF PURPOSE

The Bushfire Management Plan (BMP)

The BMP sets out the required package of bushfire protection measures to lessen the risks associated with a bushfire event. It establishes the responsibilities to implement and maintain these measures.

The BMP also identifies the potential for any negative impact on any environmental, biodiversity and conservation values that may result from the application of bushfire protection measures or that may limit their implementation.

Risks Associated with Bushfire Events

The relevant risks are the potential for loss of life, injury, or destroyed or damaged assets which results in personal loss and economic loss. For a given site, the level of that risk to persons and assets (the exposed elements) is a function of the potential threat levels generated by the bushfire hazard, and the level of exposure and vulnerability of the at risk elements to the threats.

Bushfire Protection Measures

The required package of protection measures is established by *State Planning Policy 3.7 Planning in Bushfire Prone Areas (SPP 3.7),* its associated *Guidelines* and any other relevant guidelines or position statements published by the Department of Planning, Lands and Heritage. These measures are limited to those considered by the WA planning authorities as necessary to be addressed for the purpose of land use planning. They do not encompass all available bushfire protection measures as many are not directly relevant to the planning approval stage. For example:

- Protection measures to reduce the vulnerability of buildings to bushfire threats is primarily dealt with at the building application stage. They are implemented through the process of applying the Building Code of Australia (Volumes 1 and 2 of the national Construction Code) in accordance with WA building legislation and the application of construction requirements based on a building's level of exposure - determined as a Bushfire Attack Level (BAL) rating); or
- Protection measures to reduce the threat levels of consequential fire (ignited by bushfire and involving combustible materials surrounding and within buildings) and measures to reduce the exposure and vulnerability of elements at risk exposed to consequential fire, are not specifically considered.

The package of required bushfire protection measures established by the Guidelines includes:

- The requirements of the bushfire protection criteria which consist of:
  - Element 1: Location (addresses threat levels).
  - Element 2: Siting and Design of Development (addresses exposure levels of buildings).
  - Element 3: Vehicular Access (addresses exposure and vulnerability levels of persons).
  - Element 4: Water (addresses vulnerability levels of buildings).
  - Element 5: Vulnerable Tourism Land Uses (addresses exposure and vulnerability as per Elements 1-4 but in use specific ways and with additional considerations of persons exposure and vulnerability).
- The requirement to develop Bushfire Emergency Plans / Information for 'vulnerable' land uses for persons to prepare, respond and recover from a bushfire event (this addresses vulnerability levels).
- The requirement to assess bushfire risk and incorporate relevant protection measures into the site emergency plans for 'high risk' land uses (this addresses threat, exposure and vulnerability levels).

Compliance of the Proposed Development or Use with SPP 3.7 Requirements

The BMP assesses the capacity of the proposed development or use to implement and maintain the required 'acceptable' solutions and any additionally recommended bushfire protection measures - or its capacity to satisfy the policy intent through the justified application of additional bushfire protection measures as supportable 'alternative' solutions.

THE PROPOSED DEVELOPMENT/USE – BUSHFIRE PLANNING COMPLIANCE SUMMARY		
Environmental Considerations		Assessment Outcome
Will land with identified environmental, biodiversity and conservation values limit the full application of the required bushfire protection measures?		No
Will land with identified environmental, biodiversity and conservation values need to be managed in the implementation and maintenance of the bushfire protection measures - but not limit their application?		No
Required Bushfire Protection Measures The Acceptable Solutions of the Bushfire Protection Criteria (Guidelines)		Assessment Outcome
Element	The Acceptable Solutions	
1: Location	A1.1 Development location	Fully Compliant
2: Siting and Design of Development	A2.1 Asset Protection Zone (APZ)	Fully Compliant
3: Vehicular Access	A3.1 Public roads	Fully Compliant
	A3.2a Multiple access routes	Not Compliant
	A3.2b Emergency access way	N/A
	A3.3 Through-roads	Not Compliant
	A3.4a Perimeter roads	N/A
	A3.4b Fire service access route	N/A
	A3.5 Battle-axe legs	N/A
	A3.6 Private driveways	Fully Compliant
4: Water	A4.1 Identification of future water supply	N/A
	A4.2 Provision of water for firefighting purposes	Fully Compliant
Other 'Bushfire Planning' Documents to Be Produced This necessity for additional documents is determined by the proposed development/use type and the requirements established by SPP 3.7 and the associated Guidelines (as amended). They may be produced concurrently or subsequent to the BMP. Relevant actions will be identified within Section 6 'Responsibilities for Implementation of Bushfire Protection Measures.		Required
Bushfire Emergency Plan: An operational document presenting prevent, prepare, respond and recover procedures and associated actions. As necessary, supporting information to justify determinations is included.		Yes
Summary Statement: Due to the type of facility and its remote location a BEP will be required.		
Bushfire Emergency Information (Poster): As a concise response information poster		Yes
Summary Statement: A Bushfire Emergency Poster will be created as part of the Bushfire Emergency Plan and will be required to be displayed on site.		

Bushfire Emergency Information (Content): As content for inclusion into the Site's Emergency Plan for certain high risk land uses:	Yes
Bushfire Risk Assessment and Management Report:	Yes

Summary Statement: The proposed development is considered a 'high-risk' land use as defined by SPP 3.7 and its associated Guidelines.

This triggers the requirement, through the development of a Risk Assessment and Management Report to:

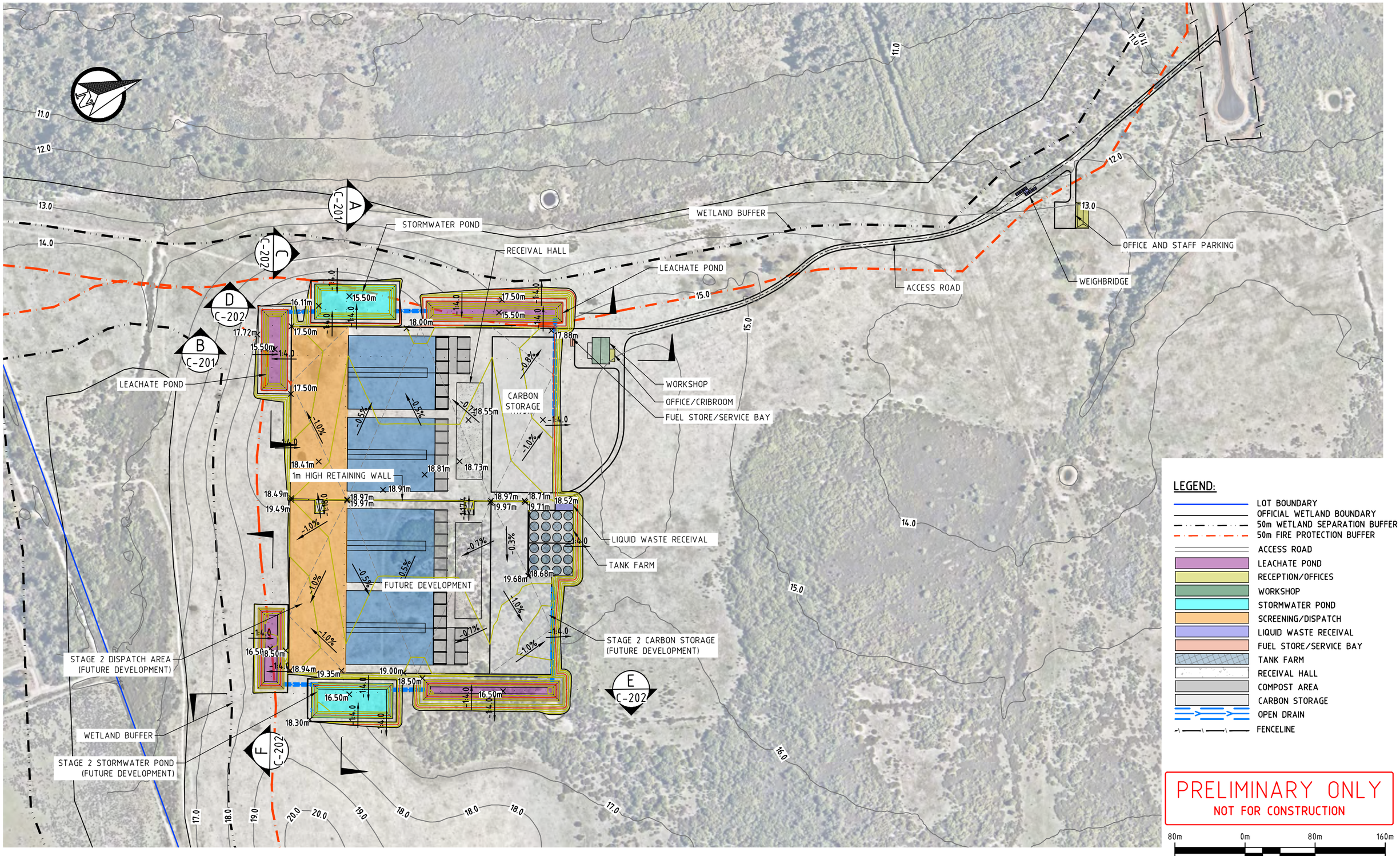
- Identify the level of exposure and vulnerability of any onsite stored materials and liquids to bushfire attack mechanisms (threats);
- Identify any potential source of ignition threat the use may present to adjoining and/or adjacent bushfire prone vegetation; and
- Recommend protection measures that can be incorporated into the site operations emergency plan as necessary.

The requirement for this report to be developed and any variation to content, can be decided by the planning approval decision maker (e.g., the local government). Otherwise, SPP 3.7 states it 'should' be produced.

1 PROPOSAL DETAILS AND THE BUSHFIRE MANAGEMENT PLAN

1.1 The Proposed Development/Use Details, Plans and Maps

The **Proposal's** Planning Stage For which certain bushfire planning documents are required to accompany the planning application.		Development Application	
The Subject Land/Site		Lot 9500 on Plan 414516	
Total Area of Subject Lot/Site		1608.903 hectares	
Number of Additional Lots Created		N/A	
Primary Proposed Construction	Type(s)	Waste management	
	NCC Classification	Class 8 (factory/workshop/laboratory)	Class 5 (office building - professionals)
The 'Specific' Land Use Type for Bushfire Planning When applicable, this classification establishes a requirement to conduct assessments and develop documents that are additional to this Bushfire Management Plan.		Facility: High-Risk Land Use	
Factors Determining the 'Specific Bushfire Planning' Land Use Type		The land use will store combustible materials and/or flammable hazardous materials onsite that may be exposed and vulnerable to ignition from the direct attack mechanisms of bushfire (flame contact, radiant heat and embers). Business operations/activities may include those that are a potential source of ignition for onsite or offsite combustible/flammable materials, including bushfire prone vegetation.	
Additional **Factors Determining the 'Specific'** Land Use Type		The proposed development is a land use that is categorised as a Day uses (Group Tours)	
Additional **Factors Determining the 'Specific' Land** Use Type		The proposed land use involves visitors who are unfamiliar with the surroundings and/or presents evacuation challenges. The proposal would benefit from a Bushfire Emergency Plan to manage the safety of occupants in a bushfire event.	
Description of the Proposed Development/Use			
Proposed Food Organics and Garden Organics (FOGO) Facility including provision for educational day tours/school groups.			



LEGEND:

- LOT BOUNDARY
- OFFICIAL WETLAND BOUNDARY
- 50m WETLAND SEPARATION BUFFER
- 50m FIRE PROTECTION BUFFER
- ACCESS ROAD
- LEACHATE POND
- RECEPTION/OFFICES
- WORKSHOP
- STORMWATER POND
- SCREENING/DISPATCH
- LIQUID WASTE RECEIVAL
- FUEL STORE/SERVICE BAY
- TANK FARM
- RECEIVAL HALL
- COMPOST AREA
- CARBON STORAGE
- OPEN DRAIN
- FENCELINE

PRELIMINARY ONLY
NOT FOR CONSTRUCTION

80m 0m 80m 160m
1:4000 @ A3

VERTICAL DATUM: AUSTRALIAN HEIGHT DATUM
HORIZONTAL DATUM: MGA 94 ZONE 50

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Client: C-WISE Soil Carbon Solutions

NOTES

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No.	Date	Drwn.	Chk.	Amendment / Issue	App.
D	16.01.2023	MH	AB	SITE LAYOUT UPDATED	MH
C	15.11.2022	AB	MH	BOUNDARIES UPDATED	MH
B	02.03.2022	YJ	AB	SECTIONS AND ISOPACHYTE LAYOUT ADDED	MH
A	15.11.2021	YJ	AB	PRELIMINARY ISSUE	MH

Project: C-WISE DUE DILIGENCE AND APPROVALS

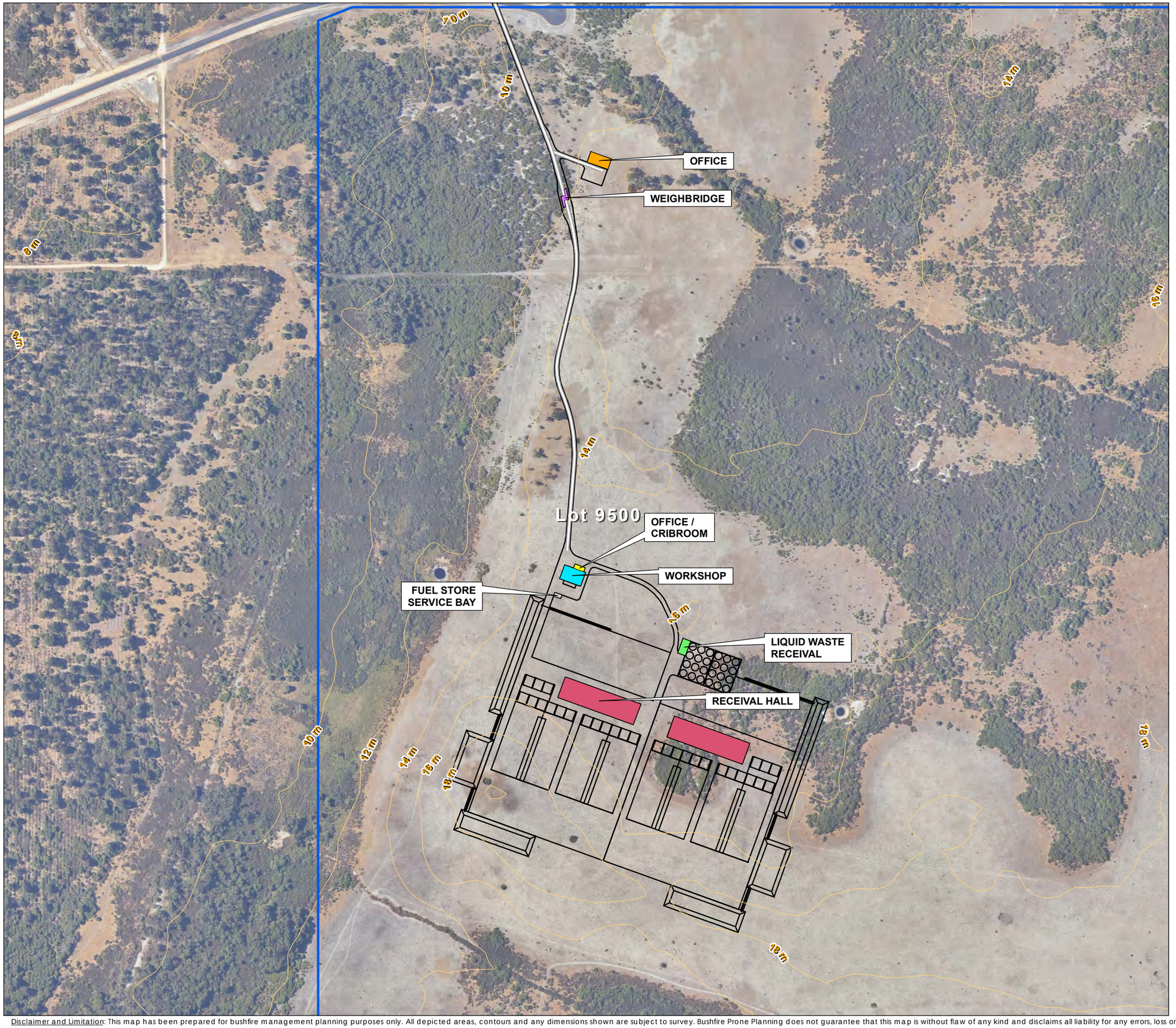
Title: SITE PLAN LAYOUT

Scale: 1:4000 @ A3		Date: 02.03.2022	
Drawn: YJ	Checked: AB	Approved: MH	
Job No: TW21124	Drg. No: C-101	Rev: D	
Filename: TW21124-SET.DWG			

Figure 1.2

Proposed Development

Lot 9500 on Plan 414516, Area : 1,608.9031 ha
320 Gull Road,
KERALUP 6182
SHIRE OF MURRAY



------ LEGEND ------

- Development Site
- Subject Site
- Other Lots
- Development

Description

- Office
- Office / Cribroom
- Workshop
- Receival Hall
- Weighbridge
- Liquid Waste Receival
- Fuel Store Service Bay
- Driveway

0 50 100 150 200 250
Metres

------ LOCALITY ------

Aerial Imagery : Landgate/SLIP
Image Date : Feb 2022

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator Units: Metre
Map compiled by: Ian Ross 13/10/2023
Map updated by: Ian 13/10/2023
A3 Scale 1:5,000

BUSHFIRE PRONE PLANNING

Map Document Path / Name: K:\Projects\Jobs 2022\220666 - 320 Gull Road Keralup (BMP)\Mapping\MXD\220666_Fig1-2_DEV_320 Gull Road Keralup.mxd

Figure 1.3

Location Plan

Lot 9500 on Plan 414516, Area : 1,608.9031 ha
320 Gull Road,
KERALUP 6182
SHIRE OF MURRAY

DEVELOPMENT SITE

Lot 9500

------ LEGEND ------

- Development Site
- Subject Site
- Development
- Future Development
- Locality / Suburb
- Career Fire & Rescue Service
- State Emergency Service Unit
- Volunteer Fire & Emergency Service Unit
- Volunteer Fire & Rescue Service
- Driveway

0 1 2 3
Kilometres

------ LOCALITY ------

Aerial Imagery : Landgate/SLIP
Image Date : Feb 2022

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator Units: Metre
Map compiled by: Ian Ross 13/11/2022
Map updated by: Ian 13/11/2022
A3 Scale 1:50,000

BUSHFIRE PRONE PLANNING

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WHERE SPP 3.7 AND THE GUIDELINES ARE TO APPLY – DESIGNATED BUSHFIRE PRONE AREAS

All higher order strategic planning documents, strategic planning proposals, subdivisions and development applications located in designated bushfire prone areas need to address SPP 3.7 and its supporting Guidelines. This also applies where an area is not yet designated as bushfire prone but is proposed to be developed in a way that introduces a bushfire hazard.

For development applications where only part of a lot is designated as bushfire prone and the proposed development footprint is wholly outside of the designated area, the development application will not need to address SPP 3.7 or the Guidelines. (Guidelines DPLH 2021 v1.4, s1.2).

For subdivision applications, if all the proposed lots have a BAL-LOW indicated, a BMP is not required. (Guidelines DPLH 2021 v1.4, s5.3.1).

