WEST
SOIL & WATER

Site and Soil Evaluation

578-590 Pinjarra Road, Furnissdale WA

Report Prepared for Nick Wheeler

23 January 2026

Project Number: 20250918_Pinjarra Road Furnissdale SSE

DOCUMENT CONTROL				
Revision	**Description**	**Date**	**Authorised by**	**Issued to**
0	Rev 0	13/11/2025	S. Mueller	N. Wheeler
1	Rev 1	23/01/2026	S. Mueller	N. Wheeler

Approval for Release

Name	**Position**	**File Reference**
Sam Mueller	Managing Director	20250918_Pinjarra Road Furnissdale SSE

Signature

Summary Table

Item	Summary		
Summary information	West Soil and Water (WSW) was commissioned by Nick Wheeler (the Client) to undertake a Site and Soil Evaluation (SSE) of his property located at 578-590 Pinjarra Road, Furnissdale WA (the site). The site is comprised of three individual vacant lots, each ~2 ha in size. The client is undertaking a commercial, mixed-use large format retail (LFR) development at the site, which will have ablution facilities for customers/site staff. As a part of this development, an SSE is required to ensure that the site has sufficient capacity to receive the associated hydraulic load.		
Assessment Purpose	WSW has been asked to undertake site suitability assessment for onsite wastewater management and to recommend the type of onsite wastewater system for the proposed development/subdivision (e.g. a primary treatment system with trenches or a secondary treatment system with irrigation). Where the full report is for the purposes of supporting a planning submission under the Government Sewerage Policy 2019 (GSP), additional detail is required to be addressed as per the GSP criteria e.g. Sewage Sensitive Areas, setbacks to water resources and Land Application Area sizing. In summary, this report is in support of any subdivision or building approvals as it relates to wastewater disposal in regard to the GSP, as a determination of the lots general capacity to receive wastewater with reference to the GSP. This report is designed to provide an assessment of the site to display any setback distances which need to be observed (vertical and horizontal) and provide comment on any limitations in soils that would warrant design changes in the future wastewater installation (where approved). This report is not a design document for the wastewater system, that is to be determined by a suitable and qualified installer.		
Lot Size	Combined Lot size: 6.2179 ha		
	578 Pinjarra Rd	580 Pinjarra Rd	590 Pinjarra Rd
	2.0016 ha	2.0259 ha	2.1904 ha
	Lots have been amalgamated		N/A
Development Details	**Combined Lots**		
	6.2179 ha (62,179 m^2)		
	All two (2) lots are currently vacant.		
	No current wastewater system onsite, to be developed with future development		
Anticipated Wastewater Volume	Wastewater: 19,500 L/day		
Most limiting soil category observed	Category 1 (Gravels and Sands)		

Is the lot within a sewerage sensitive area?	Yes
Sewage sensitive areas Minimum lot size: One hectare.	This site is located within a sewerage sensitive area. The site meets the minimum 1 ha requirement as proposed.
Separation from water resources	> 100 metres of horizontal separation between water resources is available.
Separation from groundwater	This site is located within a sewerage sensitive area. Clearance to groundwater must be a minimum of 1.5 m. Groundwater was observed to be greater than >1.5 metres during the site investigation however some site engineering may be required to ensure a consistent vertical clearance to groundwater resources is available (e.g., amended mound or raised flatbed/leach drains).
Type of On-site System Required	The site is in a Sewerage Sensitive Area, and therefore secondary treatment is required.
Land Application Area (LAA)	Based on an anticipated wastewater load of 19,500 L/day and the limiting site soil (Category 1), the required LAA for disposal of secondary treated wastewater would be 390 m^2. As the two (2) lots have a combined area of 6.2179 ha, there is sufficient onsite space for disposal while also meeting the minimum lot size requirements in a sewage sensitive area as presented in Figure 1.
Disposal Method	A range of disposal options are available, and it is considered here conventional absorption trenches or beds (i.e. leach drains of flat beds) would be likely adopted, however they may require raising to ensure a constant minimum separation of 1.5 metres to groundwater remains available. The client has indicated that for each of the two (2) blocks that comprise the site, an ATU and leach drain will be provided.
Conclusion	Based on the **proposed development plans** for the site provided in Appendix A, for the creation of a large format retail (LFR) complex, the below is concluded: • A minimum application area of 390 m^2 for the onsite disposal of wastewater is required (based on current occupancy projections that assume a hydraulic load of 19,500 L/day). • The client has indicated that 2 leach drains with an approximate area of 646 m^2 each will service the site (total of 1,938 m^2). This is considered to be sufficient to receive the currently anticipated hydraulic load.
Notes	A suitably qualified installer should be utilised for any disposal apparatus on the site. Setback distances from boundaries, buildings, septic tanks, trafficable areas, surface irrigation disposal area and other structures and buildings on the boundary alignment will apply dependant on the final system installed. Note Appendix D.

Table of Contents

1 Introduction 1
1.1 Background 1
1.2 Scope of Work 1
1.2.1 Objectives and Purpose 2
1.2.2 Guidance 2
1.3 Site Evaluator Details 3
2 Site Overview 4
2.1 Current Site Extent 4
2.2 Development Details 4
3 Desktop Assessment 6
4 Site Observations and Investigations 10
4.1 Laboratory Testing 12
5 Summary of Site Investigations 14
6 Assessment against Government Sewerage Policy 19
6.1 Comment on Groundwater Separation 22
6.2 Consideration of the current development plan and status 22
6.3 Results 23
7 Evaluation and Recommendations 24
7.1 Capability to Accommodate Onsite Wastewater Disposal 24
7.2 Treatment and Disposal Options 24
7.2.1 Client Design 24
7.3 Wastewater Volumes and Land Application Areas 24
7.3.1 Trade Waste 25
7.4 Calculated Volumes 25
7.5 Disposal method 26
7.6 Capability of land to accommodate sewerage application 28
7.6.1 Cumulative impacts 28
7.6.2 Location of LAA 28
8 Conclusions 29
8.1 Notes 29
9 Assumptions, Limitations and Liabilities 31
10 References and Resources 32

Tables

Table 1: Assessment Purpose 2
Table 2: Company & Site Assessor Details. 3
Table 3: Insurance Details 3
Table 4: Current Site Details 4
Table 5: Development Details 4
Table 6: Site Characteristics. 6
Table 7: Site Observations 10
Table 8: Field Soil Observations. 12
Table 9: Laboratory Results. 13
Table 10: Soil particle analysis 13
Table 11: Summary of Soil Constraints. 14
Table 12: Assessment Against the GSP 19
Table 13: Groundwater assessment 22
Table 14: Human Waste Hydraulic Loading Rates, per Supplement to Regulation 29 (DoH) 25
Table 15: Wastewater Design Loading Rates and LAA (Category 1 soils) 25
Table 16: Consideration of Disposal Options. 26

Figures

Figure 1: Site Layout 33

Appendices

APPENDIX A Proposed Development Details
APPENDIX B Photographs
APPENDIX C Laboratory Certificates of Analysis
APPENDIX D DoH Separation Distances
APPENDIX E DoH Risk Assessment Matrix
APPENDIX F Field Data

1 Introduction

1.1 Background

West Soil and Water (WSW) was commissioned by Nick Wheeler of Furnissdale Management Pty Ltd (the Client) to undertake a Site and Soil Evaluation (SSE) of 578/580 and 590 Pinjarra Road, Furnissdale, 6209 WA (collectively referred to as the site). It is noted here Lots 578 and 580 have been amalgamated as confirmed by the client at the time of writing.

The site is a 6.2-hectare vacant property, with the client undertaking a commercial, mixed-use large format retail (LFR) development at the site, which will have ablution facilities for customers/site staff in addition to separate car and dog wash facilities. As a part of this development, an SSE is required to assess wastewater disposal and how to accommodate wastewater produced on-site.

1.2 Scope of Work

The below is presented to provide clarity to the client on the purpose of this investigation.

This SSE is undertaken to determine the capacity of the site to contain anticipated sewerage on-site, without compromising environmental and public health outcomes, and present the most appropriate treatment/on-site wastewater management system with reference to the guidelines below. In general, the following has been completed:

1. An SSE based on the risk framework of AS/NZS 1547 On-site domestic wastewater management with reference to the Government Sewerage Policy (2019) (GSP).

For the purpose of this report, this SSE is a 'general assessment', that is to:

- Undertake a site suitability assessment for onsite wastewater management;
- Recommend the type of onsite wastewater system for the proposed development;
- Support current approved, and future planning submissions, and as such, include information pertaining to the Government Sewerage Policy (Setbacks and Land Applications Areas).

Whereby:

- Final system design and placement will be the responsibility of the client and their wastewater installer, in consultation with the relevant local government authority and Department of Health (DoH) as required.

In summary, this report is in support of any subdivision or building/development approvals as it relates to wastewater disposal in regard to the GSP, as a determination of the lots general capacity to receive wastewater with reference to the GSP.

This report is designed to provide an assessment of the site to display any setback distances which need to be observed (vertical and horizontal) and provide comment on any limitations in soils that would warrant design changes in the future wastewater installation (where approved).

<u>This report is not a design document for the wastewater system, that is to be determined by a suitable and qualified installer.</u>

1.2.1 Objectives and Purpose

- Determine capacity of site to contain proposed development and sewage on-site, without compromising environmental and public health outcomes.
- Advise on the treatment/on-site wastewater management system and land application area.
- Provide advice on implementation of management and monitoring options if and where required.

With reference to the SSE Report Template provided by Department of Health (DoH), the purpose of this SSE is outlined in Table 1.

