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:

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EAQ Consulting

Environment | Air Quality

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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

Contents

Figures

Tables

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.

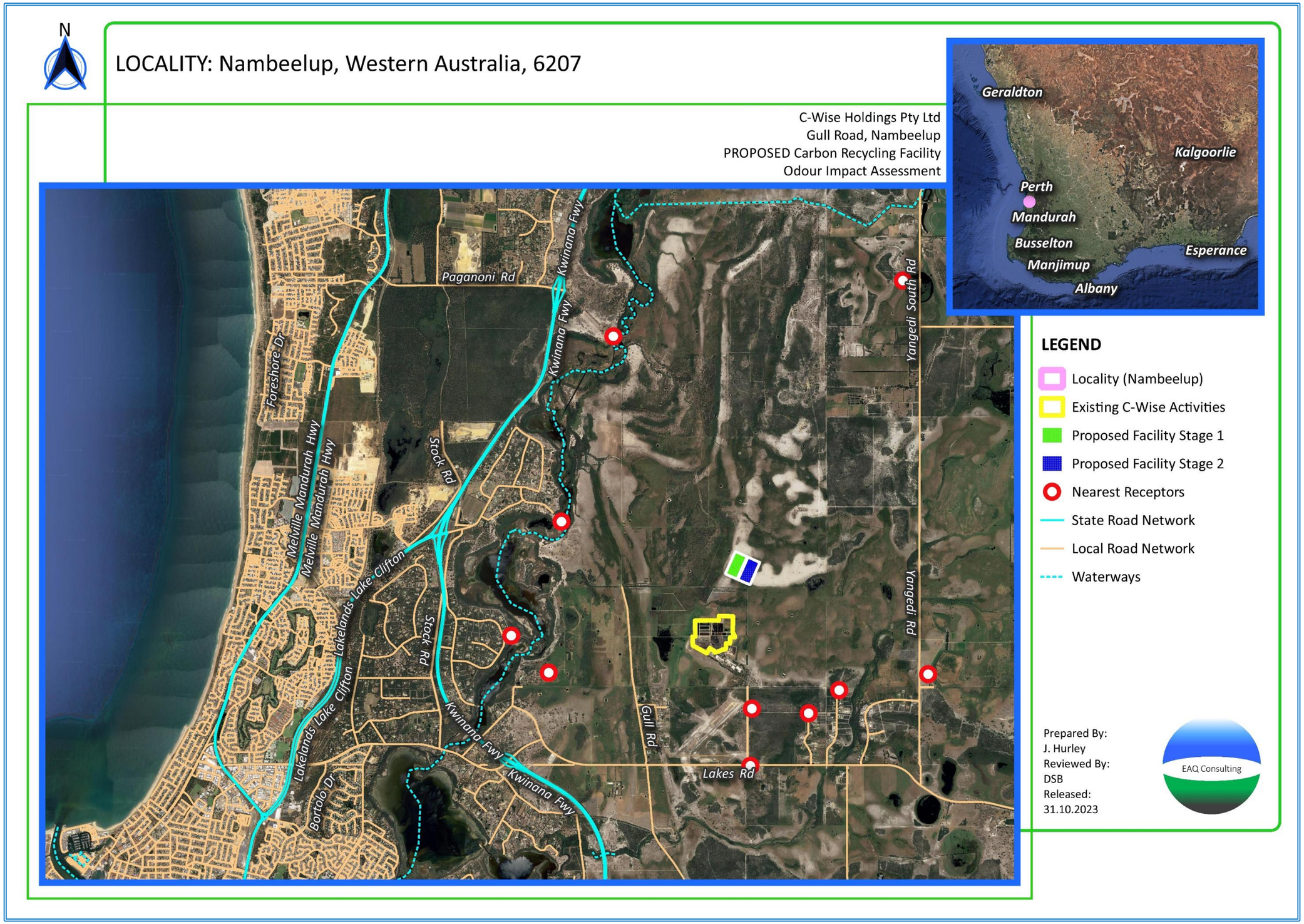


Figure 2-1: C-Wise Holdings Pty Ltd - Nambeelup Locality Map

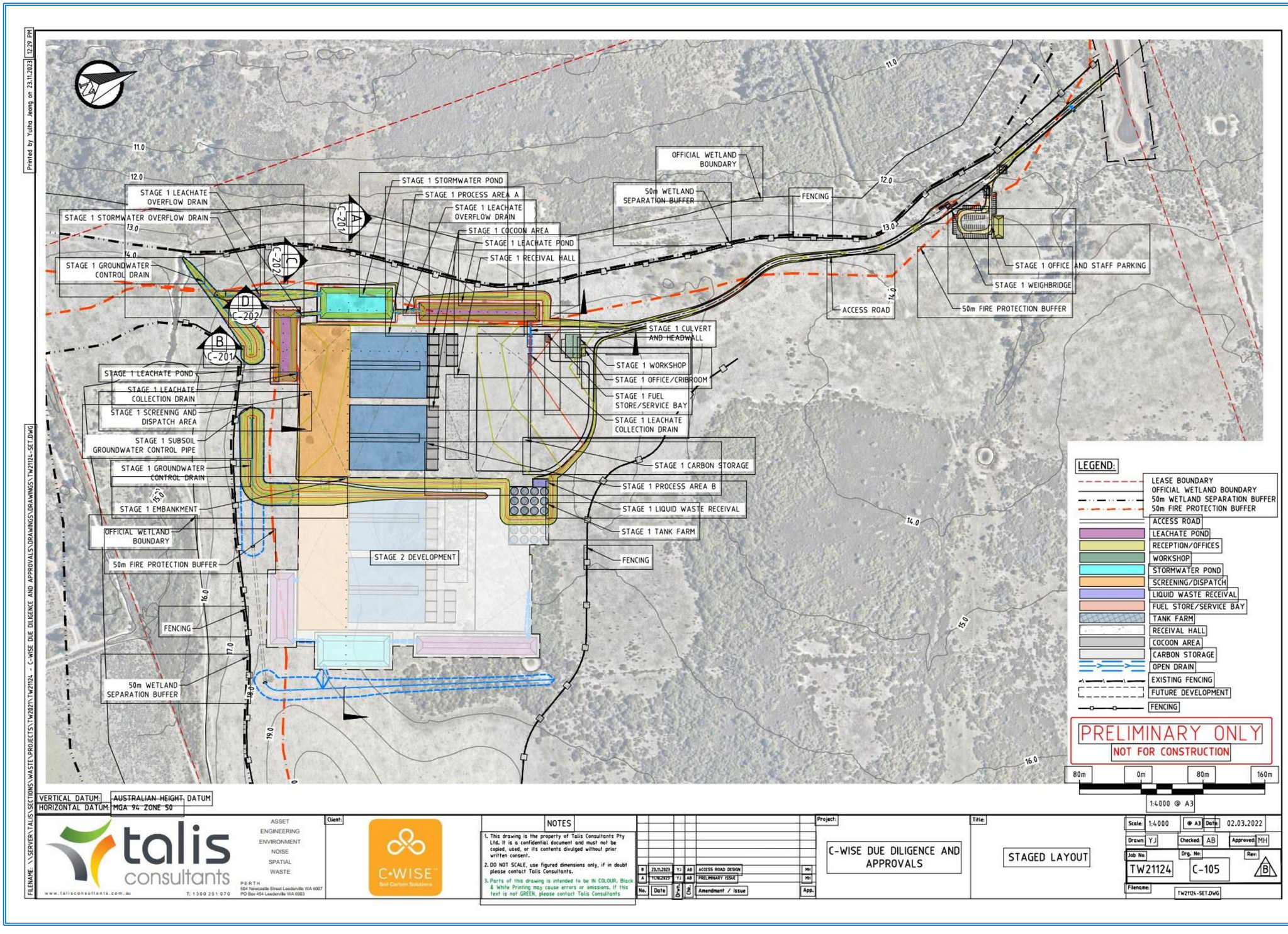


Figure 2-2: C-Wise Holdings Pty Ltd Facility Design Concept – Nambeelup

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.