Figure 1.4

Bushfire Prone Area

Lot 9500 on Plan 414516, Area : 1,608.9031 ha
320 Gull Road,
KERALUP 6182
SHIRE OF MURRAY

Lot 9500

GULL RD

------ LEGEND ------

- Development Site
- Subject Site
- Other Lots
- Development

Description

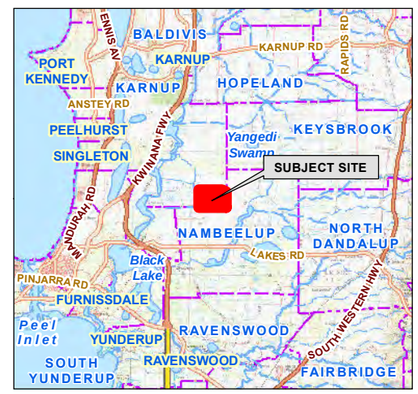
- Office
- Office / Cribroom
- Workshop
- Receival Hall
- Weighbridge
- Liquid Waste Receival
- Fuel Store Service Bay
- Driveway

Bush Fire Prone Areas

- Bushfire Prone Areas (2021)

0 200 400 600 800 1,000
Metres

------ LOCALITY ------



Aerial Imagery : Landgate/SLIP
Image Date : Feb 2022

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator Units: Metre
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Map updated by: Ian 13/10/2023
A3 Scale 1:15,000

BUSHFIRE PRONE PLANNING

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1.2 The Bushfire Management Plan (BMP)

1.2.1 Commissioning and Purpose

Landowner / proponent:	C-Wise
Bushfire Prone Planning commissioned to produce the BMP by:	Talis Consultants
Purpose of the BMP:	To apply the requirements established by State Planning Policy 3.7: Planning in Bushfire Prone Areas (SPP 3.7) and accompany the development application.
BMP to be submitted to:	Shire of Murray

1.2.2 Existing Documents with Implications for Development of this BMP

This section identifies any known assessments, reports or plans that have been conducted and prepared previously, or are being prepared concurrently, and are relevant to the subject site and the proposal/application. They potentially have implications for the assessment of bushfire threats and the implementation of the protection measures that are dealt with in the Bushfire Management Plan.

Table 1.4: Existing documents that may impact threat assessments and protection measure development.

EXISTING RELEVANT DOCUMENTS			
Existing Document	Relevant to the Proposal and the BMP	Copy Provided by Proponent / Developer	Title
Structure Plan	No	No	-
Bushfire Management Plan	No	No	-
Bushfire Emergency Plan or Information	Yes	N/A	-
Implications for the BMP: Bushfire Prone Planning to develop BEP for this site.			
Bushfire Risk – Assessment and Management Report	Yes	N/A	-
Implications for the BMP: Bushfire Prone Planning to develop Risk Report for this site.			
Environmental Asset or Vegetation Survey	Yes	Yes	Lot 9500 Gull Road Keralup -Flora, Vegetation and Fauna Survey (December 2021)
Implications for the BMP: Vegetation survey completed in 2021. No Threatened of Priority Flora were identified during the survey. (See Addendum)			
Landscaping (Revegetation) Plan	No	No	-
Implications for the BMP: N/A			
DPLH BMP Guidance 'Regions & Uses'	No	No	-
Implications for the BMP: N/A			

2 ENVIRONMENTAL CONSERVATION (DESKTOP ASSESSMENT)

Important: This 'desktop' assessment must not be considered as a replacement for a full Environmental Impact Assessment. It is a summary of potential environmental values at the subject site, inferred from information contained in listed datasets and/or reports, which are only current to the date of last modification.

These data sources must be considered indicative where the subject site has not previously received a site-specific environmental assessment by an appropriate professional.

Many bushfire prone areas also have high biodiversity values. Consideration of environmental priorities within the boundaries of the land being developed can avoid excessive or unnecessary modification or clearing of vegetation. Approval processes (and exemptions) apply at both Commonwealth and State levels.

Any 'modification' or 'clearing' of vegetation to reduce bushfire risk is considered 'clearing' under the *Environmental Protection Act 1986* (EP Act) and requires a clearing permit under the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* (Clearing Regulations) – unless for an exempt purpose.

Clearing native vegetation is an offence, unless done under a clearing permit or the clearing is for an exempt purpose. Exemptions are contained in the EP Act or are prescribed in the Clearing Regulations (note: these do not apply in environmentally sensitive areas).

The *Department of Water and Environmental Regulation* (DWER) is responsible for issuing 'clearing' permits and the framework for the regulation of clearing. Approvals under other legislation, from other agencies, may also be required, dependent on the type of flora or fauna present.

Local Planning Policy or Local Biodiversity Strategy: Natural areas that are not protected by the above Act and Regulation (or any other National or State Acts) may be protected by a local planning policy or local biodiversity strategy. Permission from the local government will be required for any modification or removal of native vegetation in these Local Natural Areas (LNA's). Refer to the relevant local government for detail.

For further Information refer to Guidelines v1.4, the Bushfire and Vegetation Factsheet - WAPC, Dec 2021 and https://www.der.wa.gov.au/our-work/clearing-permits

2.1 Existing Vegetation on Private Land

2.1.1 Declared Environmentally Sensitive Areas (ESA)

Table 2.1: Identification of relevant ESA.

IDENTIFICATION OF ESA							
ESA Class	Relevant to Proposal	Influence on Bushfire Threat Levels and / or Application of Bushfire Protection Measures	Relevant Dataset	Information Source(s) Applied to Identification of Relevant Vegetation			Further Action Required
				Dataset	Landowner or Developer	Environmental Asset or Vegetation Survey	
Wetlands and their 50m Buffer (Ramsar, conservation category and nationally important)	Yes	Yes-Significant	DBCA-010 and 011, 019, 040, 043, 044	☒	☐	☐	None
Bush Forever	No	No	DPLH-022, SPP 2.8	☒	☐	☐	None
Threatened and Priority Flora + 50m Continuous Buffer	No	No	DBCA-036	Restricted Scale of	☐	☐	None

Threatened Ecological Community	No	No	DBCA-038	Data Available (security)	☐	☐	None
Heritage Areas National / World	No	No	Relevant register or mapping	☒	☐	☐	None
Environmental Protection (Western Swamp Tortoise) Policy 2002	No	No	DWER-062	☒	☐	☐	None

DESCRIPTION OF THE IDENTIFIED ENVIRONMENTALLY SENSITIVE AREAS

A wetland exists to the east and south of the development. A wetland buffer has been applied to the development. Vegetation within the area has been classified as worst-case scenario in the Post Development Vegetation Map(Figure 3.1.1) and BAL Contour map (Figure 3.2)

2.2 Existing Vegetation on Public Land

Table 2.4: Identification of vegetation on public land with environmental, biodiversity and conservation values.

IDENTIFICATION OF PROTECTED VEGETATION ON PUBLIC LAND							
Land with Environmental, Biodiversity, Conservation and Social Values	Relevant to Proposal	Influence on Bushfire Threat Levels and / or Application of Bushfire Protection Measures	Relevant Dataset	Information Source(s) Applied to Identification of Relevant Vegetation			Further Action Required
				Dataset	Landowner or Developer	Environmental Asset or Vegetation Survey	
Legislated Lands (tenure includes national park/reserve, conservation park, crown reserve and state forest)	No	N/A	DBCA-011	☒	☐	☐	N/A
Conservation Covenants	No	N/A	DPIRD-023	Only Available to Govt.	☐	☐	N/A
National World Heritage Areas	No	No	-	☒	☐	☐	N/A
Designated Public Open Space	No	N/A	-	☒	☐	☐	N/A

2.3 Planned Landscaping and/or Re-vegetation

Table 2.5: Identification of land subject to planned vegetation modification.

AREAS OF LAND PLANNED FOR RE-VEGETATION OR LANDSCAPING			
Land with Environmental, Biodiversity, Conservation and Social Values	Relevant to Proposal	Planned Vegetation Modification	Description
Riparian Zones	No	N/A	
Foreshore Areas	No	N/A	
Wetland Buffers	Yes	Re-vegetate	Existing wetland vegetation to the east and south of the development allowed to naturally vegetate within the applied buffers (Figure 2.1). This is classified as worst case scenario (Class A Forest) in Figure 3.1.1.
Legislated Lands	No	N/A	
Public Open Space	No	N/A	
Road Verges	No	N/A	

2.4 Identified Requirement for Onsite Vegetation Modification or Removal

IDENTIFICATION OF POTENTIAL NATIVE VEGETATION MODIFICATION OR REMOVAL	
Has a requirement to modify or remove native vegetation to establish the required bushfire protection measures on the subject site been identified?	Yes
Comments: Modification and removal will be required around the FOGO plant to achieve an Asset Protection Zone of minimum BAL-29.	
Is evidence provided (from relevant agencies, the environmental or planning consultant and/or the local government), that the required modification or removal of the vegetation can be achieved?	Yes
Comments: Always consult with Local Government Authority prior to the removal of native vegetation.	

2.5 Implications for the Proposed Development and the BMP

Table 2.6: Consideration of the implications that identified protected areas of vegetation (i.e., those with environmental and subject to conservation) have for the development proposal and the BMP.

THE IMPLICATIONS FOR THE PROPOSED DEVELOPMENT (AND BMP) FROM THE IDENTIFIED **'PROTECTED' VEGETATION**	
The Determination of Bushfire Threat Levels and the Exposure of at Risk Elements	Relevant to the BMP
The ability to reduce the potential bushfire impact on the development through modification or removal of vegetation is limited due to the existence of 'protected' areas of vegetation.	No
The planned development will result in additional areas of bushfire prone vegetation (due to re-vegetation and/or landscaping) that will support fire and that may impact the development. This vegetation has been accounted for within the BMP.	No
The Application of Design and/or Construction Responses to Limit Vegetation Modification or Removal	Relevant to the BMP
Modify the development location to reduce exposure by increasing separation distance.	Not required
Redesign development, structure plan or subdivision.	Not required
Reduction of lot yield where this can increase available separation distances.	Not required
Cluster development to limit modification or removal of vegetation.	Not required
Construct building(s) to the requirements corresponding to higher BAL ratings to reduce required separation distances.	Not required

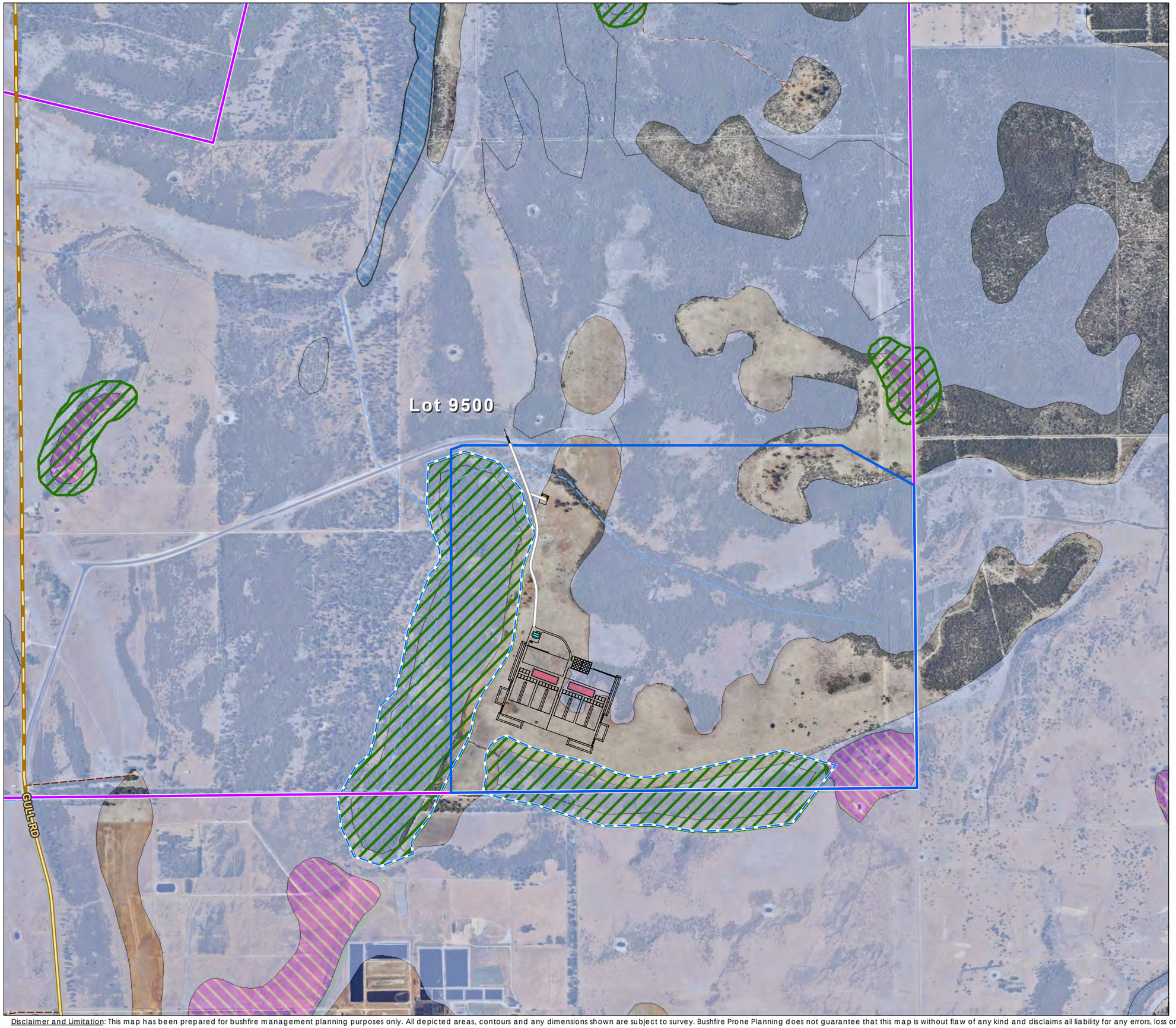


Figure 2.1

Environmental Considerations

Lot 9500 on Plan 414516, Area : 1,608.9031 ha
320 Gull Road,
KERALUP 6182
SHIRE OF MURRAY

------ LEGEND ------

- Development Site
- Subject Site
- Other Lots
- Development
- 50m Wetland Buffer

Description

- Office
- Office / Cribroom
- Workshop
- Receival Hall
- Weighbridge
- Liquid Waste Receival
- Fuel Store Service Bay
- Driveway

Geomorphic Wetlands

- Dampland
- Palusplain
- Sumpland

Clearing Regulations

- Clearing Regulations

0 200 400 600 800 1,000
Metres

------ LOCALITY ------

Aerial Imagery : Landgate/SLIP
Image Date : Feb 2022

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator Units: Metre
Map compiled by: Ian Ross 13/10/2023
Map updated by: Ian 13/10/2023
A3 Scale 1:15,000

BUSHFIRE PRONE PLANNING

Map Document Path / Name: K:\Projects\Jobs 2022\220666 - 320 Gull Road Keralup (BMP)\Mapping\MXD\220666_Fig2-1_ENV_320 Gull Road Keralup.mxd

3 BUSHFIRE ATTACK LEVEL (BAL) ASSESSMENT

BUSHFIRE ATTACK LEVELS (BAL) - UNDERSTANDING THE RESULTS

The transfer (flux/flow) of radiant heat from the bushfire to a receiving object is measured in kW/m^2. The AS 3959:2018 BAL determination methodology establishes the ranges of radiant heat flux that correspond to each bushfire attack level. These are identified as BAL-LOW, BAL-12.5, BAL-19, BAL-29, BAL-40 and BAL-FZ.

The bushfire performance requirements for certain classes of buildings are established by the Building Code of Australia (Vol. 1 & 2 of the NCC). The BAL will establish the bushfire resistant construction requirements that are to apply in accordance with AS 3959:2018 - Construction *of buildings in bushfire prone areas* and the NASH Standard – *Steel framed construction in bushfire areas (NS 300 2021),* whose solutions are deemed to satisfy the NCC bushfire performance requirements.

DETERMINED BAL RATINGS

A BAL Certificate can be issued for a determined BAL. A BAL can only be classed as 'determined' for an existing or future building/structure when:

1. It's final design and position on the lot are known and the stated separation distance from classified bushfire prone vegetation exists and can justifiably be expected to remain in perpetuity; or

2. It will always remain subject to the same BAL regardless of its design or position on the lot after accounting for any regulatory or enforceable building setbacks from lot boundaries as relevant and necessary (e.g., R-codes, restrictive covenants, defined building envelopes) or the retention of any existing classified vegetation either onsite or offsite.

If the BMP derives determined BAL(s), the BAL Certificate(s) required for submission with building applications can be provided, using the BMP as the assessment evidence.

INDICATIVE BAL RATINGS

A BAL Certificate cannot be issued for an indicative BAL. A BAL will be classed as 'indicative' for an existing or future building/structure when the required conditions to derive a determined BAL are not met.

This class of BAL rating indicates what BAL(s) could be achieved and the conditions that need to be met are stated.

Converting the indicative BAL into a determined BAL is conditional upon the currently unconfirmed variable(s) being confirmed by a subsequent assessment and evidential documentation. These variables will include the future building(s) location(s) being established (or changed) and/or classified vegetation being modified or removed to establish the necessary vegetation separation distance. This may also be dependent on receiving approval from the relevant authority for that modification/removal.

BAL RATING APPLICATION – PLANNING APPROVAL VERSUS BUILDING APPROVAL

1. Planning Approval: SPP.3.7 establishes that where BAL- LOW to BAL-29 will apply to relevant future construction (or existing structures for proposed uses), the proposed development may be considered for approval (dependent on the other requirements of the relevant policy measures being met). That is, BAL40 or BAL-FZ are not acceptable on planning grounds (except for certain limited exceptions).

   Because planning is looking forward at what can be achieved, as well as looking at what may currently exist, both determined and indicative BAL ratings are acceptable assessment outcomes on which planning decisions can be made (including conditional approvals).

2. Building Approval: The Building Code of Australia (Vol. 1 & 2 of the NCC) establishes that relevant buildings in bushfire prone areas must be constructed to the bushfire resistant requirements corresponding to the BAL rating that is to apply to that building. Consequently, a determined BAL rating and the BAL Certificate is required for a building permit to be issued - an indicative BAL rating is not acceptable.

3.1 BAL Assessment Summary - Contour Map Format

INTERPRETATION OF THE BAL CONTOUR MAP

The BAL contour map is a diagrammatic representation of the results of the bushfire attack level assessment.

The map presents different coloured contours extending out from the areas of classified vegetation. Each contour represents a set range of radiant heat flux that potentially will transfer to an exposed element (building, person or other defined element), when it is located within that contour.

Each of the set ranges of radiant heat flux corresponds to a different BAL rating as defined by the AS 3959:2018 BAL determination methodology.

The width of each shaded BAL contour will vary dependant on both the BAL rating and the relevant parameters (calculation inputs) for the subject site. Their width represents the minimum and maximum vegetation separation distances that correspond to each BAL rating (refer to the relevant table below for these distances).

The areas of classified vegetation to be considered in developing the BAL contours, are those that will remain at the intended end state of the subject development once earthworks, clearing and/or landscaping and re-vegetation have been completed. Variations to this statement that may apply include:

- Both pre and post development BAL contour maps are produced; and/or
- Each stage of a development is assessed independently.