Table 1: Assessment Purpose

Assessment Purpose	Comment
General assessment: WSW has been asked to undertake site suitability assessment for onsite wastewater management and to recommend the type of onsite wastewater system for the proposed development/subdivision (e.g. a primary treatment system with trenches or a secondary treatment system with irrigation). Where the full report is for the purposes of supporting a planning submission under the Government Sewerage Policy 2019 (GSP), additional detail is required to be addressed as per the GSP criteria e.g. Sewage Sensitive Areas, setbacks to water resources and Land Application Area sizing;	**Yes** – this report is a site suitability assessment in support of development/subdivision, with additional detail
Specific assessment: You have been asked to propose a particular type of system and therefore you are providing detailed design specifications and management recommendations to support an 'application to install' an onsite wastewater system.	**No** – this scope is not presented, and a suitably qualified wastewater provider should be engaged for this purpose.

1.2.2 Guidance

Preparation of an SSE allows on-site sewage disposal systems to be optimally designed. It allows for the most efficient use of land by facilitating the design of a system that is tailored to the specific characteristics of the site and the development, instead of being designed on the basis of conservative or generic criteria.

All project works were undertaken in general accordance, and with reference to the following standards, guidelines and references:

- Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974.
- Standards Australia - AS/NZS1547:2012 On-site Domestic Wastewater Management.
- Department of Planning, Lands and Heritage 2019. Government Sewerage Policy.
- DoH. Supplement to Regulation 29 and Schedule 9 - Wastewater system loading rates.

1.3 Site Evaluator Details

Table 2: Company & Site Assessor Details.

Company	**West Soil and Water Pty Ltd**
ABN	80 670 322 915
Name of Technical Reviewer / Project Lead **Qualifications/ Experience**	**Sam Mueller** Bachelor of Science (Bsc) Env Man/ Mar Sc (Murdoch University, 27/01/2010) 15+ years environmental consultancy experience/ contaminated sites assessments
Name of Project Team Member(s) **Qualifications/ Experience**	As above
Contact Details	Up to date contact information can be found at www.westsoilandwater.com.au

Table 3: Insurance Details

Insurer	Insurance	Limit	Expiry*	Policy Number
Allianz Australia Insurance Limited ABN 15 000 122 850 AFS Licence No. 234708 (Allianz)	Public Liability	$20,000,000	10/02/2026	109XN56700COM
Berkley Insurance Company ABN 53 126 559 706 AFSL 463129	Professional Indemnity	$10,000,000	15/11/2026	202111-1195 R1 BIA

*At the time of reporting.

2 Site Overview

2.1 Current Site Extent

Table 4: Current Site Details

Description	Details		
Street Address	578 Pinjarra Rd, Furnissdale, 6209 WA	580 Pinjarra Rd, Furnissdale, 6209 WA	590 Pinjarra Rd, Furnissdale, 6209 WA
	Amalgamated		N/A
Land Description	Vacant land		
Local Government	Shire of Murray		
Zoning	Service Commercial – Scheme No.4		
Volume/Folio	2741/792	1186/442	1742/137
Lot on Plan	401 - 063717	154 – 020014	155 – 020014
Total Lot Area	2.0016 ha	2.0259 ha	2.1904 ha
	4.0275 ha		
Bore onsite for drinking water purposes?	No		

2.2 Development Details

The proposed development is for the construction of a large format retail (LFR) building. Development plans are presented in Appendix A.

Table 5: Development Details

Description	Details
General description	Development of a commercial, mixed-use LFR development
Purpose of Assessment	New development
Are building envelopes confirmed?	Per Appendix A
Planned Site Details	6.62 ha
	No current building, proposed LFR building
	Wastewater system to be installed onsite during development works
	Refer Appendix A for detailed plans.
Anticipated Wastewater Volume(s)	Wastewater: 19,500 L/day

Trade Waste Volume	N/A
Sewerage Sensitive Area?	Yes
Drinking Water Source Area?	No
Sewerage available for the property (via Water Corporation)	No
Water Source	Scheme

The client is intending to install a single (1) 20 kL aerobic treatment unit (ATU) per lot (total of 2 lots). The client intends to dispose treated wastewater via leach drains of dimension 21.55 metres by 30 metres (~ 650 m^2). A total of two (2) leach drain areas are to be utilised (see Figure 1) equating to 1 per lot.

3 Desktop Assessment

Assessment of the site-specific and regional characteristics requires understanding the site and surrounding characteristics to ascertain limiting factors to be considered in the type, and placement of wastewater disposal at the site. The table below outlines the desktop review and site observations to the existing environment and general site characteristics.

Table 6: Site Characteristics.

Item	Summary	Comment on Constraint Potential	Source of Information
Climate / Evaporation	Historical Data Mean Rainfall: 629.8 mm Lowest mean rainfall month: December Highest mean rainfall month: June Mean annual evaporation of 1,600mm Evaporation Balance: 970.2 mm	Where evaporation exceeds rainfall, the stored water levels in the soil profile are reduced, thereby reducing the size of the land application area and generally reducing the risk of off-site effluent export, however some contaminants (e.g. nutrients) may build up in the soil profile. No significant constraint noted.	BoM, Sept 2025 Department of Agriculture and Food, 2003
Exposure	Mean Solar Exposure: 5.3 kWh/m^2 (2.5 – 8.3 kWh/m^2 (lowest in June, highest in December)).	High exposure to sun, low-moderate shade, good ventilation should assist with evapotranspiration of effluent.	BoM, 2025
Vegetation	The site is mostly covered by native vegetation, including mature trees and shrubs. Ground cover is present as grass. Clearing of the site is assumed to be a likely need for future development.	Low constraint.	Landgate's Locate V5 Online Mapping Tool, 2025. In field observations.

Landform/ **Topography/** **Slope/** **Erosion Potential**	The site is low lying with no visible slope, sitting at 2 - 4 mAHD. No significant curvature is noted in the proposed application area (convex or concave), and it is assumed that this will not change with any future development (with the exception of building pads). The maximum slope suitable for on-site sewage systems is dependent upon the type of system proposed and ranges from 10% to 30% (Standards Australia and Standards New Zealand 2012), with surface application systems more sensitive to slope. The topography within the investigation area (excluding localised irregularities) is noted at <10% - with <3% of map unit with high to extreme water erosion risk. No signs of erosion within the area of proposed wastewater disposal are noted. Area has a negligible slope, is moderately compacted, with minor amounts of vegetation throughout. Considered stable with low erosion potential. DPIRD Land instability risk mapping indicates a low risk of erosion with < 3% of the map unit having a high to extreme risk of water erosion risk. In addition, no rainfall runoff was observed given winter conditions (assessment undertaken in September).	No constraint noted.	Landgate's Locate V5 Online Mapping Tool, 2025 With site reference to National Committee on Soil and Terrain (2009). DPIRD-072 Mapping Layer, 2025 DPIRD-013 Mapping Layer, 2025
Flood Risk	The location is not listed to be within a flood plain risk according to DWER's Floodplain Mapping Tool.	Low constraint noted.	Sourced from Locate V6 – DPIRD-007 map and DWER's Floodplain Mapping Tool, 2025

Groundwater / Groundwater Bores / Groundwater Abstraction Areas	The Perth groundwater atlas indicates that the depth to groundwater (mbgl) at the site ranges from ~ 2.12 – 2.41 mbgl. Review of DoW WIN sites which indicates there are no groundwater bores within the property, or within 30 m of the boundary of the proposed lots, however numerous active groundwater licences are noted to be within a 1 km radius of the site. Additionally, DoW Water Information Reporting mapping tools indicate multiple monitoring wells/bores within 500 metres of the site, with maximum depths ranging from 0.9 – 10.97 mbgl. Groundwater was observed within two (2) of the three (3) test pits constructed during the investigation, at 1.9 mbgl and 1.7 mbgl. Based on the above, groundwater levels are conservatively estimated to be > 1.5 mbgl.	Moderate constraint noted.	DWER, Perth Groundwater Atlas DWER, Water Information Reporting Infield observations.
Surface Waters and Wetlands	The Serpentine River is located ~550m from the site boundary. There are no other surface waters or dams located within the proposed subdivision nor within 100m of the site's boundary.	Low constraint noted.	Infield observations. Sourced from Landgate's Locate V5 Online Mapping Tool, 2025 DPIRD-083 Mapping Layer, 2025
Soil Landscape	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.	Detailed site soil information presented in Section 4.	Sourced from Landgate's Locate V5 Online Mapping Tool. DPIRD-027 Mapping Layer.

Geology/ Landform	**Bedrock:** Warnbro Group: Interbedded sandstone, siltstone, and shale; minor conglomerate **Regolith:** Sandplain, mainly eolian; includes some residual deposits **Dominant surface soil groups:** Pale sands.	Discussed in detail within this report.	Sourced from Landgate's Locate V5 Online Mapping Tool. DPIRD-077 & 079 DMIRS-016 & 17

4 Site Observations and Investigations

The site was attended on the 26/09/2025 by qualified environmental scientists. The following was undertaken:

- Walkover of the site and collection of site observations. Photographs of the site can be found in Appendix B.
- Installation of three (3) test pits to a maximum depth of 2.0 m below ground level (mbgl).
- Observation and photographic recording of soil horizons.
- Collection of soil samples of identified soil horizons, ensuring assessment of perceived limiting soil horizons in accordance with the GSP and AS/NZS1547:2012.

Results of the site visit are presented in the following tables.