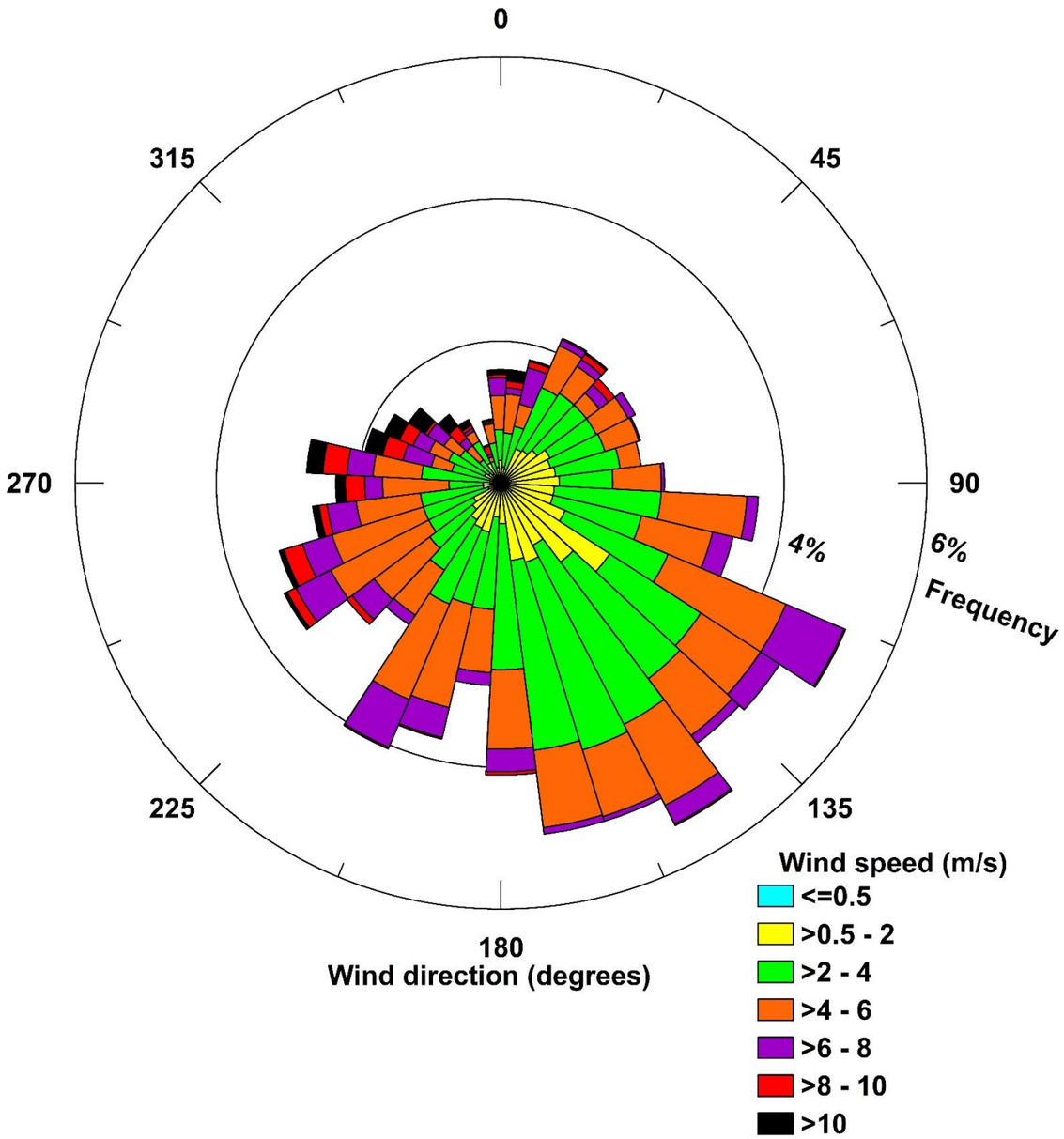


Figure 2-3: Mandurah BoM 2021 Surface Observations (WS & WD)