3.1.1 The BAL Determination Method(s) Applied and the Location of Data and Results

Procedure Method (AS 3959:2018)	Applied to the BAL Assessment	Location of the Site Assessment Data			Location of the Results
		Classified Vegetation and Topography Map(s)	Calculation Input Variables		Assessed Bushfire Attack Levels and/or Radiant Heat Levels
			Summary Data	Detailed Data with Explanatory and Supporting Information	
Method 1 (Simplified)	Yes	Figure 3.1	Table 3.1	Appendix A1	BAL Contour Map Table 3.1

Figure 3.1

Classified Vegetation & Topography

Lot 9500 on Plan 414516, Area : 1,608.9031 ha
320 Gull Road,
KERALUP 6182
SHIRE OF MURRAY

AREA : 1
Class (D) Scrub
Effective slope: 0°

AREA : 2
Class (A) Forest
Effective slope: 0°

AREA : 3
Class (G) Grassland
Effective slope: 0°

Excluded

Lot 9500

------ LEGEND ------

- Development Site
- Subject Site
- Other Lots
- Development
- Photo & Direction

Description

- Office
- Office / Cribroom
- Workshop
- Receival Hall
- Weighbridge
- Liquid Waste Receival
- Fuel Store Service Bay
- Driveway

150m Vegetation Assessment Area

- 150m from Subject Site

Classified Vegetation

- Class (A) Forest
- Class (D) Scrub
- Class (G) Grassland
- Exclusion 2.2.3.2

0 100 200 300 400 500
Metres

------ LOCALITY ------

Aerial Imagery : Landgate/SLIP
Image Date : Feb 2022

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator Units: Metre
Map compiled by: Ian Ross 13/10/2023
Map updated by: Ian 13/10/2023
A3 Scale 1:7,500

BUSHFIRE PRONE PLANNING

Map Document Path / Name: K:\Projects\Jobs 2022\220666 - 320 Gull Road Keralup (BMP)\Mapping\MXD\220666_Fig3-1_VEG_320 Gull Road Keralup.mxd

Figure 3.1.1

Classified Vegetation & Topography (Post Development)

Lot 9500 on Plan 414516, Area : 1,608.9031 ha
320 Gull Road,
KERALUP 6182
SHIRE OF MURRAY

------ LEGEND ------

- Development Site
- Subject Site
- Other Lots
- 50m Wetland Buffer
- Development

Radiant Heat Flux
- <10kw Zone (Within Subject Site)

Asset Protection
- Indicative BAL 29 APZ

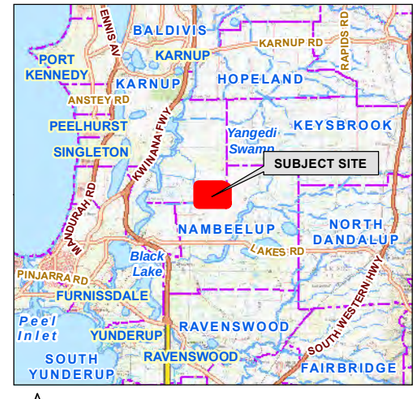
Description
- Office
- Office / Cribroom
- Workshop
- Receival Hall
- Weighbridge
- Liquid Waste Receival
- Fuel Store Service Bay
- Driveway

150m Vegetation Assessment Area
- 150m from Subject Site

Classified Vegetation
- Class (A) Forest
- Class (D) Scrub
- Class (G) Grassland
- Exclusion 2.2.3.2
- APZ Distance
- Vegetation Distance

0 100 200 300 400 500
Metres

------ LOCALITY ------



Aerial Imagery : Landgate/SLIP
Image Date : Feb 2022

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator Units: Metre
Map compiled by: Ian Ross 21/03/2024
Map updated by: Ian 21/03/2024
A3 Scale 1:7,500

BUSHFIRE PRONE PLANNING

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Figure 3.1.2

Classified Vegetation & Topography (Post Development) Showing 10kw APZ

Lot 9500 on Plan 414516, Area : 1,608.9031 ha
320 Gull Road,
KERALUP 6182
SHIRE OF MURRAY

Lot 9500

AREA : 1
Class (D) Scrub
Effective slope: 0°

AREA : 2
Class (A) Forest
Effective slope: 0°

AREA : 3
Class (G) Grassland
Effective slope: 0°

Excluded

29.5 m
48.9 m
32.9 m

------ LEGEND ------

- Development Site
- Subject Site
- Other Lots
- 50m Wetland Buffer
- Development

Radiant Heat Flux
- <10kw Zone (Within Subject Site)

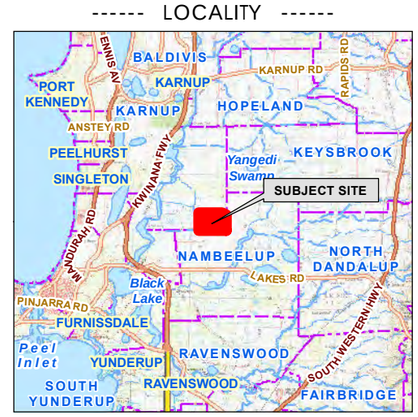
Description
- Office
- Office / Cribroom
- Workshop
- Receival Hall
- Weighbridge
- Liquid Waste Receival
- Fuel Store Service Bay
- Driveway

150m Vegetation Assessment Area
- 150m from Subject Site

Classified Vegetation
- Class (A) Forest
- Class (D) Scrub
- Class (G) Grassland
- Exclusion 2.2.3.2
- APZ Distance

0 100 200 300 400 500
Metres

------ LOCALITY ------



Aerial Imagery : Landgate/SLIP
Image Date : Feb 2022

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator Units: Metre
Map compiled by: Ian Ross 5/12/2023
Map updated by: Ian 5/12/2023
A3 Scale 1:7,500

BUSHFIRE PRONE PLANNING

Map Document Path / Name: K:\Projects\Jobs 2022\220666 - 320 Gull Road Keralup (BMP)\Mapping\MXD\220666_BRMP_Fig3-1-2_VEG_POST_320 Gull Road.mxd

CONSTRUCTION OF THE BAL CONTOUR MAP(S) – RELEVANT CLASSIFIED VEGETATION	
Identification of Classified Vegetation that is Relevant to the Production of the BAL Contour Map(s)	Relevant Map
All identified areas of classified vegetation that exist at the time of the site assessment – both within the subject site (onsite) and external to the subject site (offsite) will be the relevant vegetation.	Figure No.3.1.1
All identified areas of classified vegetation that exist at the time of the site assessment – both within the subject site (onsite) and external to the subject site (offsite) will be the relevant vegetation for the post-development BAL contour map.	Figure No.3.2
Supporting Assessment Details: N/A	

3.1.3 Summary Site Data Applied to Construction of the BAL Contour Map(s)

Table 3.1: Summary of applied calculation input variables applied to determining the site specific separation distances corresponding to each bushfire attack level.

SUMMARY OF CALCULATION INPUT VARIABLES (INCLUDING SITE DATA) APPLIED TO THE DETERMINATION OF SEPARATION DISTANCES CORRESPONDING TO BUSHFIRE ATTACK LEVELS [1]												
Applied BAL Determination Method	METHOD 1 - SIMPLIFIED PROCEDURE (AS 3959:2018 CLAUSE 2.2)											
Calculation Variables Corresponding to BAL Determination Method												
Methods 1 and 2		Method 1	Method 2									
Vegetation Classification		FDI	Effective Slope		Site Slope	FFDI or GFDI	Flame Temp.	Elevation of Receiver	Flame Width	Fireline Intensity	Flame Length	Modified View Factor
			Applied Range	Measured								
Area	Class		degree range	degrees	degrees		K	metres	metres	kW/m	metres	% Reduction
1	(D) Scrub	80	Upslope or flat 0	flat 0	-0	80	1200K	4.64	100	53,815	11.62	-
2	(A) Forest	80	Upslope or flat 0	flat 0	-0	80	1200K	8.82	100	43,400	19.8	-
3	(G) Grassland	80	Upslope or flat 0	flat 0	N/A	110	1200K	3.13	100	33,247	100	-

[1] All data and information supporting the determination of the classifications and values stated in this table and any associated justification, is presented in Appendix A.

Where the values are stated as 'default' these are either the values stated in AS 3959:2018, Table B1 or the values calculated as intermediate or final outputs through application of the equations of the AS 3959:2018 BAL determination methodology. They are not values derived by the assessor.

Table 3.2: Vegetation separation distances corresponding to radiant heat levels and illustrated as BAL contours in Figure 3.2.

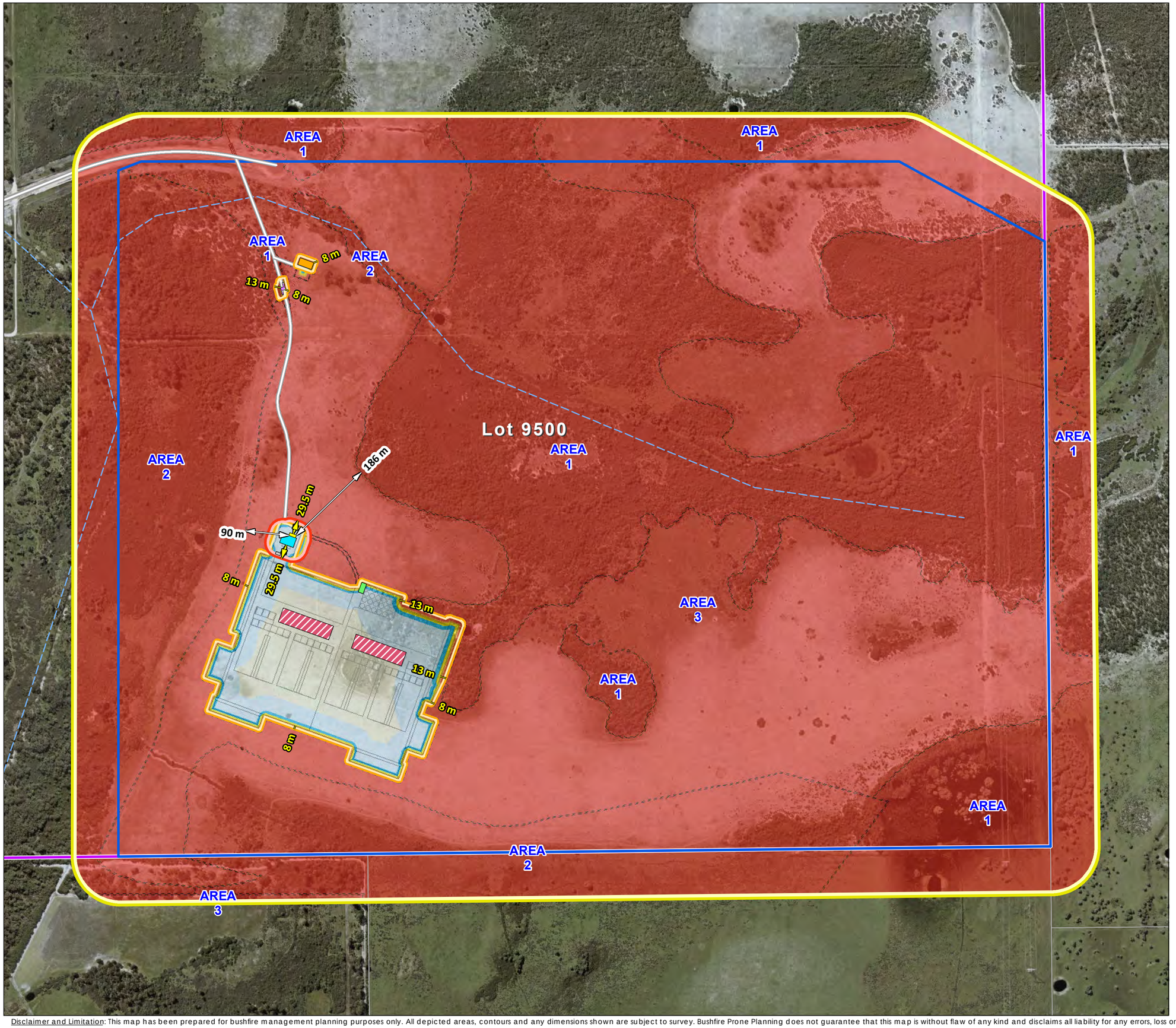
THE CALCULATED VEGETATION SEPARATION DISTANCES CORRESPONDING TO THE STATED LEVEL OF RADIANT HEAT [1]									
Vegetation Classification		Separation Distances Corresponding to Stated Level of Radiant Heat (metres)							
		Bushfire Attack Level						Maximum Radiant Heat Flux	
Area	Class	BAL-FZ	BAL-40	BAL-29	BAL-19	BAL12.5	BAL-LOW	10 kW/m^2	2 kW/m^2
1	(C) Shrubland	<7	7-<9	9-<13	13-<19	19-<100	>100	-	-
2	(A) Forest	<16	16-<21	21-<31	31-<42	42-<100	>100		
3	(G) Grassland	<6	6-<8	8-<12	12-<17	17-<50	>50	-	-

[1] All calculation input variables are presented in Table 3.1. The summary 'printouts' of calculation input and output values for each area of classified vegetation are presented in Appendix A.

Figure 3.2

BAL Contour Map

Lot 9500 on Plan 414516, Area : 1,608.9031 ha
320 Gull Road,
KERALUP 6182
SHIRE OF MURRAY



------ LEGEND ------

- Development Site
- Subject Site
- Other Lots
- Development

Radiant Heat Flux
- <10kw Zone (Within Subject Site)

Asset Protection
- Indicative BAL 29 APZ

Description
- Office
- Office / Cribroom
- Workshop
- Receival Hall
- Weighbridge
- Liquid Waste Receival
- Fuel Store Service Bay
- Driveway

100m Vegetation Assessment Area
- 100m from Subject Site

Indicative Bushfire Attack Levels
- BAL FZ
- BAL 40
- BAL 29
- BAL 19
- BAL 12.5
- BAL LOW
- APZ Distance
- Vegetation Distance

0 100 200 300 400 500
Metres

------ LOCALITY ------

Aerial Imagery : Landgate/SLIP
Image Date : Feb 2022

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator Units: Metre
Map compiled by: Ian Ross 21/03/2024
Map updated by: Ian 21/03/2024
A3 Scale 1:7,500

BUSHFIRE PRONE PLANNING

Map Document Path / Name: K:\Projects\Jobs 2022\220666 - 320 Gull Road Keralup (BMP)\Mapping\MXD\220666_Fig3-2_BAL_320 Gull Road Keralup.mxd

Figure 3.2.1

BAL Contour Map

Infrastructure Detail

Lot 9500 on Plan 414516, Area : 1,608.9031 ha
320 Gull Road,
KERALUP 6182
SHIRE OF MURRAY

OFFICE AND WEIGHBRIDGE INSET

OFFICE / CRIBROOM INSET

See Inset

AREA 1
AREA 2
AREA 3

8 m
13 m
29.5 m
90 m
186 m
15 m

Office
Workshop

0 20 40 60 80
Metres

0 50 100 150 200
Metres

------ LEGEND ------

- Development
- 50m Wetland Buffer

Radiant Heat Flux
- <10kw Zone (Within Subject Site)

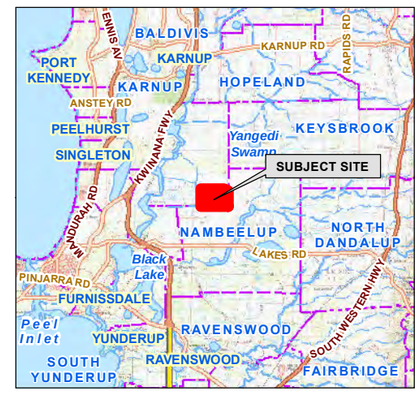
Asset Protection
- Indicative BAL 29 APZ

Description
- Office
- Office / Cribroom
- Workshop
- Receival Hall
- Weighbridge
- Liquid Waste Receival
- Fuel Store Service Bay
- Driveway

Indicative Bushfire Attack Levels
- BAL FZ
- BAL 40
- BAL 29
- BAL 19
- BAL 12.5
- BAL LOW

- APZ Distance
- Vegetation Distance

------ LOCALITY ------



Aerial Imagery : Landgate/SLIP
Image Date : Feb 2022

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator Units: Metre
Map compiled by: Ian Ross 21/03/2024
Map updated by: Ian 21/03/2024
A3 Scale 1:4,500

BUSHFIRE PRONE PLANNING

Map Document Path / Name: K:\Projects\Jobs 2022\220666 - 320 Gull Road Keralup (BMP)\Mapping\MXD\220666_Fig3-2-1_BAL_ZOOM_320 Gull Road Keralup.mxd

3.1.5 BAL Ratings Derived from the Contour Map

Table 3.3: Indicative and determined BAL(s) for existing and/or proposed building works.

BUSHFIRE ATTACK LEVEL FOR EXISTING/PLANNED BUILDINGS/STRUCTURE [1]		
Building/Structure Description	Indicative BAL [2]	Determined BAL [2]
Office near weighbridge	BAL-29	N/A
Office/Crib-room (onsite shelter)	BAL-12.5	N/A
Workshop	BAL-19	N/A

[1] The assessment data used to derive the BAL ratings is sourced from Table 3.1 and Figure 3.2.

[2] Refer to the start of Section 3 for an explanation of indicative versus determined BAL ratings.

4 IDENTIFICATION OF BUSHFIRE HAZARD ISSUES

The Guidelines for Planning in Bushfire Prone Areas (WAPC 2021 v1.4), Appendix 5, establish that the application of this section of the BMP is intended to support *strategic planning* proposals. At the strategic planning stage there will typically be insufficient proposed development detail to enable all required assessments, including the assessment against the bushfire protection criteria.

Strategic Planning Proposals

For strategic planning proposals this section of the BMP will identify:

- Issues associated with the level of the threats presented by any identified bushfire hazard;
- Issues associated with the ability to implement sufficient and effective bushfire protection measures to reduce the exposure and vulnerability levels (of elements exposed to the hazard threats), to a tolerable or acceptable level; and
- Issues that will need to be considered at subsequent planning stages.

All Other Planning Proposals

For all other planning stages, this BMP will address what are effectively the same relevant issues but do it within the following sections:

- Section 2 – Environmental Conservation: Assess environmental, biodiversity and conservation values);
- Section 3 – Potential Bushfire Impact: Assess the bushfire threats with the focus on flame contact and radiant heat; and
- Section 5 – Assessment Against the Bushfire Protection Criteria (including the guidance provided by the *Position Statement: 'Planning in bushfire prone areas – Demonstrating Element 1: Location and Element 2'):* Assess the ability of the proposed development to apply the required bushfire protection measures thereby enabling it to be considered for planning approval for these factors.

Is the proposed development a strategic planning proposal?	No

5 ASSESSMENT AGAINST THE BUSHFIRE PROTECTION CRITERIA (GUIDELINES V1.4)

5.1 Bushfire Protection Criteria Elements Applicable to the Proposed Development/Use

APPLICATION OF THE CRITERIA, ACCEPTABLE SOLUTIONS AND PERFORMANCE ASSESSMENT

The criteria are divided into five elements – location, siting and design, vehicular access, water and vulnerable tourism land uses. Each element has an intent outlining the desired outcome for the element and reflects identified planning and policy requirements in respect of each issue.

The example acceptable solutions (bushfire protection measures) provide one way of meeting the element's intent. Compliance with these automatically achieves the element's intent and provides a straightforward pathway for assessment and approval.

Where the acceptable solutions cannot be met, the ability to develop design responses (as alternative solutions that meet bushfire performance requirements) is an alternative pathway that is provided by addressing the applicable performance principles (as general statements of how best to achieve the intent of the element).

A merit based assessment is established by the SPP 3.7 and the Guidelines as an additional alternative pathway along with the ability of using discretion in making approval decisions (sections 2.5, 2.6 and 2.7). This is formally applied to certain development (minor and unavoidable – sections 5.4.1 and 5.7). Relevant decisions by the State Administrative Tribunal have also supported this approach more generally.

Elements 1 – 4 should be applied for all strategic planning proposals, subdivision or development applications, except for vulnerable tourism land uses which should refer to Element 5. Element 5 incorporates the bushfire protection criteria in Elements 1 – 4 but caters them specifically to tourism land uses. (Guidelines DPLH 2021v1.4)

The Bushfire Protection Criteria	Applicable to the Proposed Development/Use
Element 1: Location	Yes
Element 2: Siting and Design	Yes
Element 3: Vehicular Access	Yes
Element 4: Water	Yes
Element 5: Vulnerable Tourism Land Uses	No

5.2 Local Government Variations to Apply

Local governments may add to or modify the acceptable solutions to recognise special local or regional circumstances (e.g., topography / vegetation / climate). These are to be endorsed by both the WAPC and DFES before they can be considered in planning assessments. (Guidelines DPLH 2021v1.4).