Table 7: Site Observations

Item	Summary
Site Walkover	A site walkover was undertaken by West Soil and Water which confirmed the site slope (minimal to no slope noted through the site, surface lithology and surrounding land-uses (commercial)). The site is a vacant with numerous trees and bushes present in addition to grasses/weeds as ground cover. No surface waters were identified during the site visit within the lot boundary.
Test Pits	Three (3) test pits (via excavator) were completed at the site to ascertain an appropriate review of soil conditions (Figure 1). Samples were taken from Test Pit 1 and are considered representative of onsite soils. • TP1: First test pit was located within the boundary of 578 Pinjarra Road and in the (general) proposed area of the wastewater treatment system, dug to a maximum depth of 2.0 mbgl. • TP2: Second test pit was located within the boundary of 580 Pinjarra Road, dug to a depth of 2.0 mbgl. • TP3: Third test pit was located within the boundary of 590 Pinjarra Road, dug to a depth of 2.0 mbgl. Lithology field observations and inferred soil categories (AS/NZS 1547:2012) are summarised in Table 6. Groundwater was identified within TP1 (1.7 mbgl) and TP3 (1.9 mbgl). No water was observed within TP2.

Sample Collection and Analysis	Based on observed soil horizons, the following soil samples were collected from test pits. • TP1: Sample collected from 1.0 mbgl (sample reference "TP1 1.0"). • TP1: Sample collected from 2.0 mbgl (sample reference "TP1 2.0"). Analysis of the sampled soils was completed, with all laboratory certificates presented in Appendix C. Samples were collected for the assessment of the following: • Phosphorus Adsorption (mg/kg). • Soil Classification by Particle Size Analysis (Sieve). • Hydrometer and SPD analysis to "Yellow Book" specification – 4 analytes. • pH and Electrical Conductivity EC1:5 (salinity). • Sodicity (Exchange Sodium Percentage, ESP).
Permeability testing	An infiltrometer was used onsite to determine an indicative rate at which water infiltrates the soil at a location immediately adjacent to Test Pit 1 at a depth of 0.5 mbgl. A second infiltration test was not undertaken based on site soils from the test pits remaining consistent. In-field infiltration testing was undertaken utilising a (Cromer) Constant Head Field Permeator, which measures indicative field-saturated hydraulic conductivity. The permeator operates under 'constant head' conditions, where a constant depth to water is maintained within test holes while the reservoir contains water. Calculations are performed by observing the water level within the reservoir and noting the time at which specific volume intervals are reached, allowing for water flow rate and saturated hydraulic conductivity (K_{Sat}) of a known borehole diameter to be determined. Calculated in field at TP 1 location K_{Sat} (m/day): TP1: 6.93 m/day
Uncontrolled Fill	Not identified

Table 8: Field Soil Observations.

Test Pit /Location	Depth Range (m below surface)	Description	Soil Category (AS/NZS 1547:2012)	Indicative Soil Permeability (AS/NZS 1547:2012)
TP1	0.0 – 1.0 (A)	Grey coarse sand with some brown colouring and possible silt inclusions.	Gravels and Sands (Soil Category 1)	Weakly structured (K_{Sat}: >3.0 m/day)
	1.0 – 2.0 (B)	Light brown to brown coarse sand with possible silt inclusions.	Gravels and Sands (Soil Category 1)	Weakly structured (K_{Sat}: >3.0 m/day)
TP2	0.0 – 0.7 (A)	Grey coarse sand with some brown colouring and possible silt inclusions.	Gravels and Sands (Soil Category 1)	Weakly structured (K_{Sat}: >3.0 m/day)
	0.7 – 2.0 (B)	Light brown to brown coarse sand with possible silt inclusions.	Gravels and Sands (Soil Category 1)	Weakly structured (K_{Sat}: >3.0 m/day)
TP3	0.0 – 1.0 (A)	Grey coarse sand with some brown colouring and possible silt inclusions.	Gravels and Sands (Soil Category 1)	Weakly structured (K_{Sat}: >3.0 m/day)
	1.0 – 2.0 (B)	Light brown to brown coarse sand with possible silt inclusions.	Gravels and Sands (Soil Category 1)	Weakly structured (K_{Sat}: >3.0 m/day)

4.1 Laboratory Testing

Laboratory analysis results are presented in Table 9, with soil particle analysis presented in Table 10.

Soils are noted to be slightly alkaline, with a varying phosphate adsorption capacity. They predominately consist of coarse sands (93 – 95%), with negligible fractions of clay, silt, fine sand and gravels.

Table 9: Laboratory Results.

Test Pit Location	Depth (m)	pH / EC (dS/m)	Phosphorus Sorption (mg P sorbed/kg)*	Soil Particle Density (g/cm^3)	Sodicity (Exchangeable Sodium %)
TP1	1.0	9.0 / 0.035	< 250	2.60	0.8
TP1	2.0	8.6 / 0.035	413	2.61	2.1

Table 10: Soil particle analysis

Test Pit	Depth	Clay (<2 µm)	Silt (2-20 µm)	Fine Sand (0.02-0.2 mm)	Coarse Sand (0.2-2.0 mm)	Gravel (>2mm)
		%				
TP1	1.0	2	2	< 1	95	< 1
TP1	2.0	2	2	2	93	1

5 Summary of Site Investigations

Table 11 outlines the soil constraint summary and discussion from the soil investigations per DoH guidance.

Table 11: Summary of Soil Constraints.

Characteristic	Summary	Source	Level of Constraint	Comments
General Site Characteristics				
Climate (difference between average annual rainfall and average pan evaporation, mm/year)	Mean Rainfall: 630 mm Mean Evaporation: 1,600 mm Evaporation Balance: 970 mm	BoM, 2025 Department of Agriculture and Food, 2003	Low	Where evaporation exceeds rainfall, the stored water levels in the soil profile are reduced, thereby reducing the size of the land application area and generally reducing the risk of off-site effluent export, however some contaminants (e.g. nutrients) may build up in the soil profile.
Exposure to Sun & Wind Vegetation Coverage	Mean Solar Exposure: 5.3 kWh/m^2 Vegetation Coverage: Some native vegetation (trees/shrubs).	BoM, 2025 Visual Evidence (Vegetation)	Low	Significant solar exposure and good vegetation cover provide ideal evapotranspiration conditions.
Landslip/Potential Landslip/Erosion	<3% of the map unit has a high to extreme water erosion risk.	Locate V6 - DPIRD-013 & DPIRD-016, 2025	Low	Unlikely to experience a significant water impact event that would result in sudden erosion.
Slope Form (affects water shedding ability)	No visible slope observed onsite.	Locate V6 – DPIRD-072	Low	Landform assessment, based on topography.
Site Drainage	No evidence of any dampness onsite – September 2025.	Visual Observation	Low	No moisture or surface water noted aside from within the perimeter trench.

Slope Gradient - Absorption Trenches	< 10%	Locate V6 – DPIRD-072	Low	Desktop assessment indicates that the elevation increases at an even rate. The maximum slope suitable for on-site sewage systems is dependent upon the type of system proposed and ranges from 10% to 30% (Standards Australia and Standards New Zealand 2012), with surface application systems more sensitive to slope. The topography within the investigation area (excluding localised irregularities) is noted at <10%.
Fill	No fill noted.	Visual observation	Low	Natural soils observed during excavations at the site.
Flood Frequency (AEP)	No evidence in source tools that the site is located on a floodplain and/or at risk of flooding.	Locate V5 & DWER Floodplain Mapping Tool	Low	Comparison of available mapping tools indicates that there is a low risk of flooding occurring within the site area.
Private Bore Onsite	No bores are noted within the site boundaries.	Field Notes DWER Water Information Reporting – offline as of 25-09-2025.	Low	No setback distances relating to the presence of onsite bores are necessary.
Proximity to Water Resources	No water sources are noted to be within 100m of the site's boundary.	Locate V5 – DWER-031 & DBCA-019, 2025	Low	No setback distances relating to the close proximity of water resources are necessary.
Groundwater Depth (Wettest Time of Year)	> 1.5 mbgl (conservatively) when the site was assessed in September and including online database information.	DWER Perth Groundwater Map. DWER Water information Reporting – offline as of 25-09-2025. Visual observations.	Moderate	Groundwater was observed at 1.7 mbgl and 1.9 mbgl in TP1 and TP3 respectively (no water was observed in TP2) in September. A conservative value of 1.5 mbgl for the site has been utilised. Givern this constraint, some site engineering **may** be required to ensure appropriate vertical separation is available (i.e., raised systems/mounds).

Rock Outcrops	< 20%	Visual Observation	Low	No significant rocks or gravels were noted at surface level across the property.
Stormwater run-on/run-off	Low likelihood	Visual Observation	Low	Based on minimal slope observed onsite.
Lot Size	The three (3) lots encompass an area of 6.62 hectares.	Landgate Client-provided information	Low	There is sufficient area per GSP requirements.
Soil Profile Characteristics.				
Soil Permeability Category (AS1547)	1 – Gravels and Sands.	Onsite assessment.	Moderate	Analysis indicates that site soils have a high infiltration rate which can be a constraint given the shallow depth to groundwater. This reduces the contact time that any disposed wastewater has with soil to remove nutrients, which may result in nutrient introduction to groundwater. Some site engineering **may** be required to extend contact time (i.e., reduce infiltration rate).
Profile Depth	2 m	Visual Observation	Low	No hardpan or bedrock was encountered to a test pit depth of 2 metres.
Hardpan/bedrock	> 2 m	Visual Observation	Low	
Mottling	No mottling noted	Visual Observation	Low	No evidence of mottling was observed in site soils.
Coarse Fragments or Gravel	TP1 1.0: < 1% TP1 2.0: 1%	Laboratory Analysis	Low	Minimal presence of gravels will not impede plant growth or water infiltration.
pH	TP1 1.0: 9.0 TP1 2.0: 8.6	Laboratory Analysis	Moderate	Alkaline pHs can impede/prevent plant growth, however, based on the presence of vegetation/groundcover across the site, the pH is