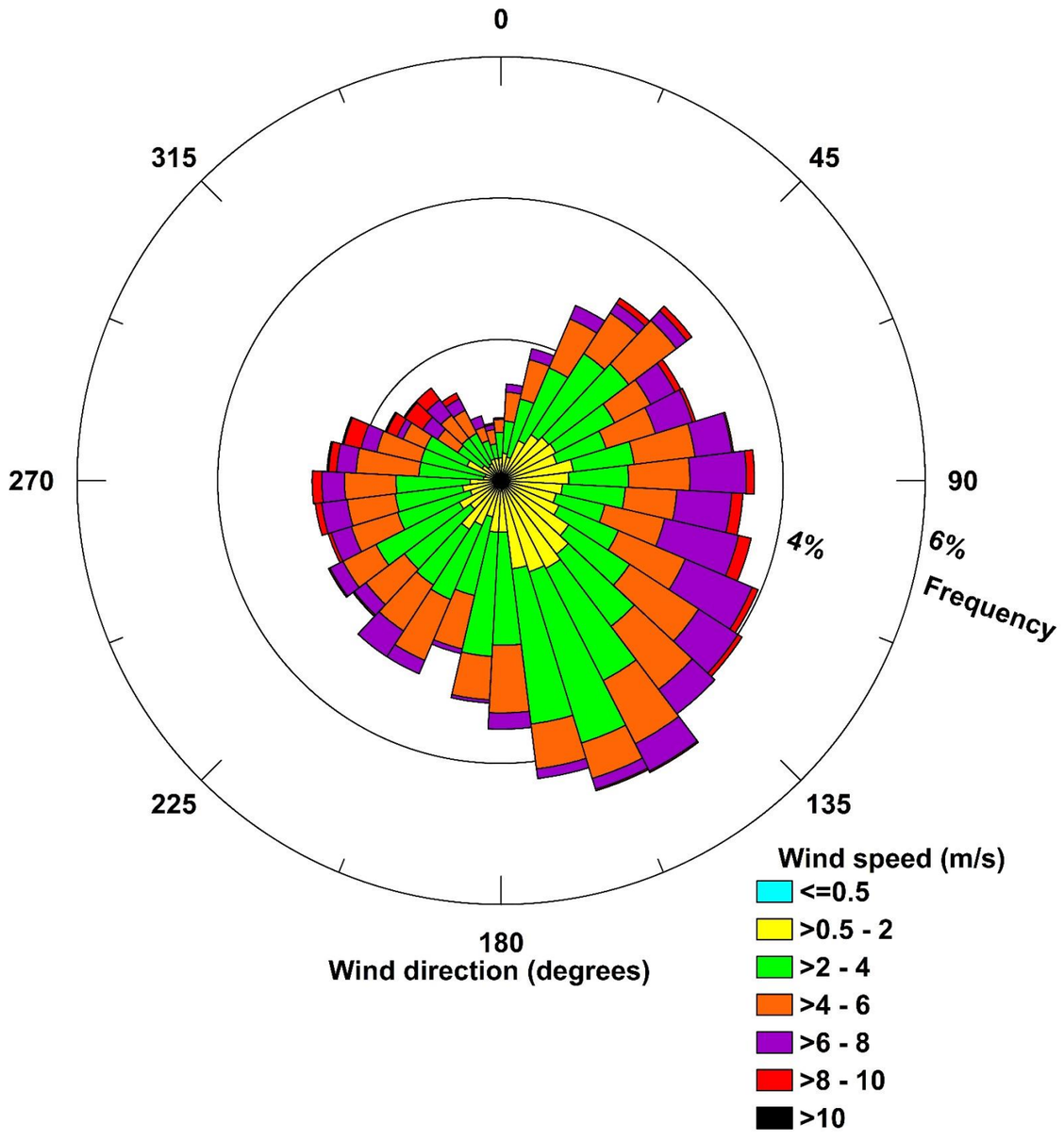


Figure 2-4: Calmet Hybrid (Mandurah BoM + TAPM) 2021 Dataset (WS & WD)

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.