Do endorsed regional or local variations to the acceptable solutions apply to the assessments against the Bushfire Protection Criteria for the proposed development /use?	None known or identified

5.3 Assessment Statements for Element 1: Location

LOCATION					
Element Intent	To ensure that strategic planning proposals, subdivision and development applications are located in areas with the least possible risk of bushfire to facilitate the protection of people, property and infrastructure.				
Proposed Development/Use – Relevant Planning Stage	(Do) Development application other than for a single dwelling, ancillary dwelling or minor development				
Element Compliance Statement	The proposed development/use achieves the intent of the element by being fully compliant with all applicable acceptable solutions.				
Pathway Applied to Provide an Alternative Solution	N/A				
Acceptable Solutions - Assessment Statements *All details of acceptable solution requirements are established in the Guidelines for Planning in Bushfire Prone Areas, DPLH v1.4 (Guidelines) and apply the guidance established by the Position Statement: 'Planning in bushfire prone areas – Demonstrating Element 1: Location and Element 2: Siting and design' (WAPC Nov 2019) and the 'Bushfire Management Plan Guidance for the Dampier Peninsula' (WA Department of Planning, Lands and Heritage, 2021 Rev B) as relevant. These documents are available at https://www.wa.gov.au/government/document-collections/state-planning-policy-37-planning-bushfire-prone-areas.*					
Solution Component Check Box Legend	☑ Relevant & met	☒ Relevant & not met	⃠ Not relevant		
A1.1 Development location	Applicable:	Yes	Compliant:	Yes	
ASSESSMENT AGAINST THE REQUIREMENTS ESTABLISHED BY THE GUIDELINES					
☑ ☐ ☐ The development application is located in an area that is or will, on completion, be subject to either a moderate or low bushfire hazard level, or BAL-29 or below.					
Supporting Assessment Details: All habitable buildings and associated buildings within the development fall within BAL-29. BAL-40 or BAL-FZ construction requirements will not be required to be applied. This meets the requirements established by Acceptable Solution A1.1 and its associated explanatory note. In addition, the vegetation surrounding the proposed development can be classed as a moderate bushfire hazard level.					
ASSESSMENTS APPLYING THE GUIDANCE ESTABLISHED BY THE WAPC ELEMENT 1 & 2 POSITION STATEMENT (2019)					
"Consideration should be given to the site context where 'area' is the land both within and adjoining the subject site. The hazards remaining within the site should not be considered in isolation of the hazards adjoining the site, as the potential impact of a bushfire will be dependent on the wider risk context, including how a bushfire could affect the site and the conditions for a bushfire to occur within the site." Strategic Planning Proposals: Consider the threat levels from any vegetation adjoining and within the subject site for which the potential intensity of a bushfire in that vegetation would result in it being classified as an Extreme Bushfire Hazard Level (BHL). Identify any proposed design strategies to reduce these threats. Structure Plans (lot layout known) and Subdivision Applications: As for strategic planning proposals but within the subject site the relevant threat levels to consider are the radiant heat levels represented by BAL-FZ and BAL-40 ratings.					
The planning proposal is a development application, consequently the referred to position statement is not applicable to the Element 1 assessment.					

5.4 Assessment Statements for Element 2: Siting and Design

SITING AND DESIGN OF DEVELOPMENT					
Element Intent	To ensure that the siting and design of development minimises the level of bushfire impact. (BPP Note: not building/construction design)				
Proposed Development/Use – Relevant Planning Stage	(Do) Development application other than for a single dwelling, ancillary dwelling or minor development				
Element Compliance Statement	The proposed development/use achieves the intent of the element by being fully compliant with all applicable acceptable solutions.				
Pathway Applied to Provide an Alternative Solution	N/A				
Acceptable Solutions - Assessment Statements *All details of acceptable solution requirements are established in the Guidelines for Planning in Bushfire Prone Areas, DPLH v1.4 (Guidelines) and apply the guidance established by the Position Statement: 'Planning in bushfire prone areas – Demonstrating Element 1: Location and Element 2: Siting and design' (WAPC Nov 2019) and the 'Bushfire Management Plan Guidance for the Dampier Peninsula' (WA Department of Planning, Lands and Heritage, 2021 Rev B) as relevant. These documents are available at https://www.wa.gov.au/government/document-collections/state-planning-policy-37-planning-bushfire-prone-areas.*					
Solution Component Check Box Legend	☑ Relevant & met	☒ Relevant & not met	⃠ Not relevant		
A2.1 Asset Protection Zone (APZ)	Applicable:	Yes	Compliant:	Yes	

UNDERSTANDING THE APZ PLANNING ASSESSMENT VERSUS APZ IMPLEMENTATION REQUIREMENTS

Note: Appendix B: 'Onsite Vegetation Management' provides further information regarding the different APZ dimensions that can be referenced, their purpose and the specifications of the APZ that is to be established and maintained.

To reduce risk to buildings (and indirectly to persons) from a bushfire event, a key bushfire protection measure required to be implemented is reducing the exposure of building elements to the direct bushfire threats of flame contact, radiant heat and embers and the indirect threat of consequential fires that result from the subsequent ignition of other combustible materials that may be constructed, stored or accumulate in the area surrounding buildings.

This is achieved by separating existing and/or proposed buildings from areas of classified bushfire prone vegetation. The total area of separation is identified as the Asset Protection Zone (APZ), which exists as an area of minimal fire fuels (or no fuel) and is considered able and likely to remain a low threat and/or be maintained to a low threat state in perpetuity. The required separation distances will vary according to the site specific conditions.

THE APZ PLANNING ASSESSMENT: To achieve planning approval for this factor it must be demonstrated that separation distances that correspond to a maximum level of radiant transfer to a building (29 kW/m^2), either exist or can be established (with certain exceptions). These separation distances are the dimensions of the **'Planning BAL-29' APZ**.

The purpose of this planning assessment is to identify and justify how this low threat area (the Planning BAL-29' APZ) can exist – or not.

THE DIMENSIONS OF THE 'PLANNING BAL-29' APZ MAY EXTEND OUTSIDE SUBJECT LOT BOUNDARIES. THE APZ MAY NOT BE EQUIDISTANT AROUND A BUILDING AS THE REQUIRED SEPARATION DISTANCES DEPEND ON THE TYPE OF VEGETATION PRESENT IN EACH DIRECTION ALONG WITH OTHER SITE VARIABLES.

IT IS IMPORTANT **TO UNDERSTAND THAT THE 'PLANNING BAL-29' APZ IS NOT NECESSARILY THE SIZE OF THE APZ THAT MUST** BE PHYSICALLY ESTABLISHED AND MAINTAINED BY A LANDOWNER. IT IS A SCREENING TOOL FOR MAKING PLANNING APPROVAL DECISIONS.

THE APZ TO BE IMPLEMENTED: The required dimensions to be established and maintained by the landowner will be those that correspond to the determined BAL rating of a relevant building but limited to the land of the subject lot (with limited exceptions). The requirement for a greater dimension within a lot will only exist if it is required by the relevant local government's annual firebreak / hazard reduction notice or the APZ size is increased as an additional bushfire protection measure as a recommendation of this BMP.

> Within this BMP it is the 'Planning BAL-29' APZ that will be identified on maps, diagrams and in tables as necessary.
>
> The exceptions are the data provided in Appendix B part B1 and when a Property Bushfire Management Statement is required to be produced for a development application, in which case the '**Landowner' APZ** dimensions will be shown on the site map (refer to s6.3.1 when relevant).

	ASSESSMENT AGAINST THE REQUIREMENTS ESTABLISHED BY THE GUIDELINES
☑ ☐ ☐	APZ Width: The proposed (or a future) habitable building(s) on the lot(s) of the proposed development - or an existing building for a proposed change of use – can be (or is) located within the developable portion of the lot and be surrounded by a 'Planning BAL-29' APZ of the required dimensions (measured from any external wall or supporting post or column to the edge of the classified vegetation), that will ensure their exposure to the potential radiant heat impact of a bushfire does not exceed 29 kW/m^2. Notes: When established by the relevant decision maker, the meeting of this requirement may also apply to proposed non-habitable buildings and other structures.
☐ ☐ ⦸	Restriction on Building Location: It has been identified that the current developable portion of a lot(s) provides for the proposed future (or a future) building/structure location that will result in that building/structure being subject to a BA-40 or BAL-FZ rating. Consequently, it may be considered necessary to impose the condition that a restrictive covenant to the benefit of the local government pursuant to section 129BA of the Transfer of Land Act 1893, is to be placed on the certificate(s) of title of the proposed lot(s) advising of the existence of a restriction on the use of that portion of land (refer to Code F3 of Model Subdivision Conditions Schedule, WAPC June 2021 and Guidelines s5.3.2).
☑ ☐ ☐	APZ Location: The required dimensions for a 'Planning BAL-29' APZ can be contained solely within the boundaries of the lot(s) on which the proposed (or a future) habitable building(s) - or an existing building(s) for a proposed change of use – is situated.
☐ ☐ ⦸	APZ Location: The required dimensions for a 'Planning BAL-29' APZ can be partly established within the boundaries of the lot(s) on which the proposed (or a future) habitable building(s) - or an existing building(s) for a proposed change of use – is situated. The balance of the APZ would exist on adjoining land that satisfies the exclusion requirements of AS 3959:2018 cl 2.2.3.2 for low threat vegetation and non-vegetated areas.
☐ ☐ ⦸	APZ Location: It can be justified that any adjoining (offsite) land forming part of a 'Planning BAL-29' APZ will: • If non-vegetated, remain in this condition in perpetuity; and/or • If vegetated, be low threat vegetation managed in a minimal fuel condition in perpetuity.
☑ ☐ ☐	APZ Management: The area of land (within each lot boundary), that is to make up the required 'Landowner' APZ dimensions (refer to Appendix B, Part B1), can and will be managed in accordance with the requirements of the Guidelines Schedule 1 'Standards for Asset Protection Zones' (refer to Appendix B).

☐ ☐ ⊘	Subdivision Staging: There are undeveloped future stages of subdivision, containing bushfire prone vegetation, that have been taken into consideration for their potentially 'temporary' impact on the ability to establish a 'Planning BAL-29' APZ on adjoining developed lots. A staging plan is developed to manage this.
☑ ☐ ☐	Firebreak/Hazard Reduction Notice: Any additional requirements established by the relevant local government's annual notice to install firebreaks and manage fuel loads (issued under s33 of the Bushfires Act 1954), can and will be complied with.

Supporting Assessment Details: Asset Protection Zones will be maintained in accordance with Schedule 1: Standards for Asset Protection Zones (see extract below) established by the Guidelines;

The associated explanatory notes (Guidelines E2) that address (a) managing an asset protection zone (APZ) to a low threat state (b) landscaping and design of an asset protection zone and (c) plant flammability; and

Any additional requirements established by the Shire of Murray Firebreak Notice.

ASSESSMENTS APPLYING THE GUIDANCE ESTABLISHED BY THE WAPC ELEMENT 1 & 2 POSITION STATEMENT (2019)

Strategic Planning Proposals: "At this planning level there may not be enough detail to demonstrate compliance with this element. The decision-maker may consider this element is satisfied where A1.1 is met."

Structure Plans (lot layout known) and Subdivision Applications: "Provided that Element 1 is satisfied, the decision-maker may consider approving lot(s) containing BAL-40 or BAL-FZ under the following scenarios.

The planning proposal is a development application, consequently the position statement is not applicable to the proposed development.

5.5 Assessment Statements for Element 3: Vehicular Access

VEHICULAR ACCESS					
Element Intent	To ensure that the vehicular access serving a subdivision/development is available and safe during a bushfire event.				
Proposed Development/Use – Relevant Planning Stage	(Do) Development application other than for a single dwelling, ancillary dwelling or minor development				
Element Compliance Statement	The proposed development/use cannot comply with all applicable acceptable solutions. An alternative solution cannot be provided. The intent of the element cannot be achieved.				
Pathway Applied to Provide an Alternative Solution	Bushfire Risk - Assessment and Management Report - is developed to demonstrate all possible bushfire protection measures that can be implemented and identify the subsequent residual risk levels applying to elements exposed to the bushfire hazard.				
Acceptable Solutions - Assessment Statements *All details of acceptable solution requirements are established in the Guidelines for Planning in Bushfire Prone Areas, DPLH v1.4 (Guidelines) and apply the guidance established by the Position Statement: 'Planning in bushfire prone areas – Demonstrating Element 1: Location and Element 2: Siting and design' (WAPC Nov 2019) and the 'Bushfire Management Plan Guidance for the Dampier Peninsula' (WA Department of Planning, Lands and Heritage, 2021 Rev B) as relevant. These documents are available at https://www.wa.gov.au/government/document-collections/state-planning-policy-37-planning-bushfire-prone-areas.* *The technical construction requirements for access types and components, and for each firefighting water supply component, are also presented in Appendices 2 and 3. The local government will advise the proponent where different requirements are to apply and when any additional specifications such as those for signage and gates are to apply (these are included in the relevant appendix if requested by the local government).*					
Solution Component Check Box Legend	☑ Relevant & met	☒ Relevant & not met	⃠ Not relevant		
A3.1 Public roads			Applicable:	Yes	Compliant: Yes
☑ ☐ ☐ The technical construction requirements of vertical clearance and weight capacity (Guidelines, Table 6) can and will be complied with (Refer also to Appendix C in this BMP).					
☑ ☐ ☐ All other applicable technical requirements of trafficable width, gradients and curves, are required to be in "accordance with the class of road as specified in the IPWEA Subdivision Guidelines, Liveable Neighbourhoods, Ausroad Standards and/or any applicable standard in the local government area" (Guidelines, Table 6 and E3.1. Refer also to Appendix C in this BMP). The assessment conducted for the bushfire management plan indicates that it is likely that the proposed development can and will comply with the requirements. However, the applicable class of road, the associated technical requirements and subsequent proposal compliance, will need to be confirmed with the relevant local government and/or Main Roads WA.					
☑ ☐ ☐ A traversable verge is available adjacent to classified vegetation (Guidelines, E3.1), as recommended.					
Supporting Assessment Details: Existing public road network is compliant with the local government standards.					

A3.2a Multiple access routes	Applicable: Yes	Compliant: No
☐ ☐ ⊘	For each lot, two-way public road access is provided in two different directions to at least two different suitable destinations with an all-weather surface.	
☐ ☐ ⊘	The two-way access is available at an intersection no greater than 200m from the relevant boundary of each lot, via a no-through road.	
☐ ☒ ☐	The two-way access is not available at an intersection within 200m from the relevant boundary of each lot. However, the available no-through road satisfies the established exemption for the length limitation in every case. These requirements are: • Demonstration of no alternative access (refer to A3.3 below); • The no-through road travels towards a suitable destination; and • The balance of the no-through road that is greater than 200m from the relevant lot boundary is within a residential built-out area or is potentially subject to radiant heat levels from adjacent bushfire prone vegetation that correspond to the BAL-LOW rating (<12.5 kW/m^2).	
Supporting Assessment Details: Gull Road is the only access route to and from site. It is approximately 4km from the site to the nearest two-way access route at Lakes Road. The site is non-compliant with the element for vehicle access. However, an onsite shelter building will be provided for occupants as an alternative solution*. * Note: As discussed with the Shire of Murray on 10th August 2023.		
A3.2b Emergency access way	Applicable: No	Compliant: N/A
☐ ☐ ⊘	The proposed or existing EAW provides a through connection to a public road.	
☐ ☐ ⊘	The proposed or existing EAW is less than 500m in length and will be signposted and gated (remaining unlocked) to the specifications stated in the Guidelines and/or required by the relevant local government.	
☐ ☐ ⊘	The technical construction requirements for widths, clearances, capacity, gradients and curves (Guidelines, Table 6 and E3.2b. Refer also to Appendix C in this BMP), can and will be complied with.	
Supporting Assessment Details: None		
A3.3 Through-roads	Applicable: Yes	Compliant: No
☑ ☐ ☐	A no-through public road is necessary as no alternative road layout exists due to site constraints.	
☐ ☒ ☐	The no-through public road length does not exceed the established maximum of 200m to an intersection providing two-way access (Guidelines, E3.3).	
☐ ☒ ☐	The no-through public road exceeds 200m but satisfies the exemption provisions of A3.2a as demonstrated in A3.2a above.	
☑ ☐ ☐	The public road technical construction requirements (Guidelines, Table 6 and E3.1. Refer also to Appendix C in this BMP), can and will be complied with as established in A3.1 above.	
☑ ☐ ☐	The turnaround area requirements (Guidelines, Figure 24) can and will be complied with.	

Supporting Assessment Details: Gull Road is the only access route to and from site. It is approximately 4km from the site to the nearest two-way access route at Lakes Road. The site is non-compliant with the element for vehicle access. However, an onsite shelter building will be provided for occupants as an alternative solution*. * Note: As discussed with the Shire of Murray on 10th August 2023.				
A3.4a Perimeter roads		Applicable:	No	Compliant: No
☐ ☐ ⊘	The proposed greenfield or infill development consists of 10 or more lots (including those that are part of a staged subdivision) and therefore should have a perimeter road. This is planned to be installed.			
☐ ☐ ⊘	The proposed greenfield or infill development consists of 10 or more lots (including those that are part of a staged subdivision). However, it is not required on the established basis of: • The vegetation adjoining the proposed lots is classified Class G Grassland; • Lots are zoned rural living or equivalent; • It is demonstrated that it cannot be provided due to site constraints; or • All lots have existing frontage to a public road.			
☐ ☐ ⊘	The technical construction requirements of widths, clearances, capacity, gradients and curves (Guidelines, Table 6 and E3.4a) can and will be complied with.			
Supporting Assessment Details: None Required.				
A3.4b Fire service access route		Applicable:	No	Compliant: No
☐ ☐ ⊘	The FSAR can be installed as a through-route with no dead ends, linked to the internal road system every 500m and is no further than 500m from a public road.			
☐ ☐ ⊘	The technical construction requirements of widths, clearances, capacity, gradients and curves (Guidelines, Table 6 and E3.4b. Refer also to Appendix C in this BMP), can and will be complied with.			
☐ ☐ ⊘	The FSAR can and will be signposted. Where gates are required by the relevant local government, the specifications can be complied with.			
☐ ☐ ⊘	Turnaround areas (to accommodate type 3.4 fire appliances) can and will be installed every 500m on the FSAR.			
Supporting Assessment Details: None Required.				
A3.5 Battle-axe access legs		Applicable:	No	Compliant: No
☐ ☐ ⊘	A battle-axe leg cannot be avoided due to site constraints.			
☐ ☐ ⊘	The proposed development is in a reticulated area and the battle-axe access leg length from a public road is no greater than 50m. No technical requirements need to be met.			
☐ ☐ ⊘	The technical construction requirements for widths, clearances, capacity, gradients and curves (Guidelines, Table 6 and E3.5. Refer also to Appendix C in this BMP), can and will be complied with.			
☐ ☐ ⊘	Passing bays can and will be installed every 200m with a minimum length of 20m and a minimum additional trafficable width of 2m.			

Supporting Assessment Details: None Required.

A3.6 Private driveways	Applicable:	Yes	Compliant:	Yes
☐ ☐ ⊘	The private driveway to the most distant external part of the development site is within a lot serviced by reticulated water, is accessed via a public road with a speed limit of 70 km/hr or less and has a length is no greater than 70m (measured as a hose lay). No technical requirements need to be met.			
☑ ☐ ☐	The technical construction requirements for widths, clearances, capacity, gradients and curves (Guidelines, Table 6 and E3.6. Refer also to Appendix C in this BMP), can and will be complied with.			
☐ ☐ ⊘	Passing bays can and will be installed every 200m with a minimum length of 20m and a minimum additional trafficable width of 2m.			
☑ ☐ ☐	The turnaround area requirements (Guidelines, Figure 28, and within 30m of the habitable building) can and will be complied with.			
Supporting Assessment Details: The proposed private driveway will be two-way and 6 metres wide. The driveway will be a limestone road base and compliant with the technical standards (see Appendix C). Slashing of 3m is required on road verges.				