				unlikely to be a constraint to site development. It is noted that soil supplements can be utilised to improve pH conditions of the soil (i.e., elemental sulphur to reduce the pH).
Electrical Conductivity (dS/m)	TP1 1.0: 0.035 TP1 2.0: 0.035	Laboratory Analysis	Low	Low conductivity results indicate soils are not saline, which would impact plant growth.
Sodicity (ESP%)	TP1 1.0: 0.8% TP1 2.0: 2.1%:	Laboratory Analysis	Low	Minimal sodicity indicates that site soils are unlikely to display any dispersive effects which may impact infiltration rate.
Phosphorus Adsorption	Phosphate Sorption Capacity TP1 1.0: < 250 mg P sorbed/kg TP1 2.0: 413 mg P sorbed/kg	Laboratory Analysis	Moderate	The soil has a low to moderate capacity for phosphorus uptake. This increases the likelihood of nutrients migrating into groundwater (dependent on the groundwater level). Like pH management, soil supplementation can improve the likelihood of nutrient binding and retention (e.g., organic matter/mulch).
General Soil Characteristics	Two (2) soil horizons were observed during test pitting with some minor variation in properties. Site soils are generally alkaline and are highly permeable, with some variability in nutrient uptake (poor uptake in shallow soils that improves to moderate at greater depth). Site soils are not considered sodic. Additionally, soils display a high infiltration rate and groundwater across the site is conservatively	Laboratory Analysis Visual Observations	Low	Soils are noted to be highly permeable, and groundwater is considered shallow at the site (> 1.5 mbgl). Given the limited nutrient uptake capabilities of the site soils, secondary treatment will add benefit (required based on the site being in a sewerage sensitive area regardless). As an alternative, where wastewater is to be disposed of, incumbent soils could be substituted with soils (imported offsite) that have ideal characteristics for wastewater disposal (slightly reduced infiltration rates and improved nutrient adsorption/retention). Additionally, to improve the vertical separation to groundwater, a mound/raised system can also be

	estimated at > 1.5 mbgl (shallow). Soils are mostly comprised of coarse sands with negligible fractions of clay, silt, fine sand and gravels.			constructed. While alkaline pHs were noted in site soils, they are not anticipated to disrupt onsite vegetation growth (based on the plants/groundcover observed during the site investigation). As such, while some constraints are noted, appropriate soil management can mitigate these issues.

6 Assessment against Government Sewerage Policy

The site is located within a sewerage sensitive area and must meet the requirements for on-site wastewater disposal under the Government Sewerage Policy (GSP) (2019). These are addressed below.

Table 12: Assessment Against the GSP

GSP (2019) Criteria	This Site
General	
Is the lot within a public drinking water source area?	No
Is the lot within a sewerage sensitive area?	Yes
Lot Sizes	
Public drinking water source areas in rural, rural residential/rural living zones **Minimum lot size: One to four hectare.** Minimum lot size dependent upon priority area (P1, P2 and P3) and zone. Refer to Water quality Protection Note 25: Land use Compatibility Tables for Public Drinking Water Source Areas for further guidance	Not applicable to this proposed development.
Sewage sensitive areas **Minimum lot size: One hectare.** Land in a sewage sensitive area that is already zoned for urban use with a residential density coding of R 2 to R10 under a local planning scheme or structure plan endorsed by the Western Australian Planning Commission, may be subdivided in accordance with the existing density coding. Where R10 subdivision is proposed, it should be demonstrated that the density coding was assigned with the understanding that reticulated sewerage would not be provided. Smaller lots in sewage sensitive areas may be considered for non-residential, commercial and industrial subdivision on a case-by-case basis where it can be demonstrated that the proposal meet the minimum site requirements and the responsible authority, in consultation with relevant agencies is satisfied that the proposal is consistent with the objectives of this policy.	This site is located within a sewerage sensitive area, however, will not be subdivided. The combined size of the site meets the minimum required lot size.

Urban/Industrial subdivision outside public drinking water source areas and sewage sensitive areas **Minimum Lot size: 2,000 m^2.** For heavy soils, secondary treatment systems will be required to achieve this lot size (refer to Table 1 in Schedule 2 of the GSP).	Not applicable to this proposed development.
Outside public drinking water source areas and sewage sensitive areas and: • Infill residential or commercial subdivision in existing urban areas; or • Residential and commercial subdivision in towns outside the Metropolitan and Peel Region Scheme areas without an established reticulated sewerage scheme; or • Residential and commercial subdivision in towns outside the Metropolitan and Peel Region Scheme areas with existing sewerage schemes (as listed in Schedule 3) where unsewered subdivision at the density proposed is specifically provided for through the provisions of the local planning scheme or a local structure plan endorsed by the Western Australian Planning Commission **Minimum Lot size: 1,000 m^2.** The average lot size is not to be less than 1,000 m^2 , with a minimum individual lot size of 950 m^2 . Does not apply for soil category 6 (medium to heavy clay), where larger lot sizes are required. For soil categories 4 (clay loams) and 5 (light clays), secondary treatment systems will be required (refer to Table 1 in Schedule 2 of the GSP).	Not applicable to this proposed development.
Survey strata lot or strata lot for an approved grouped dwelling, commercial or industrial development (outside public drinking water source areas). **Minimum Lot size: Case by Case Assessment.** The on-site system for strata schemes must service each lot and should be owned and operated by a single person or entity contracted to provide the service or the strata company for the strata scheme. An acceptable maintenance program should be in place for the system and disposal area. Due regard to be given to impacts within sewage sensitive areas.	Not applicable to this proposed development.
Separation from Water Resources	
An on-site sewage system is not to be located within: • a wellhead protection zone or on Crown land within a reservoir protection zone;	Not applicable to this proposed development.

• 100 metres of the high-water mark of a reservoir or 100 metres of any bore used for public drinking water supply where: — a wellhead protection zone or reservoir protection zone has not been assigned; or — where existing lots would be rendered undevelopable by the wellhead protection zone;	Not applicable to this proposed development.
• 30 metres of a private bore used for household/ drinking water purposes;	Not applicable to this proposed development.
• 100 metres of a waterway or significant wetland and not within a waterway foreshore area or wetland buffer. The separation distance should be measured outwards from the outer edge of riparian or wetland vegetation;	Not applicable to this proposed development.
• 100 metres of a drainage system that discharges directly into a waterway or significant wetland without treatment;	Not applicable to this proposed development.
• Any area subject to inundation and/or flooding in a 10 percent Annual Exceedance Probability (AEP) rainfall event. Smaller setbacks may be considered where a proponent demonstrates, to the satisfaction of the responsible authority in consultation with the relevant advisory agencies (Department of Water and Environmental Regulation and/or Department of Biodiversity, Conservation and Attractions, Department of Health and/or Local Government) that the reduced setbacks will not have a significant impact on the environment or public health.	Not applicable to this proposed development.
Separation from Groundwater	
The discharge point of the on-site sewage system should be at least the following distances above the highest groundwater level, taking into account the range of seasonal groundwater conditions in the context of long-term variability and possible groundwater rise following development: • two metres in public drinking water source areas; • 1.5 metres in sewage sensitive areas; and • 0.6 to 1.5 metres in all other areas, depending on soil type and the type of treatment system used (refer to schedule 2 of the GSP). Where the use of fill is proposed to achieve separation distances, proponents may be required to provide additional information to demonstrate that solutions are effective, do not impact on other lots through water diversion, are not cost prohibitive and will not compromise amenity or landscape values.	This site is located within a sewerage sensitive area. Clearance to groundwater must be a minimum of 1.5 m. The groundwater is considered shallow, with an anticipated depth > 1.5 mbgl, with groundwater observed at 1.7 mbgl (TP1) and 1.9 mbgl (TP3). Some engineering may be required onsite (e.g., mound or raised leach drains/flat beds) to ensure sufficient vertical separation is available.

Type of On-site System Required	
Secondary treatment systems with nutrient removal will generally be required in public drinking water source areas and sewage sensitive areas. In all other instances, secondary treatment systems should only be required to address site-specific physical or environmental constraints (refer to Schedule 2). In rural and remote areas, determination of the type of treatment system required should consider the availability of maintenance personnel required to service secondary treatment systems in accordance with Department of Health requirements.	The site is located in a Sewerage Sensitive Area, and therefor secondary treatment is required.
Land Application Area (LAA)	
Each lot should be of sufficient size to accommodate development and an unencumbered land application area for the disposal of sewage in accordance with Schedule 2 of the policy.	While final system plans are not yet available, there is sufficient area onsite for wastewater disposal based on the required LAA.

6.1 Comment on Groundwater Separation

Further to the information provided in Table 12, the following has been assessed to determine whether sufficient data is available for decision making on groundwater separation:

Table 13: Groundwater assessment

Is regional groundwater data available?	Yes
Was groundwater observed in any constructed test pits during the site investigation?	Yes
Is groundwater likely to breach vertical separation requirements?	Possible – consideration needed in design
Are <u>further</u> works required to be completed during the winter period?	No (initial works completed in September)
Are there any indicators of perched aquifers/groundwater?	No

Based on the above, sufficient data is available regarding any decision making relating to groundwater separation.

6.2 Consideration of the current development plan and status

At the time of this report, a draft site plan has been provided, as well as an indicative location of the proposed wastewater disposal area, and this SSE is being completed as a component of the approvals process. The client is engaging a contractor to design the wastewater system.

The investigation is to demonstrate that the proposed development can accommodate an appropriate wastewater disposal area. The proposed disposal area discussed in this SSE and presented in relevant figures is considered as:

- The required Land Application Area LAA within the available area not restricted horizontal separations.
- Occupies as much practical space as is available to ensure that final calculated minimum LAA can be utilised within this space, while maintaining horizontal distances.
- Sufficient room to ensure that once final development plans are made, appropriate horizontal setback to buildings and boundaries can be achieved (per Appendix D).