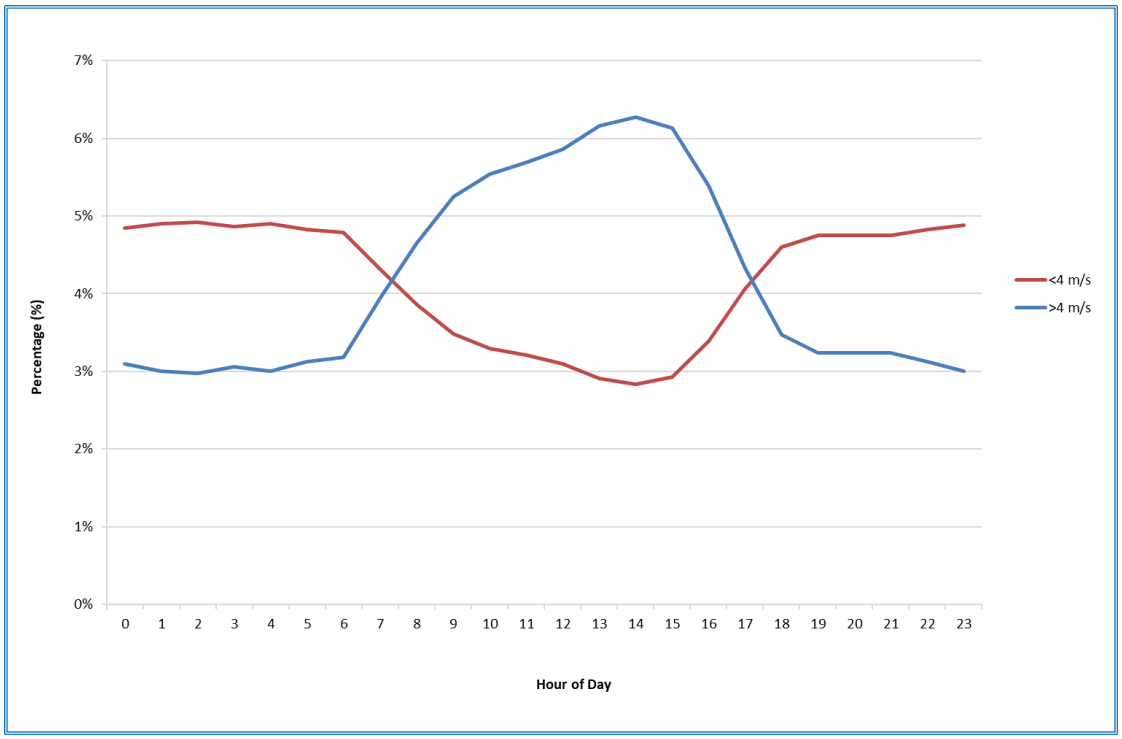


Figure 2-5: Diurnal Trends of Wind Speeds < 4 m/s & > 4 m/s

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.