5.6 Assessment Statements for Element 4: Water

FIREFIGHTING WATER		
Element Intent	To ensure water is available to enable people, property and infrastructure to be defended from bushfire.	
Proposed Development/Use – Relevant Planning Stage	(Do) Development application other than for a single dwelling, ancillary dwelling or minor development	
Element Compliance Statement	The proposed development/use achieves the intent of the element by being fully compliant with all applicable acceptable solutions.	
Pathway Applied to Provide an Alternative Solution	N/A	

Acceptable Solutions - Assessment Statements

All details of acceptable solution requirements are established in the Guidelines for Planning in Bushfire Prone Areas, DPLH v1.4 (Guidelines) and apply the guidance established by the Position Statement: 'Planning in bushfire prone areas – Demonstrating Element 1: Location and Element 2: Siting and design' (WAPC Nov 2019) and the 'Bushfire Management Plan Guidance for the Dampier Peninsula' (WA Department of Planning, Lands and Heritage, 2021 Rev B) as relevant. These documents are available at https://www.wa.gov.au/government/document-collections/state-planning-policy-37-planning-bushfire-prone-areas.

The technical construction requirements for access types and components, and for each firefighting water supply component, are also presented in Appendices 2 and 3. The local government will advise the proponent where different requirements are to apply and when any additional specifications such as those for signage and gates are to apply (these are included in the relevant appendix if requested by the local government).

Solution Component Check Box Legend	☑ Relevant & met	☒ Relevant & not met	⃠ Not relevant

A4.1 Identification of future firefighting water supply	Applicable:	No	Compliant:	N/A

☐ ☐ ⃠	It can be demonstrated that reticulated or sufficient non-reticulated water for firefighting can be provided at the subdivision and/or development application stage in accordance with the specifications of the relevant water supply authority or the requirements of Schedule 2.

Supporting Assessment Details: None Required.

A4.2 Provision of water for firefighting purposes	Applicable:	Yes	Compliant:	Yes

☐ ☐ ⃠	A reticulated water supply is available to the proposed development. The existing hydrant connection(s) are provided in accordance with the specifications of the relevant water supply authority.
☐ ☐ ⃠	A reticulated water supply will be available to the proposed development. Hydrant connection(s) can and will be provided in accordance with the specifications of the relevant water supply authority.
☑ ☐ ☐	A static water supply (tank) for firefighting purposes will be installed on the lot that is additional to any water supply that is required for drinking and other domestic purposes.
☐ ☐ ⃠	A strategic water supply (tank or tanks) for firefighting purposes will be installed within or adjacent to the proposed development that is additional to any water supply that is required for drinking and other domestic purposes. The required land will be ceded free of cost to the local government and the lot or road reserve where the tank is to be located will be identified on the plan of subdivision.

☐ ☐ ⊘	The strategic static water supply (tank or tanks) will be located no more than 10 minutes travel time from a subject site (at legal road speeds).
☑ ☐ ☐	The technical requirements (location, number of tanks, volumes, design, construction materials, pipes and fittings), as established by the Guidelines (A4.2, E4 and Schedule 2) and/or the relevant local government, can and will be complied with.
Supporting Assessment Details: A 50,000L water tank will need to be installed for bushfire firefighting. This will be located near the Tank farm. It can be moved or removed if hydrants are installed. Refer to information contained in Appendix D for the firefighting water supply specifications and technical requirements.	

5.7 Additional Bushfire Protection Measures to be Implemented (derived from Bushfire Risk Management Report)

BUSHFIRE HAZARD THREAT REDUCTION RECOMMENDED ADDITIONAL BUSHFIRE PROTECTION MEASURES				
The Protection Mechanism	Ref No	Brief Description [1]	Recommendation Details	Implementation Priority Rating [2]
Prevent Bushfire ignition and/or severity by managing the fuels	1.4	Remove onsite bushfire fuel	Before clearing, approval must be obtained from the local government before removing or managing native vegetation.	Highest
	1.6	Reduce onsite bushfire fuel - mechanical	Local government approval required before clearing or managing native vegetation.	Highest
	1.8	Enforce compliance with local government property management directives	Include ongoing management requirements in facility guidance and operational documents.	High
Prevent bushfire ignition by managing heat energy sources	1.9	Robust and effective site operational procedures	Develop guidance documents and operating procedures.	High
	1.11	Design and construct equipment to prevent airborne ignition	Monitor purchase and construction of plant equipment for adequate protection measure against potential ignition sources.	Medium
	1.12	Actively enforce activity restrictions	Develop Standard Operating Procedures to restrict operation during TFB days. Consider documenting the process for exemptions for certain critical operations.	High
	1.14	Bushfire awareness and 'good practices' education	Basic fire awareness to be included in company induction. Relevant staff training required, site specific Bushfire Awareness and emergency response.	Medium
Prevent bushfire ignition	1.15	Barriers (shielding) between ignition sources and fuels	Include in the facility design stage items and equipment that may be exposed to excessive radiant heat or has the potential to allow the spread of fire.	High

BUSHFIRE HAZARD THREAT REDUCTION RECOMMENDED ADDITIONAL BUSHFIRE PROTECTION MEASURES				
The Protection Mechanism	Ref No	Brief Description [1]	Recommendation Details	Implementation Priority Rating [2]
by managing the interactions of heat energy sources and fuels	1.16	Equipment design and construction to reduce heat transfer	Consider in the facility design stage, to reduce the potential of ignition and heat transfer.	Medium
	1.17	Separation distance between ignition sources and fuels	Include the critical assets within the 10kWm^2 area.	Highest
[1] The full description of each bushfire protection measure and the detail of the assessment is presented in Section 5.1.5 [2] Refer to Appendix A1.2.5 for implementation priority rating explanation.				

EXPOSURE REDUCING MEASURES - PERSONS

PERSONS EXPOSURE REDUCTION RECOMMENDED ADDITIONAL BUSHFIRE PROTECTION MEASURES				
The Protection Mechanism	Ref No	Brief Description [1]	Recommendation Details	Implementation Priority Rating [2]
	Persons Located Onsite and Temporarily Offsite			
Establish sufficient separation from relevant bushfire hazard threats	2.1	Stay away from the subject site	Recommend closing facility to non-essential staff and contractors during heightened fire conditions, being FDI above 75 and catastrophic fire danger days.	Medium
	2.2	Remote tourism sites - stay within the subject site	Apply protection measures. Include safer pathways in the facility design.	Medium
	2.4	Relocate (evacuate) to designated safer offsite location(s)	Include Bushfire Emergency Plan into operational documents including the site emergency plan. The cribroom is the nominated shelter in place building.	High
	2.6	Safer pathways for onsite movement	Apply protection measures. Include safer pathways in the facility design.	Highest
	2.7	Pre-emptively relocate to designated safer offsite location(s)	Develop guidelines and procedures to respond to pre-determined FDI and FDR days and other established conditions, eg restricted site access for non-essential people.	High
	Persons on Access / Egress Routes in Vehicles			
	3.1	Locating route away from adjacent hazards		Lowest
	3.2	Egress routes located to ensure driving away from hazard	Driveway verge to be managed. 3m from the limestone road base will be slashed prior fire season.	Medium

PERSONS EXPOSURE REDUCTION RECOMMENDED ADDITIONAL BUSHFIRE PROTECTION MEASURES				
The Protection Mechanism	Ref No	Brief Description [1]	Recommendation Details	Implementation Priority Rating [2]
	3.3	Greater road width	The driveway will meet public road requirements and additional verge slashing is required. 3m wide verge slashing is required.	Medium
	3.4	Reduce and maintain road verge fuel to low threat state	3m wide verge slashing is required.	Medium
Establish shielding from relevant bushfire hazard threats	Persons Located Onsite and Temporarily Offsite			
	2.9	On-site shelter building – not to community refuge standard	Will be constructed to NASH Standard	High
	2.10	On-site shelter building – not a 'vulnerable' use	The flame temperature will be calculated at 1200k rather than 1090k and the office/crib room will be constructed to NASH standard	Highest
	Persons on Access / Egress Routes in Vehicles			

[1] The full description of each bushfire protection measure and the detail of the assessment is presented in Section 5.3.1.1 and Section 5.3.2.1

[2] Refer to Appendix A1.2.5 for implementation priority rating explanation.

EXPOSURE REDUCING MEASURES – ALL STRUCTURES AND MATERIALS STORED OUTDOORS

ALL STRUCTURES & MATERIALS STORED OUTDOORS EXPOSURE REDUCTION RECOMMENDED ADDITIONAL BUSHFIRE PROTECTION MEASURES				
The Protection Mechanism	Ref No	Brief Description [1]	Recommendation Details	Implementation Priority Rating [2]
Establish sufficient separation from relevant bushfire hazard threats	4.2 5.2 6.2 6.1	Designed location of non-vegetated areas and/or managed open space	Use roads, hardstand areas and footpaths as open managed spaces. Construct and maintain the APZ to ensure maximum heat flux exposure does not exceed 10kWm^2.	Medium
	4.3 5.3 6.2	Landscaping - asset protection zone (APZ)	10kWm^2 @ 1200k APZ will be constructed and maintained around the nominated shelter in place building. A Landscape Management Plan will be provided. To minimise exposure from external radiant heat, a <10kWm^2 @ 1200k APZ is required to be established. The dimensions for this APZ are provided within the associated BMP. The increased APZ to 10kWm2 will reduce the overall preheating on combustible materials. Develop an emergency Management Plan Install an appropriate fire hydrant system (and water runoff/catchment) Install appropriate fire sprinkler suppression systems (and water runoff/catchment) External storage management of organic material Maximum height of any stockpile loosed piled or baled <4.8m. Maximum width of a stockpile is to be 20m Maximum length of a stockpile to be <50m Arrangement of stockpiles is to minimise the likelihood of fire spread and provide access for fire appliances.	Highest

ALL STRUCTURES & MATERIALS STORED OUTDOORS EXPOSURE REDUCTION RECOMMENDED ADDITIONAL BUSHFIRE PROTECTION MEASURES				
The Protection Mechanism	Ref No	Brief Description [1]	Recommendation Details	Implementation Priority Rating [2]
			DFES Information Note September 2014 – Spontaneous combustion of green waste windrows and stockpiles due to elevated internal temperatures. Moisture content of the composting windrows will be maintained above 45% as part of the composting process, and by virtue will reduce the risk of spontaneous combustion. This will be maintained by watering once a day or as required. Moisture content of the green waste received on site will not exceed 20% to prevent the generation of heat occurring through biological activity occurring and in turn resulting in spontaneous combustion.	
	4.4 5.4	Landscaping - tree location	Avoid planting trees that allow fire to ascend the trunk and produce embers and firebrands. A Landscape Management Plan will be provided.	High
	4.6 5.6 6.3	Separation from stored flammable products – fuels / other hazardous materials (consequential fire fuels)	Include in facility guidelines to direct the storage of fuel, flammable liquids and workshop gas bottles, used and new oils storage and other flammable items. Where external heat sources have not been considered by the manufacture or Standard, then the separation distance, than item # 7.7 is to be used. If cabling and other flammable items are exposed to direct radiant heat, than <10kWm2 will be the maximum exposure. Include in the facilities emergency plan and operational documents where to store the items, state the separation distances and provide direction on maintaining buildup of fine and heavy fuels. Provide staff training.	High

ALL STRUCTURES & MATERIALS STORED OUTDOORS EXPOSURE REDUCTION RECOMMENDED ADDITIONAL BUSHFIRE PROTECTION MEASURES				
The Protection Mechanism	Ref No	Brief Description [1]	Recommendation Details	Implementation Priority Rating [2]
	4.7 5.7 6.4	Separation from stored and constructed combustible items (consequential fire fuels)	Details: Include in the guidance document separation distances required for flammable and combustible materials. Detail in the facilities guidance document and information in the Emergency Management Plan guidance on storage of heavy fuels and separation distances. It is recommended that this 10m buffer form all hard fix assets is sealed or compacted with concrete, compacted limestone, gravel, blue metal etc.	Highest
Establish shielding from relevant bushfire hazard threats	4.8 5.8 6.5	Constructed barrier – shielding from bushfire	Fencing, external walls and retaining walls to be constructed using non-combustible materials.	Medium
	4.9 5.9 6.9 8.6	Constructed barrier – shielding from consequential fire	Ensure all subfloor spaces are sealed. Shield fuel lines and electrical components extending form the infrastructure. When Separating Masonry walls are used, the walls are to be marked showing the maximum height and width to identify the stockpile limits.	Medium
	4.11 5.11 6.8	Planted vegetation barrier	Include in the facility guidance documents and operational documents management of planted vegetation. Vegetation planting to be in accordance with the Landscape Plan. Plantings to be managed to low threat if located in the APZ and Guidelines for Planning lin Bushfire Prone Areas - Schedule 1.	Medium
	4.12 5.12	Shield operation critical non-structural elements	Position all critical non-structural items in less than 10kWms area and shield electrical cabling, poly tanks and pipes, valves and any other item susceptible to low radiant heat. Include a maintenance regime for debris accumulation management within the guidance document.	Highest

[1] The full description of each bushfire protection measure, the detail of the assessment and any recommendation, is presented in Section 5.3.3.1. and Section 5.3.4.1 & 5.3.5.1

ALL STRUCTURES & MATERIALS STORED OUTDOORS EXPOSURE REDUCTION RECOMMENDED ADDITIONAL BUSHFIRE PROTECTION MEASURES				
The Protection Mechanism	Ref No	Brief Description [1]	Recommendation Details	Implementation Priority Rating [2]
[2] Refer to Appendix A1.2.5 for implementation priority rating explanation.				

VULNERABILITY REDUCING MEASURES - PERSONS

PERSONS VULNERABILITY REDUCTION RECOMMENDED ADDITIONAL BUSHFIRE PROTECTION MEASURES				
The Protection Mechanism	Ref No	Brief Description [1]	Recommendation Details	Implementation Priority Rating [2]
Transport and multiple evacuation destinations and routes available	Persons Located Onsite and Temporarily Offsite			
	6.1	Sufficient evacuation transport available	People on site will have their own transport.	Lowest
	6.2	Multiple safer offsite locations available	A BEP has been developed for the facility	High
Provision of bushfire emergency information and education	6.3	Develop a bushfire emergency plan	A BEP has been developed and provided.	High
	6.4	Relevant operational documents to contain the bushfire protection measures to be implemented	Update the Fire Response Plan and develop Guidance documents before facility becomes operational	High
	6.5	Prominent display of bushfire emergency information	Bushfire information to be displayed at the weigh bridge office and the administration office.	Medium
	6.6	Direct to persons emergency messaging system	Emergency messaging system to be developed.	High
	6.7	Egress pathway signage	Identified safer onsite location.	Medium
	6.8	Personnel are trained to implement the bushfire emergency plan	Staff to be trained in emergency response and bushfire awareness.	Highest

PERSONS VULNERABILITY REDUCTION RECOMMENDED ADDITIONAL BUSHFIRE PROTECTION MEASURES				
The Protection Mechanism	Ref No	Brief Description [1]	Recommendation Details	Implementation Priority Rating [2]
Onsite persons capable of managing a bushfire emergency are available	6.12	Onsite persons available to manage bushfire emergency procedures	Ensure enough appropriately trained staff are onsite at all times during the bushfire season to assist with emergency procedures. Emergency procedures to be reviewed annually.	Highest
	6.13	Onsite persons can operate firefighting equipment	Provide a mobile response unit. Recommend 2 x slip-on units and basic bushfire awareness and response.	Highest
	6.14	External emergency response services available	Safe early evacuation is the preferred response. Local brigade turnout is 20 minutes.	Highest
Lower risk road construction (design and materials)	Persons on Access / Egress Routes in Vehicles			
	7.1	Greater road width	The driveway will be constructed to public road standards as per Table 6 of the Guidelines for planning in Bushfire Prone Areas.	Medium
	7.4	Stable road surfaces	Road surfaces will meet the technical requirement of the Guidelines. Recommend the driveway is limestone road base.	Medium
Evacuees are self-sufficient and have local awareness and own transport	7.8	Self-sufficient persons with local awareness	Site induction and contractor information to include information about the sites evacuation process. Include in the Facility guidelines and induction.	High
	7.9	Onsite persons have own transport	Include in facility training and induction program.	Medium

[1] The full description of each bushfire protection measure, the detail of the assessment and any recommendation, is presented in Section 5.4.1.1 and Section 5.3.5.1

[2] Refer to Appendix A1.2.5 for implementation priority rating explanation.

VULNERABILITY REDUCING MEASURES – STRUCTURES

STRUCTURES VULNERABILITY REDUCTION RECOMMENDED ADDITIONAL BUSHFIRE PROTECTION MEASURES				
The Protection Mechanism	Ref No	Brief Description [1]	Recommendation Details	Implementation Priority Rating [2]
Construction design and materials	9.1 10.1	Construct to AS 3959:2018	Built infrastructure assets - Fit ember screens, gaps to be 2mm or less. The built infrastructure assets where applicable will implement the protection measures. Comment - Nominated shelter in place building to comply with NASH standard.	Medium
	9.2 10.2	Construct to NASH Standard	Nominated shelter in place building to comply with NASH standard. The facilities built infrastructure assets where applicable will implement the protection measures.	Highest
	9.3 12.3 14.3	Construction materials for external and internal cavity building elements	Where possible use non-combustible material.	Medium
	9.4 10.4	Construction materials for consequential fire fuels	Use of non-combustible materials is preferred/recommended.	Medium
	9.5 10.5	Construction design/materials resistant to high wind damage	Construct shelter in place building to NASH standard. NASH Standard has been designed for impact of wind.	High
	9.7 10.7	Construction of electricity supply	Cabling to be underground wherever possible. Cabling above ground to be shielded and cradled a minimum 100mm above the ground.	High
	9.8 10.8	Minimise re-entrant detail to minimise debris and ember accumulation	The shelter in place building (office) to consider design features to minimise debris and ember accumulation.	Lowest

STRUCTURES VULNERABILITY REDUCTION RECOMMENDED ADDITIONAL BUSHFIRE PROTECTION MEASURES				
The Protection Mechanism	Ref No	Brief Description [1]	Recommendation Details	Implementation Priority Rating [2]
	9.9 10.9	Minimise debris and ember trapping surfaces	The facility is constructed for a specific industry use therefore the trapping surfaces may be flat.	Lowest
	9.10 10.10	Protect roof plumbing to minimise debris and ember accumulation	Design of facility, workshop pluming and associated structures and equipment to consider reducing the risk off ignition. The office (shelter in place building) will be constructed using the NASH protection measures.	Medium
	9.11 10.11	Minimise construction cavities to minimise debris and ember accumulation	The office will be constructed the BAL-29 requirements. Built infrastructure Assets - Seal subfloor space and apply ember screening to opening.	Highest
	9.12 10.12	Minimise external openings to limit flame / radiant heat / ember / debris entry	For the facility, workshop and associated structures, protection measure to be applied where practicable. Office to comply with the NASH Standard protection measures.	High
	9.13 10.13	Screen and seal gaps and penetrations	For the facility, workshop and associated structures and built assets, protection measure to be applied where practicable. Office to comply with the NASH Standard protection measures.	High
	9.14 12.14 14.14	Screen external doors and windows	For the facility, workshop and associated structures, protection measure to be applied where practicable.	High
	9.15 10.15	Shutter external doors and windows		N/A

STRUCTURES VULNERABILITY REDUCTION RECOMMENDED ADDITIONAL BUSHFIRE PROTECTION MEASURES				
The Protection Mechanism	Ref No	Brief Description [1]	Recommendation Details	Implementation Priority Rating [2]
	10.16	Construction materials for critical non-structural elements	The critical non-structural elements to be located in <10kWm2 area or shielded.	Highest
Availability of a firefighting response capability	9.16 10.17	Firefighting water supply	Firefighting water tanks are to be non-combustible. Minimum 50,000lt are required and to be fitted with coupling as per BMP requirements. If hydrants are installed, the 50,000lt tank will not be required.	Highest
	9.17 10.18	Firefighting equipment actively operated	Sprinkler system required for all stockpiles of flammable materials. Training required for system operations. Operational plans required for sprinkler operations. As a minimum, 2 x slip-on firefighting units (not trailer type) are required. Staff training required in unit operations. Training operation manual to be developed in response and equipment operations. PPE to be provided to trained staff.	Highest
	9.18 10.19	Firefighting equipment passively operated	Sprinkler system required for all stockpiles of flammable materials. Training required for system operations. Operational plans required for sprinkler operations.	Highest
	9.19 10.20	Firefighting equipment operability maintained	Develop operational manual and maintenance schedule.	Highest
	12.20 10.21	Access via firebreaks provided	The site will comply with the Firebreak Notice.	Medium

STRUCTURES VULNERABILITY REDUCTION RECOMMENDED ADDITIONAL BUSHFIRE PROTECTION MEASURES				
The Protection Mechanism	Ref No	Brief Description [1]	Recommendation Details	Implementation Priority Rating [2]
Manage and maintain effectiveness of applied protection measures	9.21 10.22	Formal documents created to guide and enforce management	Guidance documents to be developed for site operations and emergency management (maintenance of equipment & training) The different documents will be able to satisfactorily perform this function to differing extents.	High

[1] The full description of each bushfire protection measure, the detail of the assessment and any recommendation, is presented in Sections 5.4.3.1 & 5.4.3.4

[2] Refer to Appendix A1.2.5 for implementation priority rating explanation.