It is considered here that this assessment is based on the site's current condition. Future development factors may include the use of fill material in the general vicinity of the site, and slight alterations to the footprint may occur. With this considered:

- This SSE proposes to define the sites' ability to receive wastewater, and display that appropriate separations distances and apparatus requirements are met *in principle* (within the limits of the proposed application area); and
- Once final building plans have been developed and projected occupancies calculated, this SSE should be revised to ensure the proposed improvements correspond with the outcomes of:
    - This report and any decisions or conditions imposed by the local government authority and/or the DoH.

It is the client's responsibility to, in conjunction with a suitably qualified installer, design and construct a suitable system within the limitations presented in this report.

6.3 Results

The land capability assessment indicates that the site is generally suitable for on-site sewage treatment and disposal. However, minor constraints exist due to:

- Its location within a 'sewage sensitive area'; and
- The presence of shallow groundwater across the site.

Secondary treatment systems are required due to the site's setting in a sewerage sensitive area. These systems will help mitigate nutrient leaching and protect nearby water bodies and local groundwater.

The presence of shallow groundwater increases the likelihood of nutrient-rich water migrating into local groundwater below the site. In addition to secondary treatment systems, increasing the vertical separation distance between the proposed wastewater disposal area and the maximum groundwater level can provide additional contact time for soil to remove additional nutrients from wastewater.

7 Evaluation and Recommendations

7.1 Capability to Accommodate Onsite Wastewater Disposal

The following has been identified under assessment against the GSP as requiring management (per Section 6):

- The site is located within a sewage sensitive area.
- The presence of shallow groundwater across the site.

7.2 Treatment and Disposal Options

As per the GSP 2019, where wastewater is to be disposed in a 'sewage sensitive area', it must undergo onsite secondary wastewater treatment and maintain a minimum 1.5 metre vertical separation distance to groundwater.

The selected secondary treatment system must be DoH approved.

7.2.1 Client Design

The client intends to treat wastewater produced onsite using ATUs (secondary treatment), with two (2) ATU servicing the two (2) lots.

Treated wastewater is to be disposed to onsite leach drains, with one (1) leach drain available per lot (2x in total). Disposal area dimensions are to be 30 metres by 21.55 metres (~ 646 m^2). This provides a total disposal area of 1,938 m^2.

It is noted here that distribution of the wastewater volumes is not confirmed, however, assumed to be relevant to the sizing of each disposal area.

7.3 Wastewater Volumes and Land Application Areas

Notes:

- The calculations and subsequent figures provided in this section aim to display that appropriate land space is available for the LAA based on calculations provided in the GSP and AS/NZS 1547.
- Final allocation of land will be determined by the system installed, in conjunction with an appropriately qualified installer. Indicative calculations are presented below in Table 14.
- The GSP requires that the calculations presented in this section are made to ensure appropriate space is available to support the installation of a wastewater disposal system.

The land application area requirements are specified in Schedule 2 of the GSP. The following sections are applicable to this site:

The size of the land application area should be determined in accordance with the conversion factors prescribed in Table 2 and AS/NZS 1547 On-site domestic wastewater management as follows:

Calculate land application area (m^2) = hydraulic load (L/day) ÷ DIR

From the indicative hydraulic load and using the following design loading rates (DLR) (as per AS1547) (based on the most constraining soil type identified (Category 1)), the below LAAs have been calculated.

The expected hydraulic loads for various land uses are detailed in the fact sheet: Supplement to Regulation 29 – Wastewater system loading rates (DoH 2019). Based on client comment, the approximate waste volume, with reference to the supplement, is presented in the table below.

Table 14: Human Waste Hydraulic Loading Rates, per Supplement to Regulation 29 (DoH)

Type of Premises (regulation 29)		Flow L/person/day	Quantity	Combined Flow (L /Day)
T1 Fuel Station	Amenities users	10	400	4,000
T2 LFR	Amenities only	10	50	500
T 3 Gym	Amenities only	10	500	5,000
	Shower facilities users	70	100	7,000
T4 LFR	Amenities users	50	10	500
T5 LFR	Amenities users	50	10	500
T6 Drive Through Café	Volume provided by client.			2,000
			Total Hydraulic Load	**19,500**

7.3.1 Trade Waste

No trade waste is proposed for onsite disposal.

7.4 Calculated Volumes

Calculated volumes for wastewater and trade waste are presented in Tables 15 and 16.

Table 15: Wastewater Design Loading Rates and LAA (Category 1 soils)

Treatment Type	Volume	DLR (mm/day)	LAA (m^2)
Secondary	19,500	50	390

7.5 Disposal method

The table below considers the disposal method in accordance with findings on the site from this investigation, and common disposal options (DoH).

Based on this table, a range of disposal options are available, and it is considered here conventional absorption trenches or beds (i.e. leach drains of flat beds) would be likely adopted.

Table 16: Consideration of Disposal Options.

System	Considerations (general considerations, not specific to the site assessed in this report).	Applicable to site?	Comment
Conventional Absorption Trench and Beds	Only requires primary effluent treatment, **secondary treatment holds extra benefit**.	✓	Applicable – noting that this site requires wastewater to undergo secondary treatment.
	Cheaper to install than other methods and not influenced by climatic factors.	✓	Applicable.
	Requires deep soil, generally > 1.5 m, above limiting layers (e.g., bedrock or seasonal water tables).	✘	Groundwater observed to be slightly greater than 1.5 mbgl onsite. Some onsite engineering may be necessary to maintain a consistent vertical separation.
	Treatment by absorption trench may be impeded due to high % of coarse fragments.	✓	Minimal coarse fragments.
	Soil supplementation may be an option to improve absorptive capacity.	✓	Not necessary but could further improve soils and reduce reliance on secondary treatment system.
	Sodic soils may lose permeability over life of system; larger trench lengths required.	✓	Applicable.
	Ideal for sites with little to no constraints in terms of soil depth, rock content, waterlogging, inundation or shallow water tables.	✓	Mostly suitable for this site with some modifications.
Amended Soil and Mounds	Beneficial for shallow soils, high rock contents, or highwater tables.	✓	Applicable.

	Not influenced by climatic factors.	✓	Applicable.
	Requires an above-ground mound for effluent absorption that contains imported sand/soil.	✓	Applicable however is of greater expense.
	Treatment will not be limited by soil absorption capacity, and less influenced by sodic soils as new soil can be imported.	✓	Applicable if mound is constructed.
Subsurface Irrigation	Secondary treatment is required prior to irrigation.	✓	Required at the site.
	Suitable for areas of high exposure with high evaporation rates (limited during wet season).	✓	Applicable.
	Suitable for sites with shallow soils.	✓	Applicable.
	Not suitable for areas that are seasonally inundated or waterlogged.	✓	Applicable.
	Sodic soils may lose permeability over life of system; but sodicity generally lower in surface soils than subsoils.	✓	Applicable (some sodic soils observed but can be managed).
	Can be hindered by high rock or gravel content.	✓	Applicable (minimal gravels noted in soil samples collected).

7.6 Capability of land to accommodate sewerage application.

7.6.1 Cumulative impacts

It is noted that the land uses surrounding the site currently consists of general rural residential and commercial land use (a caravan park is noted directly adjacent to the eastern site boundary). Notwithstanding, the key factors that determine the impact of on-site sewage management (for the site and cumulatively in the catchment) have been addressed in this SSE. The response to these factors in the management of the site has been based on the overarching Government Sewerage Policy and AS1547, which has formed the basis for the SSE as a whole. **As such the specific assessment of the cumulative impact summary are not repeated within this section.**

7.6.2 Location of LAA

Sufficient area is noted within the project area that meets the required LAA (excluding setback distances) calculated.

- With the above considered, the LAA can be located in an area that suits the purpose of the client, as long as horizontal separation distances (to building/boundaries as outlined in Appendix D & E) are met.
- **The client has provided an indicative area within which the LAA is to be set.**

8 Conclusions

The sewage management strategy for the site, as outlined in this SSE, has been developed to be consistent with the approach and requirements detailed the Government Sewerage Policy (DPLH 2019) and AS/NZS 1547 On-site domestic wastewater management. This is completed to determine capacity of the site to contain proposed development and sewage on-site, without compromising the environmental and public health outcomes.

Based on the **proposed subdivision plans** for the site provided in Appendix A which includes an area proposed for disposal:

- Soils onsite are classified as Category 1 soils.
- The site is located within a sewerage sensitive area, and therefore secondary treatment (i.e. an ATU) is required.
- Total wastewater is determined as 19,500 L per day, to be disposed to leach/flatbed drains with a total required LAA of 390 m^2.
- The client has provided an indicative area within which the LAA(s) is to be set. This SSE assumes separate treatment and disposal of the wastewater and trade waste unless additional information is provided.
    - The client has indicated that two (2) leach drains with an approximate area of 646 m^2 each will service the site (per lot) (total of 1,938 m^2). This is considered to be sufficient to receive the currently anticipated hydraulic load.
- Groundwater is noted at >1.5 m below ground level. 1.5m of separation to groundwater is required. Therefore, clearance needs to be considered in the final disposal area design (i.e. amended soil mound to flatbed leach drains) to ensure a minimum of 1.5 m separation to groundwater.
- No horizontal separation distances are noted in the assessment (i.e. to nearby waterbodies).
- Sufficient space is located within the proposed development for wastewater disposal.
- It is considered here **that in principle, the site can accommodate the disposal of the proposed wastewater and trade waste volumes**, with the note:
    - The client is coordinating design of an appropriate ATU and leach drain/flatbed system.
    - It is considered that sufficient space is available onsite to accommodate all volumes of generated waste waters.
    - This SSE, as required, may require update to incorporate these additional drawings/determinations.

8.1 Notes

The following is noted regarding the land application area. For all points below **your wastewater installer should advise**.

- This information is based on current available site outlay and should be ground-truthed on-site by the appropriate installer, with consideration made to final building plans.
- Based on the final system approved and utilised, re-calculation based on specific system used may be warranted to determine final LAA.