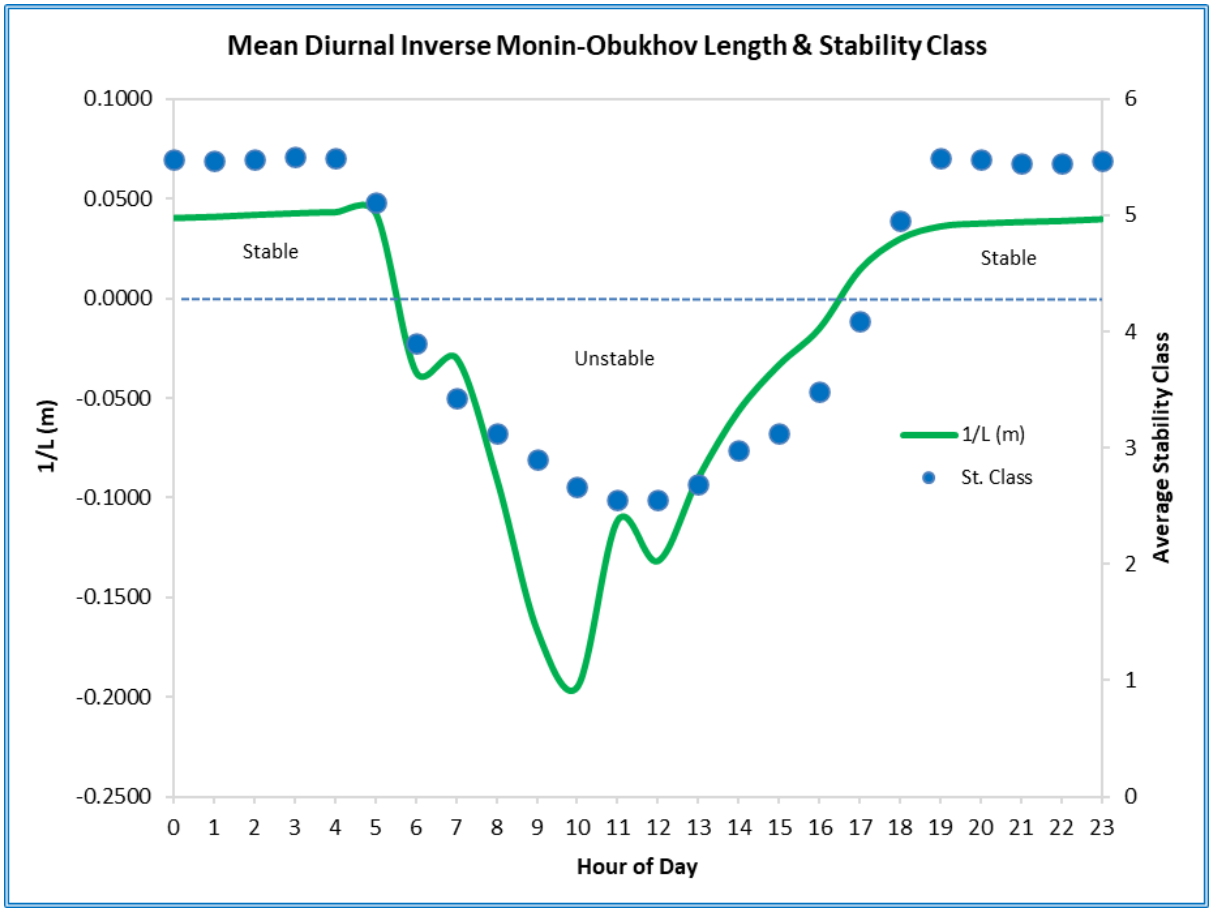


Figure 2-6: Diurnal Trends of Atmospheric Stability for locality (modelled)

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 2.8×10^{-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.