6 RESPONSIBILITIES FOR IMPLEMENTATION AND MANAGEMENT OF THE BUSHFIRE PROTECTION MEASURES

6.1 Developer / Landowner Responsibilities – Prior to Sale or Occupancy/Operation

DEVELOPER/LANDOWNER RESPONSIBILITIES – PRIOR TO SALE OR OCCUPANCY/OPERATION	
No.	Implementation Actions
1	The local government may condition a development application approval with a requirement for the landowner/proponent to register a notification onto the certificate of title and deposited plan. This will be done pursuant to Section 70A *Transfer of Land Act 1893* as amended ('Factors affecting use and enjoyment of land, notification on title'). This is to give notice of the bushfire hazard and any restrictions and/or protective measures required to be maintained at the owner's cost. This condition ensures that: 1. Landowners/proponents are aware their lot is in a designated bushfire prone area and of their obligations to apply the stated bushfire risk management measures; and 2. Potential purchasers are alerted to the Bushfire Management Plan so that future landowners/proponents can continue to apply the bushfire risk management measures that have been established in the Plan.
2	Establish the 'Landowner' Asset Protection Zone (APZ) around habitable buildings (and other structures as required) to satisfy: • The minimum required dimensions. These are to be the greatest measurements derived from either the separation distances corresponding to the determined BAL rating for the subject building/structure, or the local government's annual firebreak / hazard reduction notice (issued under s33 of the Bushfires Act 1954), or a combination of these requirements [refer to Appendix B]; and • The standards established by the Guidelines DPLH, 2021 v1.4, Schedule 1, or as varied by the local government through their annually issued firebreak / hazard reduction notice when the variations have been endorsed by the WAPC and DFES as per s4.5.3 of the Guidelines. If native vegetation is required to be modified or removed, ensure that approval has been received from the relevant authority (refer to the applicable local government for advice). This is the responsibility of the developer.
3	Prior to sale or occupancy, a copy of the Bushfire Emergency Plan (BEP) must be provided to the landowner, and they are to be informed that it contains responsibilities that must be actioned due to the use of the land being defined as a 'High Risk Land Use' for the reasons identified in Section 1.1. The 'Pre-Season Preparation Procedure' instructions must be complied with.
4	Prior to operation, construct the private driveways to comply with the technical requirements referenced in the BMP.
5	Prior to operation, install the required firefighting static water supply to comply with the technical requirements stated in the BMP.
6	Prior to occupancy, there is an outstanding obligation, created by this Bushfire Management Plan, for a Bushfire Emergency Plan for proposed occupants to be developed and approved for the 'High Risk' land use.

7	Prior to occupancy, signage must be prominently displayed within the site that informs the actions of those persons onsite in the event of a bushfire. This will include evacuation route information, site procedures – as per the instructions within the Bushfire Emergency Plan or Bushfire Information Poster developed for the site and use.
8	Prior to occupancy, all actions contained within the 'Pre-Season Preparation Procedure' established by the Bushfire Emergency Plan, must be completed.
9	For the 'high risk land use' there is an outstanding obligation, created by Guidelines and consequently this Bushfire Management Plan, for a 'Bushfire Risk Assessment and Management Report' to be produced. Additional protection measures that have been identified in the Report, are to be incorporated into the operation's site emergency plan (produced by the operator to address all potential emergencies) Refer Section 5.8 of this report.
10	Prior to relevant building work, inform the builder of the existence of this approved Bushfire Management Plan (BMP). The plan identifies that the development site is within a designated bushfire prone area and states the indicative (or determined) BAL rating(s) that may (or will) be applied to buildings/structures. A BAL assessment report may be required to confirm determined ratings and will be required when ratings are indicative. BAL certificates will need to be issued to accompany building applications. The BMP may also establish, as an additional bushfire protection measure, that construction requirements to be applied will be those corresponding to a specified higher BAL rating. Compliance with the Building Code of Australia (Volumes 1 and 2 of the National Construction Code), will require certain bushfire resistant construction requirements be applied to residential buildings in bushfire prone areas (i.e., Class 1, 2 and 3 and associated Class 10a buildings and decks). Other classes of buildings may also be required to comply with these construction when established by the relevant authority or if identified as an additional bushfire protection measure within the BMP. The deemed to satisfy solutions that will meet the relevant bushfire performance requirements are found in AS 3959 – Construction of Building in Bushfire Prone Areas (as amended) and the NASH Standard - Steel Framed Construction in Bushfire Areas (as amended).
11	On going maintenance of the separation distances between the onsite shelter building and the bushfire prone vegetation.

6.2 Landowner / Occupier Responsibilities – Ongoing Management

LANDOWNER/OCCUPIER – ONGOING MANAGEMENT	
No.	Management Actions
1	Maintain the 'Landowner' Asset Protection Zone (APZ) around habitable buildings (and other structures as required) to satisfy: • The minimum required dimensions. These are to be the greatest measurements derived from either the separation distances corresponding to the determined BAL rating for the subject building/structure, or the local government's annual firebreak / hazard reduction notice (issued under s33 of the Bushfires Act 1954), or a combination of these requirements [refer to Appendix B]; and • The standards established by the Guidelines DPLH, 2021 v1.4, Schedule 1, or as varied by the local government through their annually issued firebreak / hazard reduction notice when the variations have been endorsed by the WAPC and DFES as per s4.5.3 of the Guidelines.
2	Comply with the Shire of Murray Firebreak Notice and Bushfire Information 2022-2023 issued under s33 of the Bush Fires Act 1954. Check the notice annually for any changes.
3	Maintain private driveway within the lot to comply with the technical requirements referenced in the BMP.
4	Maintain the static firefighting water supply tank and associated pipes/fittings/pump and vehicle hardstand in good working condition.
5	Ensure that builders engaged to construct dwellings/additions and/or other relevant structures on the lot, are aware of the existence of this approved Bushfire Management Plan (BMP). The plan identifies that the development site is within a designated bushfire prone area and states the indicative (or determined) BAL rating(s) that may (or will) be applied to buildings/structures. A BAL assessment report may be required to confirm determined ratings and will be required when ratings are indicative. BAL certificates will need to be issued to accompany building applications. The BMP may also establish, as an additional bushfire protection measure, that construction requirements to be applied will be those corresponding to a specified higher BAL rating. Compliance with the Building Code of Australia (Volumes 1 and 2 of the National Construction Code), will require certain bushfire resistant construction requirements be applied to residential buildings in bushfire prone areas (i.e., Class 1, 2 and 3 and associated Class 10a buildings and decks). Other classes of buildings may also be required to comply with these construction when established by the relevant authority or if identified as an additional bushfire protection measure within the BMP. The deemed to satisfy solutions that will meet the relevant bushfire performance requirements are found in AS 3959 – Construction of Building in Bushfire Prone Areas (as amended) and the NASH Standard - Steel Framed Construction in Bushfire Areas (as amended).
6	Ensure all future buildings the landowner has responsibility for, are designed and constructed in full compliance with: • The bushfire resistant construction requirements of the Building Code of Australia (Volumes 1 and 2 of the National Construction Code), as established by the Building Regulations 2012 (WA Building Act 2011); and • Any additional bushfire protection measures this Bushfire Management Plan has established are to be implemented.

7	Annually review the Bushfire Emergency Plan and complete all actions contained within the 'Pre-Season Preparation Procedure' and the 'In-Season Preparation Procedure' at the appropriate times of the year.
8	The bushfire specific content of the operation's site emergency plan must be reviewed annually, relevant information updated and ensure all bushfire related preparation procedures are carried out.

6.3 Local Government Responsibilities – Ongoing Management

LOCAL GOVERNMENT – ONGOING MANAGEMENT	
No.	Management Actions
1	Monitor landowner compliance with the annual Shire of Murray Firebreak Notice and Bushfire Information 2022-2023 and with any bushfire protection measures that are: • Established by this BMP; • Are required to be maintained by the landowner/occupier; and • Are relevant to local government operations.

APPENDIX A: DETAILED BAL ASSESSMENT DATA AND SUPPORTING INFORMATION

A1: BAL Assessment Inputs Common to the Method 1 and Method 2 Procedures

A1.1: FIRE DANGER INDICES (FDI/FDI/GFDI)

When using Method 1 the relevant FDI value required to be applied for each state and region is established by AS 3959:2018, Table 2.1. Each FDI value applied in Tables 2.4 – 2.7 represents both the Forest Fire Danger Index (FFDI) and a deemed equivalent for the Grassland Fire Danger Index (GFDI), as per Table B2 in Appendix B. When using Method 2, the relevant FFDI and GFDI are applied.

The values may be able to be refined within a jurisdiction, where sufficient climatological data is available and in consultation with the relevant authority.

Relevant Jurisdiction:	WA	Region:	Whole State	Method 1	Applied FDI:	80
				Method 2	Applied FFDI:	N/A
					Applied GFDI:	N/A

A1.2: VEGETATION ASSESSMENT AND CLASSIFICATION

Vegetation Types and Classification

In accordance with AS 3959:2018 clauses 2.2.3 and C2.2.3.1, all vegetation types within 100 metres of the 'site' (defined as "the part of the allotment of land on which a building stands or is to be erected"), are identified and classified. Any vegetation more than 100 metres from the site that has influenced the classification of vegetation within 100 metres of the site, is identified and noted. The maximum excess distance is established by AS 3959: 2018 cl 2.2.3.2 and is an additional 100 metres.

Classification is also guided by the Visual Guide for Bushfire Risk Assessment in WA (WA Department of Planning February 2016) and any relevant FPA Australia practice notes.

Modified Vegetation

The vegetation types have been assessed as they will be in their natural mature states, rather than what might be observed on the day. Vegetation destroyed or damaged by a bushfire or other natural disaster has been assessed on its expected re-generated mature state. Modified areas of vegetation can be excluded from classification if they consist of low threat vegetation managed in a minimal fuel condition, satisfying AS 3959:2018 s2.2.3.2(f), and there is sufficient justification to reasonable expect that this modified state will exist in perpetuity.

The Influence of Ground Slope

Where significant variation in effective slope exists under a consistent vegetation type, these will be delineated as separate vegetation areas to account for the difference in potential bushfire behaviour, in accordance with AS 3959:2018 clauses 2.2.5 and C2.2.5.

THE INFLUENCE OF VEGETATION GREATER THAN 100 METRES FROM THE SUBJECT SITE	
Vegetation area(s) within 100m of the site whose classification has been influenced by the existence of bushfire prone vegetation from 100m – 200m from the site:	None
Assessment Statement:	N/A

VEGETATION AREA 1				
Classification	D. SCRUB			
Types Identified	Open scrub D-14			
Effective Slope	Measured	Flat 0 degrees	Applied Range (Method 1)	Upslope or flat 0 degrees
Dominant & Sub-Dominant Layers (species as relevant)	Mixed shrubs and scrub species growing up to 3 metres in height across undulating terrain.			
Understorey:	Pastural Grasses and sedges with scattered seasonal herbs.			
Additional Justification:	Not Required.			
Post Development Assumptions:	Vegetation is classified as worst-case scenario. Classified vegetation located within the asset protection zone will be managed to a low threat state by subject site landowner. Note: Any offsite vegetation cannot be managed or removed by the subject site landowner			

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VEGETATION AREA 2						
Classification	A. FOREST					
Types Identified	Open forest A-03					
Exclusion Clause	N/A					
Effective Slope	Measured	flat 0 degrees	Applied Range (Method 1)	Upslope or flat 0 degrees		
Foliage Cover (all layers)	30-70%	Shrub/Heath Height	1-2m	Tree Height	Over 30m	
Dominant & Sub-Dominant Layers (species as relevant)	Mixed eucalyptus and corymbia species found in low-lying wet areas and creeklines.					
Understorey:	Mixed native shrubs and pastural grasses.					
Additional Justification:	Not Required.					
Post Development Assumptions:	Vegetation is classified as worst-case scenario. Classified vegetation located within the asset protection zone will be managed to a low threat state by subject site landowner Note: Any offsite vegetation cannot be managed or removed by the subject site landowner					

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VEGETATION AREA 3				
Classification	G. GRASSLAND			
Types Identified	Tussock grassland G-22 Open herbfield G-27			
Effective Slope	Measured	Flat 0 degrees	Applied Range (Method 1)	Upslope or flat 0 degrees
Additional Justification:	Class G Grassland with occasional shrub present. Foliage cover is less than 10%.			
Post Development Assumptions:	Vegetation is classified as worst-case scenario. Classified vegetation located within the asset protection zone will be managed to a low threat state by subject site landowner Note: Any offsite vegetation cannot be managed or removed by the subject site landowner			

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A1.3: EFFECTIVE SLOPE

Measuring

Effective slope refers to the slope "under the classified vegetation which most significantly influences bushfire behaviour (AS 3959:2018, clause B4, CB4). It is not the average slope.

It is described as upslope, flat or downslope when viewed from the exposed element (e.g., building) looking towards the vegetation – and measured in degrees. Ground slope has a direct and significant influence on a bushfire's rate of spread and intensity, which increases when travelling up a slope.

The slope under the vegetation in closest proximity to the exposed element(s), over the distance that will most likely carry the entire depth of the flaming front, will be a significant consideration in the determination of the effective slope. This distance is determined as a function of the potential quasi-steady rate of spread and expected residence time (i.e., the flaming combustion period at a single point on the ground), of a bushfire in the specific vegetation type/landscape scenario.

Slope Variation Within Areas of Vegetation

Where a significant variation in effective slope exists under a consistent vegetation type, these will be delineated as separate vegetation areas to account for the difference in potential bushfire behaviour, in accordance with AS 3959:2018 clauses 2.2.5 and C2.2.5.

Slope Variation Due to Multiple Development Sites

When the effective slope, under a given area of bushfire prone vegetation, will vary significantly relative to multiple proposed development sites (exposed elements), then the effective slopes corresponding to each of the different locations, are separately identified.

The relevant (worst case) effective slope is determined in the direction corresponding to the potential directions of fire spread towards the subject building(s).

Differences in Application of Effective Slope - AS 3959:2018 Method 1 versus Method 2 Procedures

The Method 1 procedure provides five different slope ranges from flat (including all upslopes) to 20 degrees downslope to define the effective slope and bushfire behaviour model calculations apply the highest value in each range (i.e., 0^0, 5^0, 10^0, 15^0 or 20^0).

The Method 2 procedure requires an actual slope (up or down in degrees) to be determined. AS 3959:2018, clause B1 limits the effective slope that can be applied to 30 degrees downslope and 15 degrees upslope. Where any upslope is greater than 15 degrees, then 15 degrees is to be used.

SITE ASSESSMENT DETAILS - EXPLANATION & JUSTIFICATION

The effective slopes determined from the site assessment are recorded in Table 3.1 of this Bushfire Management Plan. When their derivation requires additional explanation and justification, this is provided below.

A1.4: SEPARATION DISTANCE

Measuring

The separation distance is the distance in the horizontal plane between the receiver (building/structure or area of land being considered) and the edge of the classified vegetation (AS 3959:2018, clause 2.2.4)

The relevant parts of a building/structure from which the measurement is taken is the nearest part of an external wall or where a wall does not exist, the supporting posts or columns. Certain parts of buildings are excluded including eaves and roof overhangs.

The edge of the vegetation, for forests and woodlands, will be determined by the unmanaged understorey rather than either the canopy (drip line) or the trunk (AS 3959:2018, clause C2.2.5).

Measured Separation Distance as a Calculation Input

If a separation distance can be measured because the location of the building/structure relative to the edge of the relevant classified vegetation is known, this figure can be entered into the BAL calculation. The result is a determined BAL rating.

Assumed Separation Distance as a Calculation Input

When the building/structure location within the lot is not known, an assumed building location may be applied that would establish the closest positioning of the building/structure relative to the relevant area of vegetation.

The assumed location would be based on a factor that puts a restriction on a building location such as:

- An established setback from the boundary of a lot, such as a residential design code setback or a restrictive covenant; or
- Within an established building envelope.

The resultant BAL rating would be indicative and require later confirmation (via a Compliance Report) of the building/structure actual location relative to the vegetation to establish the determined BAL rating.

Separation Distance as a Calculation Output

With the necessary site specific assessment inputs and using the AS 3959:2018 bushfire modelling equations, the range of separation distances that will correspond to each BAL rating (each of which represents a range of radiant heat flux), can be calculated. This has application for bushfire planning scenarios such as:

- When the separation distance cannot be measured because the exact location of the exposed element (i.e., the building, structure or area), relative to classified vegetation, is yet to be determined.

  In this scenario, the required information is the identification of building locations onsite that will correspond to each BAL rating. That is, indicative BAL ratings can be derived for a variety of potential building/structure locations; or

- The separation distance is known for a given building, structure or area (and a determined BAL rating can be derived), but additional information is required regarding the exposure levels (to the transfer of radiant heat from a bushfire), of buildings or persons, that will exist at different points within the subject site.

The calculated range of separation distances corresponding to each BAL rating can be presented in a table and/or illustrated as a BAL Contour Map – whichever is determined to best fit the purpose of the assessment.

For additional information refer to the information boxes in Section 3 'Bushfire Attack Levels (BAL) - Understanding the Results and Section 3.2. 'Interpretation of the BAL Contour Map'.

SITE ASSESSMENT DETAILS - EXPLANATION & JUSTIFICATION

For the subject development/use the applicable separation distances values are derived from calculations applying the assessed site data. They are an output value, not an input value and therefore are not presented or justified in this appendix.

The derived values are presented in Section 3, Table 3.2 and illustrated as a BAL contour map in Figure 3.2.

APPENDIX B: ONSITE VEGETATION MANAGEMENT - THE APZ

THE ASSET PROTECTION ZONE (APZ) - DESCRIPTION

This is an area surrounding a habitable building containing either no fire fuels and/or low threat fire fuels that are managed in a minimal fuel condition. The primary objectives include:

- To ensure the building is sufficiently separated from the bushfire hazard to limit the impact of its direct attack mechanisms. That is, the dimensions of the APZ will, for most site scenarios, remove the potential for direct flame contact on the building, reduce the level of radiant heat to which the building is exposed and ensure some reduction in the level of ember attack (with the level of reduction being dependent on the vegetation types of present);
- To ensure any vegetation retained within the APZ presents low threat levels and prevents surface fire spreading to the building;
- To ensure other combustible materials that can result in consequential fire (typically ignited by embers) within both the APZ and parts of the building, are eliminated, minimised and/or appropriately located or protected. (Note: The explanatory notes in the Guidelines provide some guidance for achieving this objective and other sources are available. Research shows that consequential fire, ignited by embers, is the primary cause of building loss in past bushfire events); and
- To provide a defendable space for firefighting activities.