- Land application systems in Category 1 soils require design and installation by a suitably qualified and experienced person.
- Note that setback distances from boundaries, buildings, septic tanks, trafficable areas, surface irrigation disposal area and other structures and buildings on the boundary alignment will apply dependant on the final system installed. Note Appendix D.

9 Assumptions, Limitations and Liabilities

The conclusions drawn and recommendations made here have been developed on the assumption that the data collected accurately represents the conditions at the site. Uncertainties pertaining to the data collected include the following:

- West Soil and Water are working on the assumption that the client understands that submission of an application does not constitute certainty of approval. Regulating bodies, at their discretion, may request further information, including site works, which may be outside of the Scope of Work outlined in this report.
- Temporal uncertainty: site conditions/soils may not have been present in the tested medium at the time of sampling but may be present within the site at other times.
- Albeit unlikely, the potential for isolated small pockets of alternate soil types to occur elsewhere within the site cannot be fully discounted. No perfect strategy exists which can conclusively confirm the type of all soils at any site at one time.
- Groundwater depth is unknown but inferred from regional information and visual assessment of infield conditions. However, as highlighted above, uncertainties exist, and without a formal groundwater investigation the depth and/or quality of groundwater beneath the site is unknown.
- West Soil and Water take no responsibility for the accuracy of data presented in this report (including any other reports undertaken for the site) or the assumptions or conclusions made.
- Installation and operation of a waste management system should by guided and undertaken by a suitably qualified individual/entity.
- The client will take note of separation distances presented in Appendix D once final plans are known.

10 References and Resources

The following DoH resources may provide an understanding of the application process and regulatory commitments:

- https://ww2.health.wa.gov.au/Articles/F_I/Guidance-on-applying-for-approval-of-installation-of-a-commercial-onsite-wastewater-system
- https://ww2.health.wa.gov.au/~/media/Files/Corporate/general%20documents/water/Wastewater/Site-Soil-Evaluation.pdf
- https://www.wa.gov.au/government/publications/government-sewerage-policy-2019

Mapping tools:

- Department of Water – Water Information Reporting tool, https://www.water.wa.gov.au/maps-and-data/maps
- Government of Western Australia, Landgate. Locate Mapping Tool. https://www0.landgate.wa.gov.au/maps-and-imagery/interactive-maps/locate

All project works were undertaken in general accordance, and with reference to the following standards and guidelines:

- Department of Health (DoH) 2019a, Guidance on Site-and-soil evaluation for on-site sewage management, Perth.
- Department of Health (DoH) 2019b, Supplement to Regulation 29 and Schedule 9 - Wastewater system loading rates.
- Western Australian Government (1974) Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974. Version 06-m0-00, as of 01 Jul 2021.
- Department of Planning, Lands and Heritage (DPLH) 2019, Government Sewerage Policy, Perth.
- Environmental Protection Regulations (1987) – Environmental Protection Act 1986.
- Standards Australia 2012, AS/NZS 1547:2021. Onsite domestic wastewater management. www.standards.com.au.

Other:

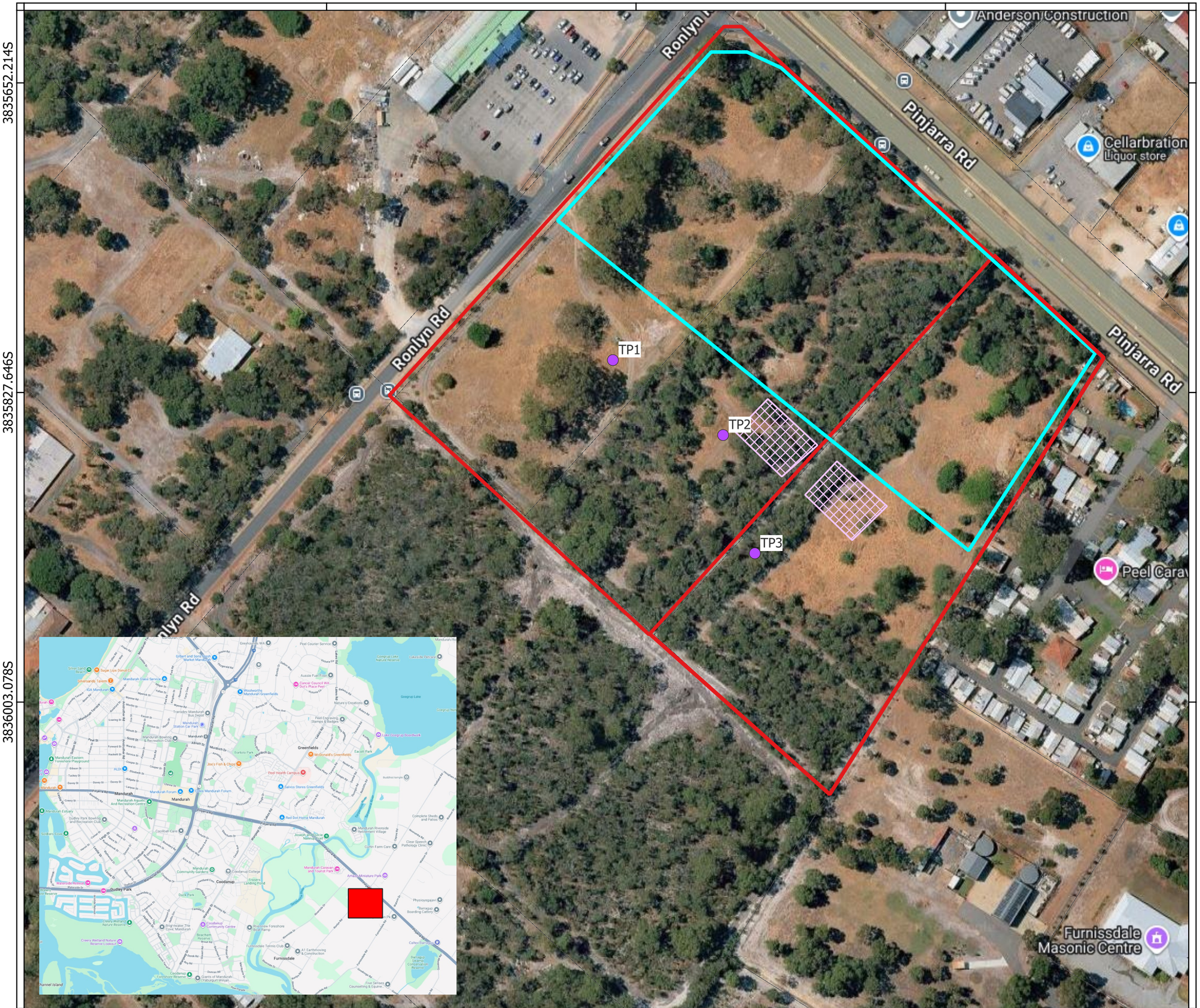
- Allen DG, Jeffery RC (1990). Methods of analysis of phosphorus in Western Australian soils. Report of Investigation No. 37. Chemistry Centre (WA), East Perth.
- Department of Agriculture Western Australia (2003). Evaporation Data for Western Australia. Resource Management Technical Report No. 65.
- National Committee on Soil and Terrain 2009 Australian Soil and Land Survey Field Handbook. Third Edition, CSIRO Publishing.
- Patterson, R. (2020) Emerson Aggregate Stability Test for Wastewater: An interpretation for consultants and regulators, Technical Note: T20-1. Lanfax Laboratories Armidale NSW. 15th December 2020.

12887784.421E 12887959.853E 12888135.285E

3835652.214S

3835827.646S

3836003.078S



LEGEND

- LOT BOUNDARIES (CADASTRE)
- DEVELOPMENT AREA STAGE 1
- INDICATIVE LAA OF 2x SEPERATE DISPOSAL AREAS (30M 21.55M (~ 646 m2)) (WASTEWATER) IN APPROXIMATE LOCATION PROPOSED BY CLIENT
- TEST PIT

0 50 100 m

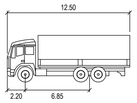
Figure 1. Site Layout

Drawn by: Sam Mueller
Date: January 2026
Proj: WGS 84 / Pseudo-Mercator EPSG:3857
Audrey@Westsoilandwater.com.au

WEST SOIL & WATER

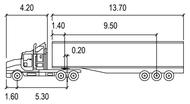
Page has been left blank intentionally.