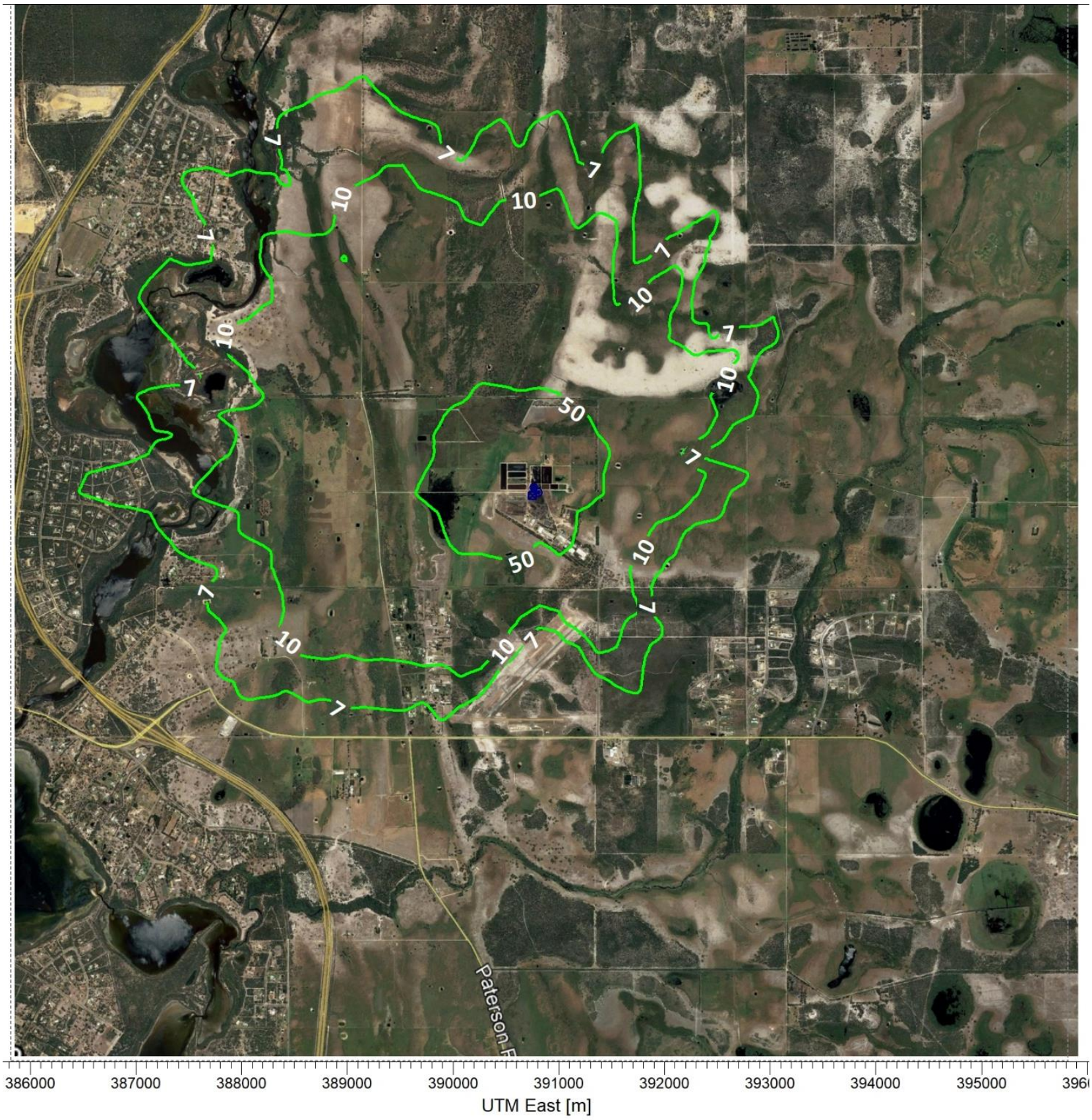
7.5 Evaluation of Odour Risk Profile

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

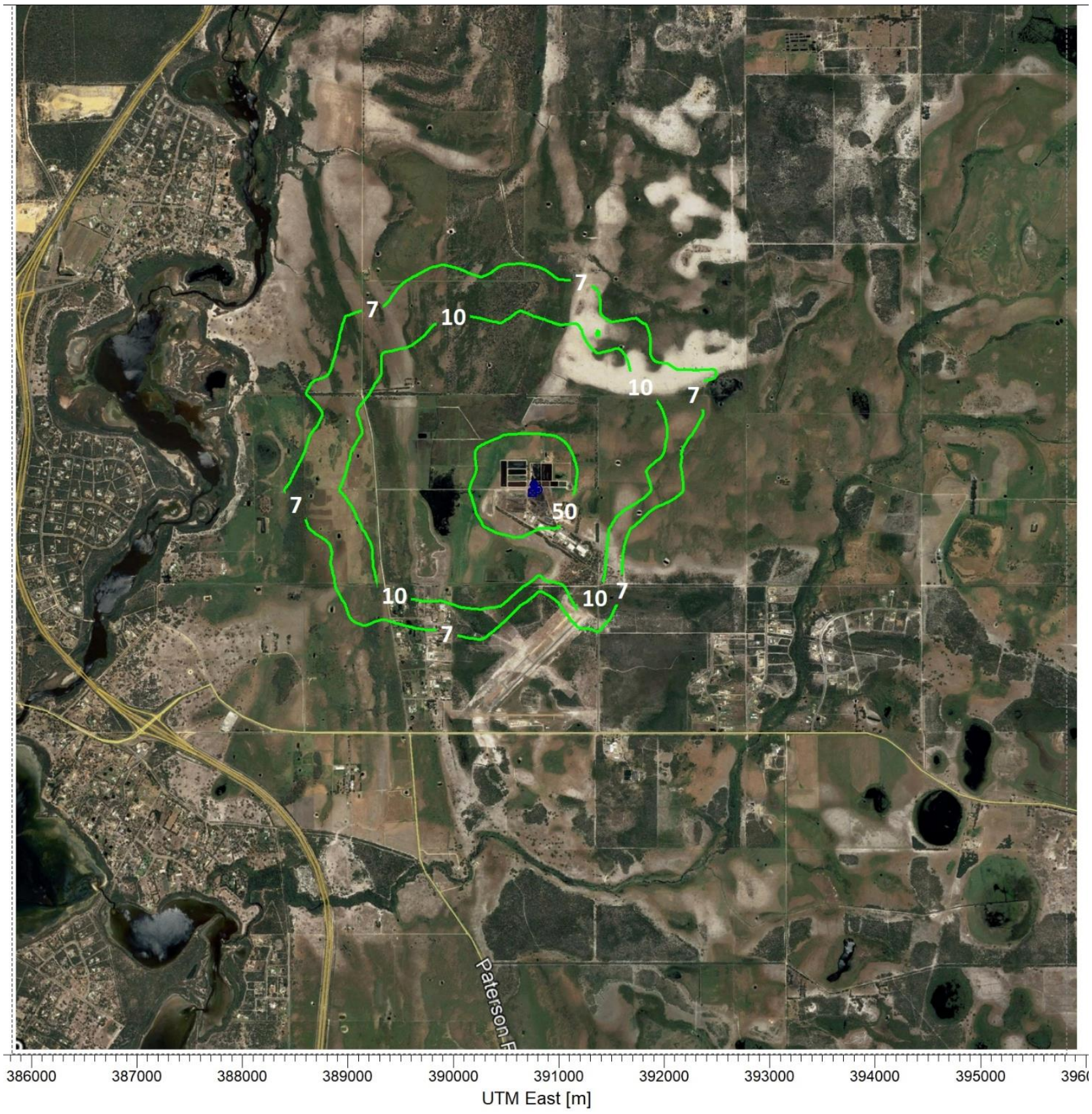
improved process concerning leachate runoff and subsequent containment leading to a reduced odour profile from process leachates.

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