B1: The Dimensions and Location of the APZ to be Established and Maintained

UNDERSTANDING THE APZ PLANNING ASSESSMENT VERSUS ITS IMPLEMENTATION REQUIREMENTS

THE 'PLANNING BAL-29' APZ

It is important ***to understand is that the 'Planning BAL-29' APZ is not necessarily the size of the APZ that must be*** *physically established and maintained by a landowner. It is a screening tool for making planning approval decisions.*

The assessment against the Bushfire Protection Criteria is conducted for planning approval purposes. To satisfy acceptable solution 'A2.1: Asset Protection Zone', it must be demonstrated that certain minimum separation distances between the relevant building/structure and different classes of bushfire prone vegetation either exist or can be created and will remain in perpetuity.

The required minimum separation distances are those that will ensure the potential radiant heat impact on relevant existing or future buildings does not exceed 29 kW/m^2. The area of land contained within these separation distances is described as an Asset Protection Zone (APZ) and is to be comprised of non-vegetated land or low threat vegetation managed in a minimal fuel condition.

The applicable minimum separation distances will vary dependent on the vegetation types, the slope of the land they are growing on and other relevant factors specific to the site and its use.

The resulting **'Planning BAL-29'** APZ dimensions may extend outside subject lot boundaries.

It is the purpose of the bushfire consultant's 'Supporting Assessment Detail', that is presented in the assessment against the acceptable solution A2.1, that will identify and justify how any offsite land within the 'Planning BAL-29 APZ (which the subject landowner has no authority or responsibility to manage), will meet the requirements of being either non-vegetated land or low threat vegetation managed in a minimal fuel condition and likely to remain in this state in perpetuity. Or otherwise, explain how this condition cannot be met.

It is the 'Planning BAL-29' APZ dimensions that will be stated in relevant tables and shown on maps as necessary in this BMP. The exceptions are the tables that are included within this appendix - when relevant to the subject lot(s) - which will present 'BAL Rating' and 'Landowner' APZ dimensions.

THE 'BAL RATING' APZ

The 'BAL Rating' APZ will ensure that the potential radiant heat exposure of the building/structure will be limited to the level that the applied construction requirements, (i.e., those corresponding to the building/structure's determined BAL rating), are designed to resist.

The minimum dimensions of the 'BAL Rating' APZ to be established and maintained will be those that correspond to the determined BAL rating for the specific building/structure. They will account for the specific conditions on and surrounding the subject lot.

The required dimensions of the ***'BAL Rating' APZ establish the size of the APZ that must physically exist either*** *entirely within a subject lot or in combination with an area of adjoining land.*

If in combination with adjoining (offsite) land, it must be justified how the offsite land can most reasonably be expected to either remain unvegetated or be able to meet and maintain the APZ Standards in perpetuity, without any actions by the owner of the subject lot.

The applicable determined BAL rating will have been stated in the relevant assessment section of this BMP when it can be assessed as a 'determined' rather than 'indicative' rating. Otherwise, it will be shown on the BAL Certificate that is submitted as part of a building application.

THE 'LANDOWNER' APZ

Dimensions: The 'Landowner' APZ is to be established and maintained by the owner of the subject lot. The minimum dimensions are the 'BAL Rating' APZ dimensions except that they will be limited to the distance that they can be established within the subject lot. (Note: Any removal of native vegetation my require the approval of the relevant authority.

The remaining required separation distance outside the lot has been assessed by the bushfire consultant to be most likely to remain in a low threat state in perpetuity without any actions to be taken by the owner of the subject lot.

These minimum 'within the lot' APZ dimensions will only be greater when the relevant local government's annual firebreak / hazard reduction notice (issued under s33 of the Bushfires Act 1954), specifies the APZ dimensions to be applied within the lot and they are greater. Consequently, the 'Landowner' APZ dimensions can be a combination of the 'BAL Rating' Dimensions and the Local Government requirements. Check their annual notice for revisions to these requirements.

The dimensions of the 'Landowner' *APZ establish the size of the APZ that must be established and maintained by the landowner within the subject lot.*

Location: The 'Landowner' APZ for which the landowner has the responsibility to establish and maintain, is that which will exist entirely within the boundaries of the relevant lot, unless an approved formal and enforceable agreement allows them to manage a specified area of land external to the subject lot.

In most cases the landowner will only have authority and responsibility to establish and manage the APZ within the subject lot.

Otherwise, when there is a remaining part of the 'BAL Rating' APZ existing outside the subject lot, then these areas of land will, in most situations, include non-vegetated areas (e.g., roads / parking / drainage / water body), formally managed areas of vegetation (e.g., public open space / recreation areas / services installed in a common section of land) or an APZ on a neighbouring lot that is required to be established and maintained by the owner of that adjoining lot.

> *For vulnerable land uses, the 'BAL Rating' APZ and 'Landowner' APZ will also refer to the dimensions corresponding to radiant heat impact levels of 10 kW/m² and 2 kW/m² (calculated using 1200K flame temperature).*
>
> *For development applications only, the 'Landowner' APZ dimensions are also shown on the Property Bushfire Management Statement in Section 6.3.1 of this BMP when it is a required component of the Bushfire Management Plan.*

Table B1.1: The applicable 'Landowner' APZ Dimensions when indicative BAL ratings have been established by the BMP.

DETERMINATION OF **THE** 'REQUIRED' **APZ DIMENSIONS TO BE** IMPLEMENTED AND MAINTAINED BY LANDOWNER WITHIN THEIR LOT									
Relevant Buildings(s)	Vegetation Classification [Refer to Fig 3.1]		Minimum Required Separation Distances from Building to Vegetation (metres)						
			Established by the 'BAL Rating' APZ Dimension					Established by the "Local Government' APZ Dimension	The 'Required' APZ Dimensions [see note]
			Determined Radiant Heat Impact	Stated 'Indicative' or 'Conditional' BAL				Firebreak / Hazard Reduction Notice	
	Area	Class		BAL-29	BAL-19	BAL-12.5	BAL-LOW		
Workshop, Office	1	(D) Scrub	N/A	13	19	27	100	'20m'	20
	2	(A) Forest		21	31	42	100	'20m'	21
	3	(G) Grassland		8	12	17	50	'20m'	20
Office/Cribroom (onsite shelter	1	(D) Scrub		N/A				N/A	44
	2	(A) Forest						N/A	63
	3	(G) Grassland						N/A	29

Note:
Workshop and Office
The 'Required' APZ Dimension corresponding to each area of vegetation is the greater of the 'BAL Rating' or the 'Firebreak/Hazard Reduction Notice' APZ dimensions - unless a local government maximum distance(s) is established as a result of their environmental assessment of the subject site. The area of the APZ will also be limited to the subject lot boundary unless otherwise justified in this Report/Plan. Final determination of the dimensions will require that any indicative or conditional BAL becomes a 'Determined' BAL.

Onsite shelter building: Office /Cribroom
The office/cribroom (on-site shelter building) will be sited in an area 73m from the nearest forest classifiable vegetation. It will be subject to a maximum heat flux of 10 kW/m^2 and built to BAL-29 construction standards.

Comments: In accordance with the Shire of Murray Firebreak Notice all vegetation within the Asset Protection Zone reduced and maintained. The flammable material is to be reduced and maintained to a height of less than 5 centimetres.

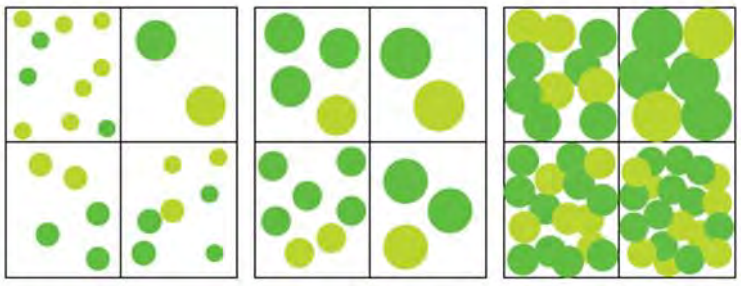
B2: The Standards for the APZ as Established by the Guidelines (DPLH, v1.4)

Within the Guidelines (source: https://www.wa.gov.au/government/document-collections/state-planning-policy-37-planning-bushfire-prone-areas), the management Standards are established by:

- Schedule 1: Standards for Asset Protection Zones (see extract below) established by the Guidelines; and
- The associated explanatory notes (Guidelines E2) that address (a) managing an asset protection zone (APZ) to a low threat state (b) landscaping and design of an asset protection zone and (c) plant flammability.

ELEMENT 2: SITING AND DESIGN OF DEVELOPMENT

SCHEDULE 1: STANDARDS FOR ASSET PROTECTION ZONES

OBJECT	REQUIREMENT
Fences within the APZ	• Should be constructed from non-combustible materials (for example, iron, brick, limestone, metal post and wire, or bushfire-resisting timber referenced in Appendix F of AS 3959).
Fine fuel load (Combustible, dead vegetation matter <6 millimetres in thickness)	• Should be managed and removed on a regular basis to maintain a low threat state. • Should be maintained at <2 tonnes per hectare (on average). • Mulches should be non-combustible such as stone, gravel or crushed mineral earth or wood mulch >6 millimetres in thickness.
Trees* (>6 metres in height)	• Trunks at maturity should be a minimum distance of six metres from all elevations of the building. • Branches at maturity should not touch or overhang a building or powerline. • Lower branches and loose bark should be removed to a height of two metres above the ground and/or surface vegetation. • Canopy cover within the APZ should be <15 per cent of the total APZ area. • Tree canopies at maturity should be at least five metres apart to avoid forming a continuous canopy. Stands of existing mature trees with interlocking canopies may be treated as an individual canopy provided that the total canopy cover within the APZ will not exceed 15 per cent and are not connected to the tree canopy outside the APZ. **Figure 19:** Tree canopy cover – ranging from 15 to 70 per cent at maturity  15% 30% 70%

Shrub* and scrub* (0.5 metres to six metres in height). Shrub and scrub >6 metres in height are to be treated as trees.	• Should not be located under trees or within three metres of buildings. • Should not be planted in clumps >5 square metres in area. • Clumps should be separated from each other and any exposed window or door by at least 10 metres.
Ground covers* (<0.5 metres in height. Ground covers >0.5 metres in height are to be treated as shrubs)	• Can be planted under trees but must be maintained to remove dead plant material, as prescribed in 'Fine fuel load' above. • Can be located within two metres of a structure, but three metres from windows or doors if >100 millimetres in height.
Grass	• Grass should be maintained at a height of 100 millimetres or less, at all times. • Wherever possible, perennial grasses should be used and well-hydrated with regular application of wetting agents and efficient irrigation.
Defendable space	• Within three metres of each wall or supporting post of a habitable building, the area is kept free from vegetation, but can include ground covers, grass and non-combustible mulches as prescribed above.
LP Gas Cylinders	• Should be located on the side of a building furthest from the likely direction of a bushfire or on the side of a building where surrounding classified vegetation is upslope, at least one metre from vulnerable parts of a building. • The pressure relief valve should point away from the house. • No flammable material within six metres from the front of the valve. • Must sit on a firm, level and non-combustible base and be secured to a solid structure.

** Plant flammability, landscaping design and maintenance should be considered – refer to explanatory notes*

B3: The Standards for the APZ as Established by the Local Government

Refer to the firebreak / hazard reduction notice issued annually (under s33 of the Bushfires Act 1954) by the relevant local government. It may state Standards that vary from those established by the Guidelines and that have been endorsed by the WAPC and DFES as per Section 4.5.3 of the Guidelines.

A copy of the applicable notice is not included here as they are subject to being reviewed and modified prior to issuing each year. Refer to ratepayers notices and/or the local government's website for the current version.

B4: Maintaining Low Threat and Non-Vegetated Areas Excluded from Classification

AS 3959 establishes the methodology for determining a bushfire attack level (BAL). The methodology includes the classification of the subject site's surrounding vegetation according to their 'type' and the application of the corresponding bushfire behaviour models to determine the BAL. Certain vegetation can be considered as low threat and excluded from classification. Where this has occurred in assessing the site, the extract from AS3959:2018 below state the requirements (including the size of the vegetation area if relevant to the assessment) for maintenance of those areas of land.

2.2.3.2 *Exclusions—Low threat vegetation and non-vegetated areas*

The following vegetation shall be excluded from a BAL assessment:

(a) Vegetation of any type that is more than 100 m from the site.

(b) Single areas of vegetation less than 1 ha in area and not within 100 m of other areas of vegetation being classified vegetation.

(c) Multiple areas of vegetation less than 0.25 ha in area and not within 20 m of the site, or each other or of other areas of vegetation being classified vegetation.

(d) Strips of vegetation less than 20 m in width (measured perpendicular to the elevation exposed to the strip of vegetation) regardless of length and not within 20 m of the site or each other, or other areas of vegetation being classified vegetation.

(e) Non-vegetated areas, that is, areas permanently cleared of vegetation, including waterways, exposed beaches, roads, footpaths, buildings and rocky outcrops.

(f) Vegetation regarded as low threat due to factors such as flammability, moisture content or fuel load. This includes grassland managed in a minimal fuel condition, mangroves and other saline wetlands, maintained lawns, golf courses (such as playing areas and fairways), maintained public reserves and parklands, sporting fields, vineyards, orchards, banana plantations, market gardens (and other non-curing crops), cultivated gardens, commercial nurseries, nature strips and windbreaks.

NOTES:

1 Minimal fuel condition means there is insufficient fuel available to significantly increase the severity of the bushfire attack (recognizable as short-cropped grass for example, to a nominal height of 100 mm).

2 A windbreak is considered a single row of trees used as a screen or to reduce the effect of wind on the leeward side of the trees.

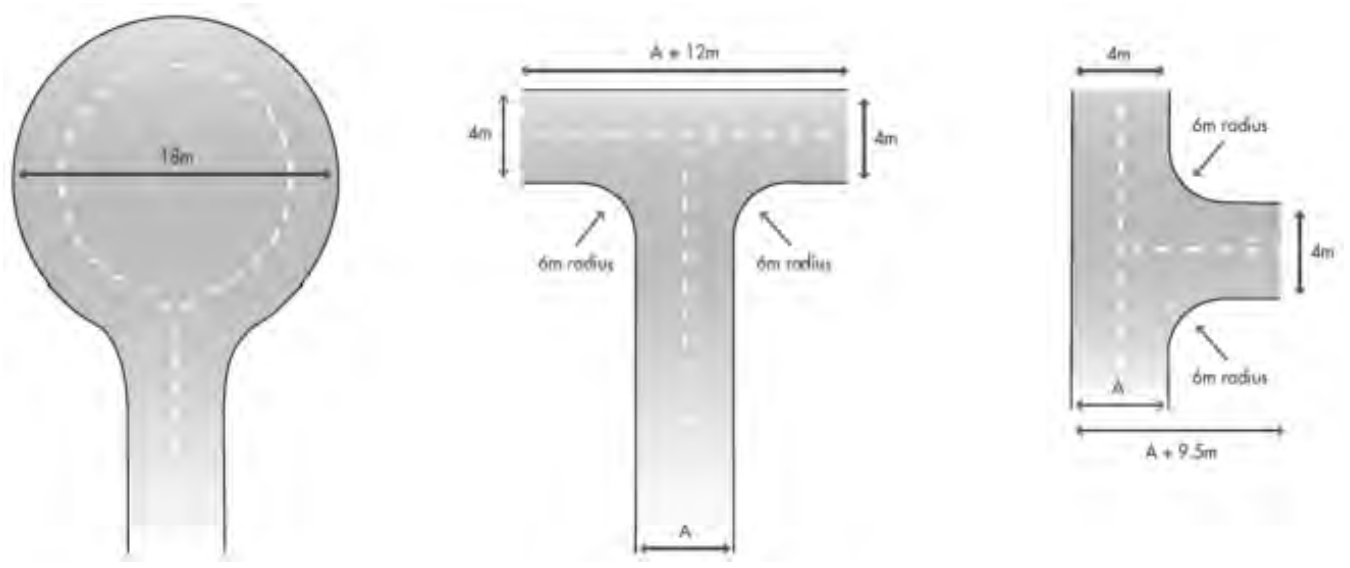
APPENDIX C: TECHNICAL REQUIREMENTS FOR VEHICULAR ACCESS

The design/layout requirements for access are established by the acceptable solutions of the Guidelines (DPLH, 2021 v1.4) Element 3 and vary dependent on the access component, the land use and the presence of 'vulnerable' persons. Consequently, the best reference source are the Guidelines. The technical requirements that are fixed for all components and uses are presented in this appendix.

GUIDELINES TABLE 6, EXPLANATORY NOTES E3.3 & E3.6 AND RELEVANT ACCEPTABLE SOLUTIONS

Technical Component	Vehicular Access Types / Components			
	Public Roads	Emergency Access Way [1]	Fire Service Access Route [1]	Battle-axe and Private Driveways [2]
Minimum trafficable surface (m)	In accordance with A3.1	6	6	4
Minimum Horizontal clearance (m)	N/A	6	6	6
Minimum Vertical clearance (m)	4.5			
Minimum weight capacity (t)	15			
Maximum Grade Unsealed Road [3]	As outlined in the IPWEA Subdivision Guidelines	1:10 (10%)		
Maximum Grade Sealed Road [3]		1:7 (14.3%)		
Maximum Average Grade Sealed Road		1:10 (10%)		
Minimum Inner Radius of Road Curves (m)		8.5		

Turnaround Area Dimensions for No-through Road, Battle-axe Legs and Private Driveways [4]



Passing Bay Requirements for Battle-axe leg and Private Driveway

When the access component length is greater than the stated maximum, passing bays are required every 200m with a minimum length of 20m and a minimum additional trafficable width of 2m (i.e. the combined trafficable width of the passing bay and constructed private driveway to be a minimum 6m).

Emergency Access Way – Additional Requirements

Provide a through connection to a public road, be no more than 500m in length, must be signposted and if gated, gates must be open the whole trafficable width and remain unlocked.

[1] To have crossfalls between 3 and 6%.

[2] Where driveways and battle-axe legs are not required to comply with the widths in A3.5 or A3.6, they are to comply with the Residential Design Codes and Development Control Policy 2.2 Residential Subdivision.

[3] Dips must have no more than a 1 in 8 (12.5% or 7.1 degree) entry and exit angle.

[4] The turnaround area should be within 30m of the main habitable building.

D1: Reticulated Areas – Hydrant Supply

The Guidelines state "where a reticulated water supply is existing or proposed, hydrant connection(s) should be provided in accordance with the specifications of the relevant water supply authority."

The main scheme water suppliers / authorities in WA are The Water Corporation, AqWest – Bunbury Water Corporation and Busselton Water Corporation. Various local authority exists in other non-scheme and regional areas. However, most existing fire hydrants are connected to Water Corporation water mains.

Consequently, the hydrant location specifications from The Water Corporation's 'No 63 Water Reticulation Standard' (Ver 3 Rev 15) are provided in the extract below with the key distances relevant to bushfire planning assessments being highlighted. This Standard is deemed to be the baseline criteria for developments and should be applied unless different local water supply authority conditions apply. Other applicable specification will be found in the Standard.

Note: The maximum distance from a hydrant to the rear of a lot/building is generally interpreted as not applicable to large lot sizes where the maximum distance becomes an impractical limitation i.e., typically rural residential areas.