APPENDIX A
Proposed Development Details



HEAVY RIGID VEHICLE

WIDTH:	2.50m
TRACK:	2.50m
LOCK TO LOCK TIME:	6.00s
STEERING ANGLE:	36.35°



PM S 19m

TRACTOR WIDTH:	2.50m
TRAILER WIDTH:	2.50m
TRACTOR TRACK:	2.50m
TRAILER TRACK:	2.50m
LOCK TO LOCK TIME:	6.00s
ARTICULATING ANGLE:	70.00°

DEVELOPMENT PARTICULARS

TOTAL SITE AREA:	62,175 m²
STAGE 1 AREA:	32,677 m²
STAGE 2 AREA:	29,498 m²
TOTAL PARKING BAYS:	314
TREES RETAINED:	16
SHADE TREES PROVIDED:	77
TOTAL TREES:	93 or 1 TREE PER 3.37 PARKING BAYS

FUEL STATION

T1 AREA:	223 m²
PARKING PROVIDED:	12 BAYS + 1 ACCESSIBLE BAY

CAR WASH

T2 AREA:	340 m²
PARKING PROVIDED:	4 BAYS + 3 VACUUM + 1 DOG WASH

GYM

T3 AREA:	1416 m²
PARKING PROVIDED:	45 BAYS + 2 ACCESSIBLE BAYS

BULKY GOOD SHOWROOM

T4 AREA:	1990 m²
T5 AREA:	1630 m²
T6 AREA:	2178 m²
PARKING PROVIDED:	193 BAYS + 6 ACCESSIBLE BAYS 39 STAFF BAYS

TAKE AWAY FOOD OUTLET

T7 AREA:	28 m²
PARKING PROVIDED:	11 BAYS + 1 ACCESSIBLE BAY

TREE NUMBER	SPREAD	HEIGHT	TYPE
127	6	7	GUM
134	6	7	GUM
135	6	7	GUM
141	9	10	JARRAH
142	7	7	GUM
143	7	7	GUM
146	6	6	OTHER
147	6	9	GUM
154	5	7	JARRAH
155	5	7	JARRAH
156	5	7	JARRAH
158	7	7	GUM
225	6	9	PINE
226	6	9	PINE
227	6	10	JARRAH
230	6	9	JARRAH

STAGE 2 DEVELOPMENT

29,498m²

LEACH DRAINS

LEACH DRAINS

12.5m HRV SHOWN TO SERVICE TENANCY 3

19m ARTICULATED VEHICLE SHOWN TO REST OF DEVELOPMENT

MOUNTABLE ROUNDABOUT

MOUNTABLE ROUNDABOUT

FUTURE ACCESS TO ADJOINING LOT

LANDSCAPE SCREEN / BUFFER TO LOADING DOCK

DEVELOPMENT WAYFIDING SIGN

DEVELOPMENT WAYFIDING SIGN

DEVELOPMENT PYLON SIGN

39 STAFF PARKING BAYS

TENANCY 3A
GYM
708m²

TENANCY 3B
GYM
708m²

9.4m² ENCROACHMENT WITHIN 3m SETBACK

TURN AROUND

9 PARKING BAYS

17 PARKING BAYS

21 PARKING BAYS

PLANT

BIN

AUTO WASH

AUTO WASH

MANUAL CARAVAN

DOG WASH

VACUUM BAYS

4 PARKING BAYS

T2
CAR WASH

FUEL SERVICE YARD

T1
FUEL STATION
223m²

8 PARKING BAYS

FUTURE ACCESS TO ADJOINING LOT

SUBSTATION

5 PARKING BAYS

FUEL PYLON SIGN

PYLON SIGN

SUBSTATION

TENANCY 4A
BULKY GOODS SHOWROOM
1229m²

TENANCY 4B
BULKY GOODS SHOWROOM
761m²

TENANCY 5A
BULKY GOODS SHOWROOM
761m²

TENANCY 5B
BULKY GOODS SHOWROOM
869m²

TENANCY 6
BULKY GOODS SHOWROOM
2178m²

REQUIREMENT FOR FIRE WALL TBC BY FIRE ENGINEER

PROPOSED PUBLIC ART MURAL ON WALL FACING RONLYN ROAD

15 PARKING BAYS

15 PARKING BAYS

7 PARKING BAYS

7 PARKING BAYS

5 PARKING BAYS

21 PARKING BAYS

19 PARKING BAYS

17 PARKING BAYS

17 PARKING BAYS

17 PARKING BAYS

17 PARKING BAYS

5 PARKING BAYS

7 PARKING BAYS

21 PARKING BAYS

21 PARKING BAYS

T7
DRIVE THRU COFFEE

BIN

EX. TREE SHOWN ON APPROVED DA TO BE RETAINED IN CURRENT PROPOSAL

EX. TREE SHOWN ON APPROVED DA TO BE RETAINED IN CURRENT PROPOSAL

EX. TREE 155

EX. TREE 156

EX. TREE 154

EX. TREE 147

EX. TREE 146

EX. TREE 143

EX. TREE 142

EX. TREE 141

EX. TREE 135

EX. TREE 134

EX. TREE 127

3.72 3.69 3.66 3.65 3.64 3.63 3.63 3.61 3.62 3.61 3.61 3.58 3.46 3.42 3.38 3.33 3.33 3.35

RONLYN ROAD

PINJARRA ROAD

NOTE LEGEND

REV.	DATE	DESCRIPTION	DRAWN	CHECKED
J	13.11.25	T2 - LARGE FORMAT RETAIL	YN	YN
K	05.01.26	REDUCED SETBACK TO PINJARRA	YN	YN
		ADDITIONAL TENANCY SPLITS		
		ADDITIONAL TREES RETAINED		
L	09.01.26	REVISED PARKING & QUEUE FOR T7	YN	YN
M	12.01.26	REVISED T7 & PARKING	YN	YN

ARCHITECT:
y. architecture STUDIO
yip@y-architecture.studio / 0430 394 223 / ABWA 3028

PRELIMINARY

PROJECT:
FURNISSDALE DEVELOPMENT
LOTS 154, 155, 401 (507-590)
PINJARRA ROAD, FURNISSDALE

DRAWING TITLE:
SITE PLAN

DRAWING NO.	REVISION:
A0.21	L

JOB NO:	SCALE:	NORTH:
163	1:500 @ A1	
DRAWN BY:	CHECKED BY:	
YN	YN	

Note: this plan has been prepared for the purpose of statutory planning approval. Areas, contours, dimensions and lot information is subject to survey.

0 10 20 30 40 50 60 70 80 90 100m

SCALE 1:1500
ORIGINAL PLAN SIZE: A3

apex planning

PREPARED FOR:
Apex Planning
Suite 3/128 Main St, Osborne Park
M 0416 672 501
E alessandro@apexplanning.com.au

Original Area Lot 401 - 2.0016ha
Original Area Lot 154 - 2.0259ha

Existing No. Lots 2
Proposed No. Lots 2

Source: MNG

Legend

- Application Area
- Existing Lot Boundary
- Proposed Lot Boundary

NORTH

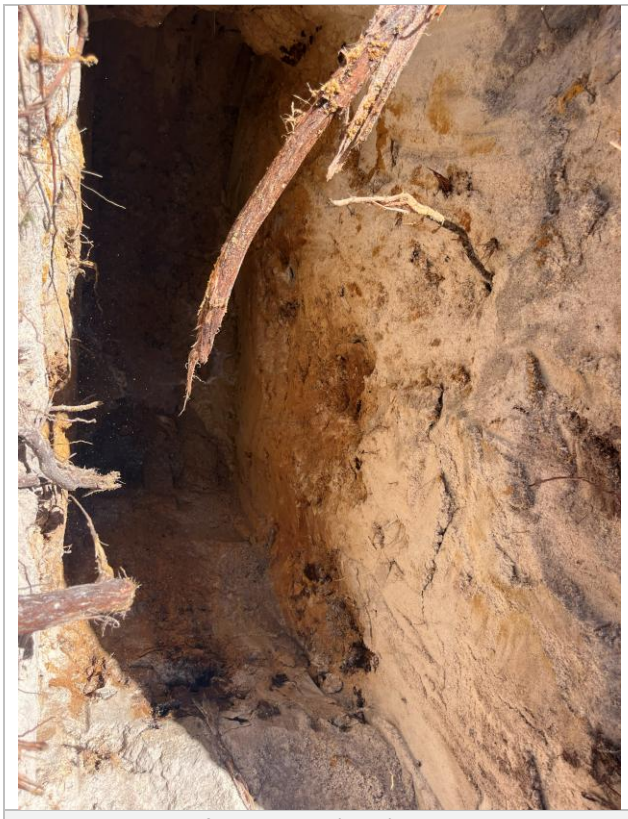
DATE: 07.10.2025

PROPOSED FREEHOLD LOT RECONFIGURATION

LOT 401 (No. 578) & LOT 154 (No. 580) PINJARRA ROAD
FURNISSDALE
Shire of Murray

APPENDIX B
Photographs

	
Development of Test Pit 1 (TP1).	Development of Test Pit 2 (TP2)

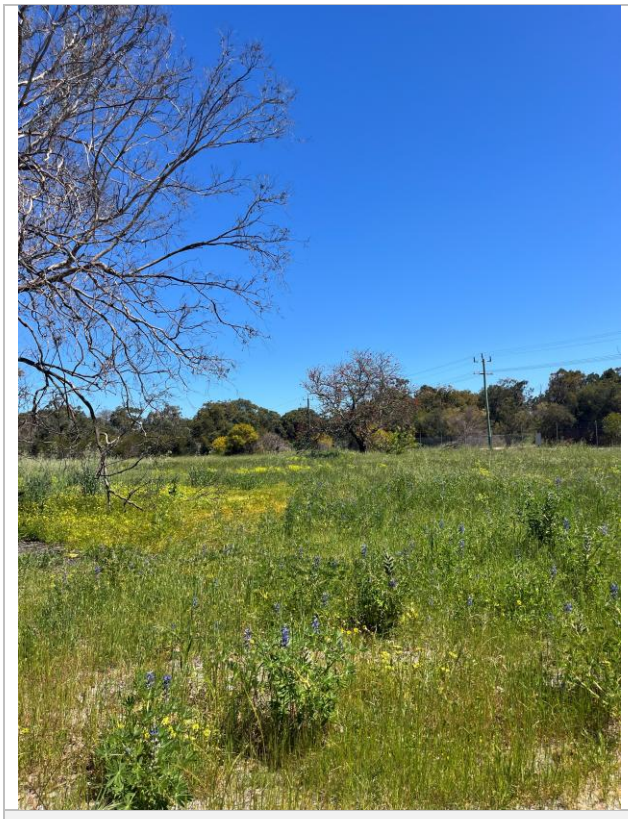


Development of Test Pit 3 (TP3)

Soil Horizon A

Soil Horizon B

General Site

	
General Site	General Site

APPENDIX C
Laboratory Certificates of Analysis

CERTIFICATE OF ANALYSIS

Work Order	: **EP2516320**	Page	: 1 of 3
Client	: **West Soil & Water**	Laboratory	: Environmental Division Perth
Contact	: Sam Mueller	Contact	: Madison Forster
Address	: 3/194 Holbeck Street Doubleview 6018	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: 20250918_Pinjarra Road Furnissdale SSE	Date Samples Received	: 30-Sep-2025 15:20
Order number	: ----	Date Analysis Commenced	: 13-Oct-2025
C-O-C number	: ----	Issue Date	: 14-Oct-2025 21:47
Sampler	: Ashley Beck, Audrey Scanlan		
Site	: Pinjarra Rd		
Quote number	: EP23WESSOI0003_V5		
No. of samples received	: 2		
No. of samples analysed	: 2		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Aleksandar Vujkovic	Laboratory Technician	Newcastle - Inorganics, Mayfield West, NSW
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Chris Lemaitre	Perth - State Manager	Perth Inorganics, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- ED007 and ED008: When Exchangeable Al is reported from these methods, it should be noted that Rayment & Lyons (2011) suggests Exchange Acidity by 1M KCl - Method 15G1 (ED005) is a more suitable method for the determination of exchange acidity (H+ + Al3+).