2.2.1.5 Appurtenances

c. Hydrants

Hydrants shall be screw-down hydrant with built-in isolation valve and installed only on DN100 or larger pipes. Hydrants shall be located:

- so that the maximum distance between a hydrant and the rear of a building envelope, (or in the absence of a building envelope the rear of the lot) shall be 120m;
- so that spacing (as measured by hose-run) between hydrants in non-residential or mixed use areas shall be maximized and no greater than 100m;
- so that spacing (as measured by hose-run) between hydrants in residential areas with lots per dwelling <10,000m^2 shall be maximized and no greater than 200m;
- so that spacing between hydrants (as measured by hose-run) in rural residential areas where minimum lots per dwelling is >10,000 m^2 (1ha) shall be maximized and no greater than 400m;
- centrally along the frontage of a lot to avoid being under driveways, unless the lot features a frontage 6m or less, in which case it shall be placed to the side opposite the driveway;
- at lots that have the widest frontage in the local area;
- where appropriate at the truncation of road junctions or intersections so that they can serve more than one street and can be readily located;
- on both sides of the major roads at staggered intervals where there are mains on both sides of the road;
- at major intersections on dual multi-lane roads, where two hydrants are to be sited on diagonally opposite corners;
- hydrants should be located at least 20m from traffic calming devices i.e., median slow points or chokers, chicanes, mini traffic circles, and intersection 'pop-outs' to ensure traffic is not impeded;
- in a position not less than 10m from any high voltage main electrical distribution equipment such as transformers and distribution boards, liquefied petroleum gas or other combustible storage;
- directly on top of the main using a tee unless proved to be impractical.

D2: Non-Reticulated Areas – Static Supply

For specified requirements, refer to the Guidelines Element 4: Water – Acceptable Solution A4.2 , Explanatory Notes E4 (that provide water supply establishment detail under the headings of water supply; independent water and power supply; strategic water supplies, alternative water sources and location of water tanks) and the technical requirements established by Schedule 2 (reproduced below).

SCHEDULE 2: WATER SUPPLY DEDICATED FOR BUSHFIRE FIREFIGHTING PURPOSES

2.1 Water supply requirements

Water dedicated for firefighting should be provided in accordance with Table 7 below, and be in addition to water required for drinking purposes.

Table 7: Water supply dedicated for bushfire firefighting purposes

PLANNING APPLICATION	NON-RETICULATED AREAS
Development application	10,000L per habitable building
Structure Plan / Subdivision: Creation of 1 additional lot	10,000L per lot
Structure Plan / Subdivision: Creation of 3 to 24 lots	10,000L tank per lot **or** 50,000L strategic water tank
Structure Plan / Subdivision: Creation of 25 lots or more	50,000L per 25 lots or part thereof Provided as a strategic water tank(s) or 10,000L tank per lot

2.2 Technical requirements

2.2.1 Construction and design

An above-ground tank and associated stand should be constructed of non-combustible material. The tank may need to comply with AS/NZS 3500.1:2018.

Below ground tanks should have a 200mm diameter access hole to allow tankers or emergency service vehicles to refill direct from the tank, with the outlet location clearly marked at the surface. The tank may need to comply with AS/NZS 3500.1:2018. An inspection opening may double as the access hole provided that the inspection opening meets the requirements of AS/NZS 3500.1:2018. If the tank is required under the BCA as part of fire hydrant installation, then the tank will also need to comply with AS 2419.

Where an outlet for an emergency service vehicle is provided, then an unobstructed, hardened ground surface is to be supplied within four metres of any water supply.

2.2.2 Pipes and fittings

All above-ground, exposed water supply pipes and fittings should be metal. Fittings should be located away from the source of bushfire attack and be in accordance with the applicable section below, unless otherwise specified by the local government.

2.2.2.1 Fittings for above-ground water tanks:

- Commercial land uses: 125mm Storz fitting; or
- Strategic water tanks: 50mm or 100mm (where applicable and adapters are available) male camlock coupling with full flow valve; or
- Standalone water tanks: 50mm male camlock coupling with full flow valve; or
- Combined water tanks: 50mm male camlock coupling with full flow valve or a domestic fitting, being a standard household tap that enables an occupant to access the water supply with domestic hoses or buckets for extinguishing minor fires.

2.2.2.2 Remote outlets

In certain circumstances, it may be beneficial to have the outlet located away from the water supply. In such instances in which a remote outlet is to be used, the applicant should consult the local government and DFES on their proposal.

EXAMPLE CONSTRUCTION AND FITTINGS	
	
Strategic 47,000 Litre Concrete Tank & Protected Fittings	
	
10,000 Litre Concrete Tank	Storz and Camlock Couplings
	
Full Flow 50mm Ball Valve	Full Flow 50mm Gate Valve and Male Camlock

(To be provided by Proponent)

ADDENDUM 2 : METHOD 2 FLAMESOL CALCULATIONS FOR 10KWM² (ONSITE SHELTER)

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Calculated December 6, 2022, 5:59 pm (MDc v.4.9)

Minimum Distance Calculator - AS3959-2018 (Method 2)			
Inputs		Outputs	
Fire Danger Index	80	Rate of spread	2.4 km/h
Vegetation classification	Forest	Flame length	19.8 m
Understorey fuel load	25 t/ha	Flame angle	63 °, 68 °, 73 °, 75 °, 77 ° & 82 °
Total fuel load	35 t/ha	Elevation of receiver	8.82 m, 9.17 m, 9.460000000000001 m, 9.56 m, 9.640000000000001 m & 9.800000000000001 m
Vegetation height	n/a	Fire intensity	43,400 kW/m
Effective slope	0 °	Transmissivity	0.843, 0.822, 0.796, 0.775, 0.764 & 0.712
Site slope	0 °	Viewfactor	0.4235, 0.3149, 0.2132, 0.144, 0.1168 & 0.0313
Flame width	100 m	Minimum distance to < 40 kW/m²	22.9 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	29.9 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	41.2 m
Flame temperature	1,200 K	Minimum distance to < 12.5 kW/m²	54.9 m
		Minimum distance to < 10 kW/m²	63.2 m

Rate of Spread - Mcarthur, 1973 & Noble et al., 1980

Flame length - NSW Rural Fire Service, 2001 & Noble et al., 1980

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005

FPA AUSTRALIA | FLAMESOL

Calculated December 6, 2022, 6:00 pm (MDc v.4.9)

Minimum Distance Calculator - AS3959-2018 (Method 2)			
Inputs		Outputs	
Fire Danger Index	80	Rate of spread	4.16 km/h
Vegetation classification	Scrub	Flame length	11.62 m
Understorey fuel load	25 t/ha	Flame angle	65 °, 71 °, 76 °, 79 °, 80 ° & 84 °
Total fuel load	25 t/ha	Elevation of receiver	5.26 m, 5.49 m, 5.64 m, 5.7 m, 5.72 m & 5.78 m
Vegetation height	m	Fire intensity	53,815 kW/m
Effective slope	0 °	Transmissivity	0.865, 0.848, 0.824, 0.8, 0.788 & 0.732
Site slope	0 °	Viewfactor	0.413, 0.3045, 0.2058, 0.1396, 0.1134 & 0.0304
Flame width	100 m	Minimum distance to < 40 kW/m²	13.9 m
Windspeed	45 km/h	Minimum distance to < 29 kW/m²	18.7 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	27 m
Flame temperature	1,200 K	Minimum distance to < 12.5 kW/m²	37.5 m
		Minimum distance to < 10 kW/m²	44.1 m

Rate of Spread - Catchpole et al. 1998

Flame length - Byram, 1959

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005

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Calculated December 6, 2022, 5:57 pm (MDc v.4.9)

Minimum Distance Calculator - AS3959-2018 (Method 2)			
Inputs		Outputs	
Grassland Fire Danger Index	110	Rate of spread	14.3 km/h
Vegetation classification	Grassland	Flame length	6.87 m
Understorey fuel load	4.5 t/ha	Flame angle	66 °, 72 °, 78 °, 81 °, 82 ° & 86 °
Total fuel load	4.5 t/ha	Elevation of receiver	3.13 m, 3.26 m, 3.36 m, 3.39 m, 3.4 m & 3.42 m
Vegetation height	n/a	Fire intensity	33,247 kW/m
Effective slope	0 °	Transmissivity	0.881, 0.869, 0.85, 0.828, 0.8159999999999999 & 0.75
Site slope	0 °	Viewfactor	0.4037, 0.2976, 0.1994, 0.1344, 0.1096 & 0.0297
Flame width	100 m	Minimum distance to < 40 kW/m²	8.4 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	11.4 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	16.9 m
Flame temperature	1,200 K	Minimum distance to < 12.5 kW/m²	24.6 m
		Minimum distance to < 10 kW/m²	29.5 m

Rate of Spread - Noble et al. 1980

Flame length - Purton, 1982

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005

ALTUS PLANNING

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14 May 2024

Shire of Murray
PO Box 21
PINJARRA WA 6208

Attention: Luke Cervi

Via email: luke.cervi@murray.wa.gov.au

Dear Luke,

Proposed Noxious Industry (Carbon Recycling Facility) – Lot 9500 (No. 320) Gull Road, Keralup – Response and Addendum

On behalf of C-Wise Holdings Pty Ltd (**Applicant**), Altus Planning submits the following submission in response to the City's request for further information dated 24 April 2024 regarding a Development Application (**Application**) for a 'Noxious Industry' (**proposed development** or **proposal**) at Lot 9500 (No. 320) Gull Road, Keralup (**subject land** or **site**)

This submission, together with all the attachments provided, should be considered as an official addendum to the lodged Application and the previous addendum dated 16 April 2024 (**previous addendum**).

1.0 Response to Bushfire

The Shire of Murray (**Shire**) have advised that there is a planned emergency access way (**EAW**) that connects the end of Gull Road (to where the private road intersects) to Yangedi Road. The proposed EAW can be found as at **Attachment 1**.

A response to this further information provided from the Shire is considered necessary when considering the potential impact of bushfire, pursuant to State Planning Policy

3.7 – Planning in Bushfire Prone Areas (**SPP3.7**) and its associated guidelines (**the Guidelines**).

1.1 Department of Fire and Emergency Services Comments

As per the previous addendum, the Department of Fire and Emergency Services (**DFES**) comments made to the application were responded to. For ease of reference, this has been quoted below.

> *An assessment by the Applicant's bushfire consultant, Bushfire Prone Planning, against DFES's comments relating to the proposal can be found as at Attachment 2.*
>
> *In addition to the above, it is noted that a meeting dated 10 August 2023 was held between the Shire's Manager Planning and Environment Services, Greg Delahunty; the Applicant; Bushfire Prone Planning; and Talis Consultants. At this meeting, it was agreed that a dedicated bushfire bunker (Shelter in Place) would be a reasonable alternative for the non-compliance of the acceptable solution for vehicular access. Accordingly, there are no outstanding bushfire issues.*

For completeness, these comments by the Applicant's bushfire consultant have been provided as at **Attachment 2**. Section 1.2 below will further expand on the justification necessary for the potential concern for vehicular access pursuant to SPP3.7.

1.2 Emergency Access Way

In addition to the bushfire assessment contained within the previously submitted planning justification report dated 14 December 2023, the previously submitted amended Bushfire Management Plan dated 14 March 2024, and the comments made by Bushfire Prone Planning in response to the DFES comments (**Attachment 2**); it is further evident that the development meets the intent of the Element 3: Vehicular Access Performance Principle P3i (**P3i**), as quoted and assessed below.

> ***P3i -*** *The design and capacity of vehicular access and egress is to provide for the community to evacuate to a suitable destination before a bushfire arrives at the site, allowing emergency services personnel to attend the site and/or hazard vegetation.*

Whilst the proposed EAW does not meet the acceptable solution for A3.2b Emergency Access Way (as quoted below) due to the length of the EAW, it is still able to be considered under P3i.

> *Where it is demonstrated that A3.2a* (multiple access routes) *cannot be achieved due to site constraints, or where an alternative design option does not exist, an emergency access way can be considered as an acceptable solution.*
>
> *An emergency access way is to meet all the following requirements:*
>
> - *requirements in Table 6, Column 2;*
> - *provides a through connection to a public road;*
> - *be no more than 500 metres in length; and*
> - *must be signposted and if gated, gates must open the whole trafficable width and remain unlocked.*

The proposal allows for three (3) different destinations for evacuees to travel, as listed below:

(1) Vehicular access is provided to Gull Road;

(2) Vehicular access is provided to the EAW which travels to Yangadi Road; and

(3) A dedicated onsite Shelter that is located within a BAL-12.5 area (an alternative solution).

These destinations allow for three (3) different options for evacuees to use, rather than the standard acceptable requirement of two (2). This is considered to satisfy the intent of performance principles P3i and therefore is deemed to be acceptable with respect to SPP3.7 and potential bushfire risks.

2.0 Response to Odour

The Shire have also requested that the Applicant's specialised odour consultant, Environmental & Air Quality Consulting Pty Ltd (**EAQ Consulting**), was to liaise directly with a specialised odour consultant of the Shire's choosing, that being Astute Environmental Consulting (**Astute Environmental**).

The purpose of this direct liaison between the two technical experts was to enable EAQ Consulting and Astute Environmental to:

> *consider the individual characteristics of the proposal and locality to form a consensus on what, off-site odour impacts would be acceptable and/or the extent of control measures necessary to be incorporated into the proposed development to ensure odour risks are appropriately responded to in context of the planning framework. In essence, the planning question to be answered is:*
>
> *Could or will the proposed land use result in off-site impacts and if so, are those impacts acceptable?*

Subsequently to the above request, EAQ Consulting and Astute Environmental have worked collaboratively on the amended Odour Impact Assessment (**amended OIA**). The final version of the agreed upon amended OIA can be found as at **Attachment 3**.

Some of the key amendments, but not all, are listed below for ease of reference.

- Figures 2-4 to 2-7,
- Section 4
- Table 4-1
- Section 4.2.1,
- Section 4.4.1,
- Section 4.5,
- Table 4-2,
- Section 7.1
- Figure 9-6. This Figure has been updated to reflect 30% of odour emissions lost from the new Facility – and this is based on 30% of the total odour emission rate from the existing MAFs which are in open air.

The amendments that were made are based on the discussions held between EAQ Consulting and Astute Environmental where it has been agreed that the development is generally a contained facility with biofilters and no exposed leachates.

Noting the above and given the separation distance of over 3 kilometres, the new design, and the controls/biofilter, it is considered that the proposed development will create minimal to no perceptual odour concerns from the development site itself.

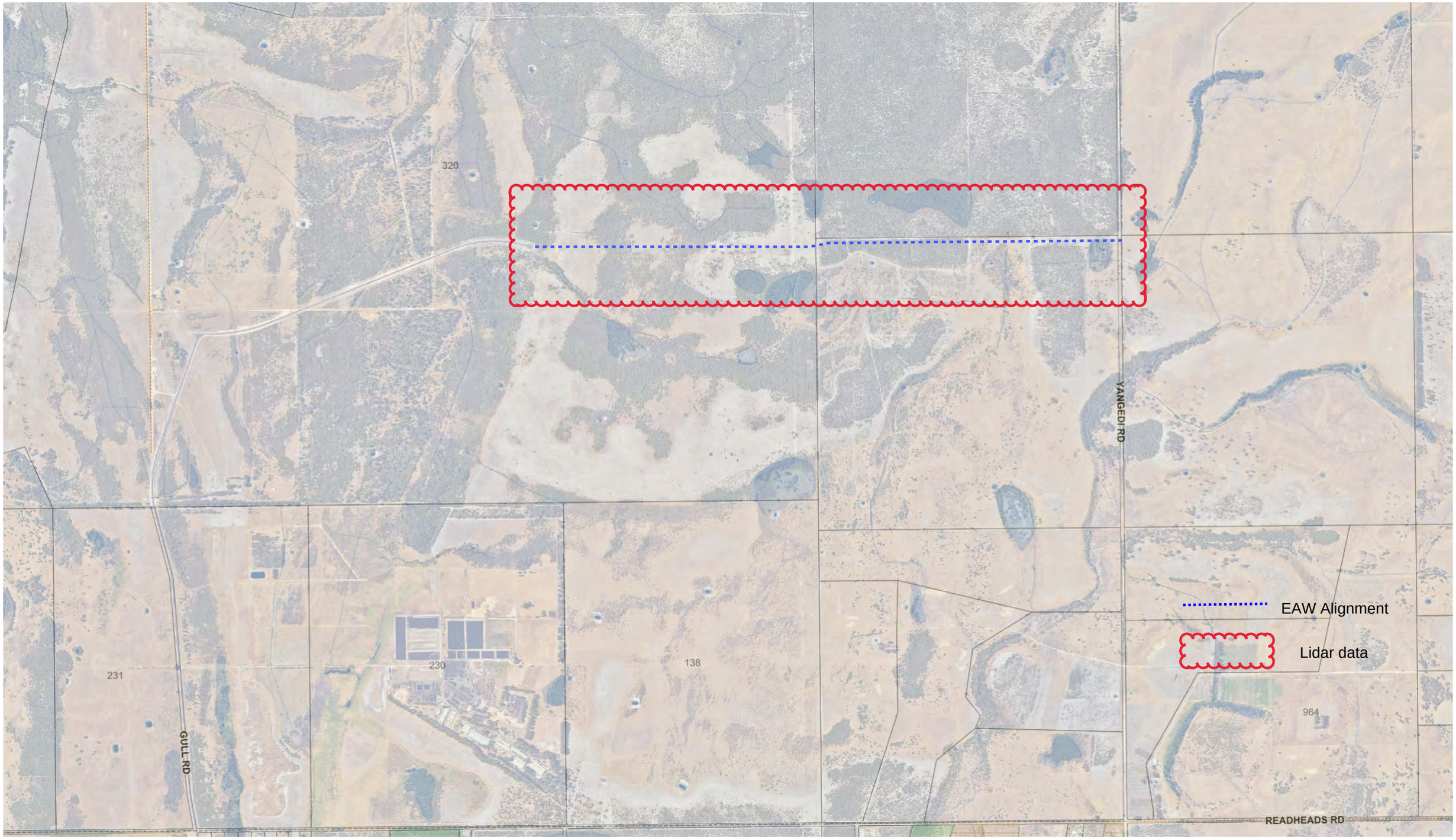
3.0 Conclusion

For the reasons outlined in this response and the further information provided, it is considered that the proposal is suitable for the site and is consistent with both the applicable local and state planning framework, inclusive of SPP3.7. The proposal will not have an adverse impact on the character or the amenity of the locality and accordingly, it is submitted that the proposal warrants approval.

We trust that this information is to your satisfaction and welcome the opportunity to review a draft suite of recommended conditions of approval. We otherwise look forward to your prompt and favourable recommendation to the Regional Development Assessment Panel.

Altus Planning

Attachment 1 – Planned Emergency Access Way



This document is compiled from various sources and whilst the Shire of Murray has made every effort to ensure the accuracy and currency of the information, Council accepts no responsibility or liability for any errors or omissions.

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Attachment 2 – Bushfire Prone Planning Response to DFES Comments

Attachment 3 – Amended Odour Impact Assessment

PART E – OTHER BUSINESS

1. State Administrative Tribunal Applications and Supreme Court Appeals

The DAP notes the status of the following State Administrative Tribunal Applications and Supreme Court Appeals:

Current SAT Applications				
File No. & SAT DR No.	**LG Name**	**Property Location**	**Application Description**	**Date Lodged**
DR169/2023 DAP/23/02486	City of Swan	Lot 1 (No.9) Waterhall Road, South Guildford	Child Care Premises	13/11/2023
DR179/2023 DAP/22/02358	Shire of Serpentine Jarrahdale	Lot 806 South Western Highway, Byford	Proposed Showroom and Fast Food/Takeaway Development	4/12/2023
DAP/23/02545 PA23/588	Shire of Serpentine Jarrahdale	Lot 218 (No.575) Abernethy Road, Oakford	Proposed Educational Establishment	19/12/2023

Current Supreme Court Appeals				
File No.	**LG Name**	**Property Location**	**Application Description**	**Date Lodged**
DAP/23/02496 CIV 2251 of 2023	City of Swan	Lot 2 & 67 (No.163) and Lot 18 (No.159) James Street, Guildford	Proposed redevelopment of Vaudeville Theatre	03/11/2023

*Matters finalised during the last meeting cycle.

2. General Business

3. Meeting Closure

In accordance with Section 7.3 of the DAP Standing Orders 2024 a DAP member must not publicly comment on any action or determination of a DAP.