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	TP1 1.0	TP1 2.0	----	----	----
			Sampling date / time	26-Sep-2025 00:00	26-Sep-2025 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EP2516320-001	EP2516320-002	--------	--------	--------
				Result	Result	----	----	----
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	**9.0**	**8.6**	----	----	----
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	**35**	**35**	----	----	----
EA150: Soil Classification - National Committee on Soil and Terrain (2009)								
Clay (<2 µm)	----	1	%	**2**	**2**	----	----	----
Silt (2-20 µm)	----	1	%	**2**	**2**	----	----	----
Fine Sand (0.02-0.2 mm)	----	1	%	<1	**2**	----	----	----
Coarse Sand (0.2-2.0 mm)	----	1	%	**95**	**93**	----	----	----
Gravel (>2mm)	----	1	%	<1	**1**	----	----	----
EA152: Soil Particle Density								
Soil Particle Density (Clay/Silt/Sand)	----	0.01	g/cm3	**2.60**	**2.61**	----	----	----
ED007: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	**7.5**	**3.2**	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g	**0.4**	**0.2**	----	----	----
Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	----	----	----
Exchangeable Sodium	----	0.1	meq/100g	<0.1	<0.1	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g	**8.0**	**3.5**	----	----	----
Exchangeable Sodium Percent	----	0.1	%	**0.8**	**2.1**	----	----	----
EK072: Phosphate Sorption Capacity								
Phosphate Sorption Capacity	----	250	mg P sorbed/kg	<250	**413**	----	----	----

Inter-Laboratory Testing

Analysis conducted by ALS Newcastle, NATA accreditation no. 825, site no. 1656 (Chemistry / Biology).

(SOIL) EA150: Soil Classification - National Committee on Soil and Terrain (2009)

(SOIL) EA152: Soil Particle Density

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry / Biology).

(SOIL) EK072: Phosphate Sorption Capacity

APPENDIX D
DoH Separation Distances

Site Feature	Setback
Horizontal setback distances	
Treatment tanks to buildings, property boundaries, driveways, paths and other tanks	1.2
Tranches, beds and soak wells to boundary, building, tanks and other land application systems	1.8
Tranches, beds and soak wells to trafficable areas	1.2
Any land application system to wells, stream, private bores or underground source of water intended for human consumption	30
Tranches, beds and soak wells to subsoil drainage or open drainage channel (as per **Section 5.2.2 of the GSP** a separation of 100m is required if there is discharge into a waterway or significant wetland without treatment of the discharge)	6.0
Spray Irrigation: • Boundaries, buildings, driveways etc • Sub-soil and open drain • Swimming pool • Treatment tanks	 1.8 6.0 3.0 1.2
Subsurface Dripper: • Boundaries, buildings, treatment tanks, driveways etc • Sub-soil and open drain • Swimming pool • Garden bore	 0.5 3.0 2.0 10.0
On-site wastewater system to water resources (for more details refer to **Section 5.2.2 of the GSP**)	100
On-site wastewater system must not be located within any area subject to inundation and/or flooding in a 10 per cent Annual Exceedance Probability (AEP) rainfall event	
Vertical setback distances	

Discharge point of the on-site wastewater system to the highest known groundwater level:	
• PDWSA	2.0
• Sensitive water resource areas	1.5
• All other areas -	
○ Sands	1.5
○ Gravels	1.0
○ Loams and heavy soils	
Hardpan or bedrock (depends on quality of treated wastewater and type of LAS)	0.6-1.5

APPENDIX E
DoH Risk Assessment Matrix

Characteristic	Level of Constraint		
	Nil or Low	**Moderate**	High
Climate **(difference between average annual rainfall and average pan evaporation, mm/year)**	Excess of evaporation over rainfall in the wettest months	Rainfall approximates to evaporation	Excess of rainfall over evaporation in the wettest months
Exposure **to sun and wind**	Full sun and/or high wind or minimal shading and North / North-East / North-West aspect	Dappled light East / West / South-East / South-West aspect	Limited patches of light and little wind to heavily shaded all day and South aspect
Vegetation coverage over the site	Plentiful vegetation with healthy growth and good potential for nutrient uptake Turf or pasture	Limited variety of vegetation	Sparse vegetation or no vegetation, dense forest with little understorey
Landslip **(or landslip potential)**	Nil	Low to moderate	High or Severe
Slope Form **(affects water shedding ability)**	Hill crests, convex or divergent side-slopes and plains	Straight side-slopes and footslopes	Floodplains, concave or convergent side-slopes and incised channels

Site Drainage (qualitative)	No visible signs or likelihood of dampness, even in wet season	Some signs or likelihood of dampness Moist soil but no standing water in soil pit.	Wet soil, moisture-loving plants, standing water in pit; water ponding on surface
(a) for absorption trenches and beds	<5%	5-15%	>15%
(b) for surface/ subsurface irrigation	<10%	10-20%	>20%
Erosion (or potential for erosion)	Nil or Low	Moderate	Severe
Fill (imported)	No fill at present or fill is good quality topsoil or minimal fill required	Moderate coverage and good quality fill	Extensive poor-quality fill and variable quality fill
Flood frequency (AEP)	Less than 1 in 100 years	Between 100 and 20 years	More than 1 in 20 years
Privet bore used for household/drinking water purposes	No bores onsite or on neighbouring properties	>30m to the nearest privet bore	<30m to the nearest privet bore
Proximity to water resources	>100m	<100m but reduced setback is supported (refer to Section 5.2.2 of the GSP)	<100m and reduced setback is not supported (refer to Section 5.2.2 of the GSP)
Groundwater (wettest time of the year)	>2m	2.0 – 0.6m need for fill to achieve setbacks listed in Appendix 1	<0.6m fill is not practical to achieve setbacks listed in Appendix 1
Land area available for LAA	Exceeds the minimum required LAA size of AS1547 or Schedule 2 of the GSP	Meets the minimum required LAA size of AS1547 or Schedule 2 of the GSP	Insufficient area available for LAA as per AS1547 or Schedule 2 of the GSP
Rock outcrops (% of surface)	<10%	10-20%	>20%

Site Drainage (qualitative)	No visible signs or likelihood of dampness, even in wet season	Some signs or likelihood of dampness Moist soil but no standing water in soil pit.	Wet soil, moisture-loving plants, standing water in pit; water ponding on surface
Stormwater run-on/run-off	Low likelihood of stormwater run-on/run-off	Moderate likelihood of stormwater run-on/run-off, need for diversionary structures	High likelihood of inundation by stormwater run-on/run-off, diversion not practical
Soil permeability Category (AS1547)	2 and 3	4 and 5	1 and 6
Profile depth	>2m	2.0-1.0	< 1.0m
Hardpan or bedrock	>1.5m	1.5-0.6m Special design requirements and distribution techniques or soil modification will be necessary, depends on quality of treated wastewater and type of LAS	<0.6m
Presence of mottling	None		Extensive
Course fragments	< 10%	10-40%	>40%
pH	6-8	4.5-6	<4.5, >8
Electrical Conductivity (ECe)(dS/m)	<0.3	0.3-2	>2
Sodicity ESP%	<3	6-8	>8
Phosphorus adsorption (mg/kg)	>500	200-500	<200

APPENDIX F
Field Data

West Soil and Water

Permeability Results

Constant head permeameter

Project 20250918_Pinjarra Road Furnissdale SSE **Location** Pinjarra Road, Furnissdale

Site description Vacant Propoerty

Tested by A. Scanlan & A. Beck. **Date** 26-Sep-25

Test hole geometry

	Test 1	Test 2
Hole depth (m)	0.5	
Depth (m) of water in hole	0.3	
Hole diameter (mm)	100	
Depth (m) to imperm. layer		

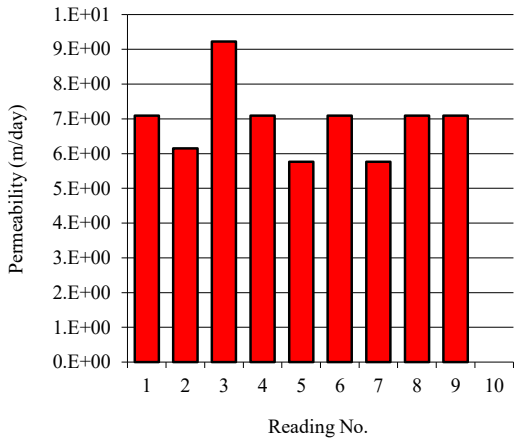
	Test 1	Test 2
Source of test water	Tap water	
Est. salinity (mg/L) of test water		
Est. SAR of test water		

TEST 1

Depth interval (m) tested 0.2 to 0.5 Soil type tested *Sands*

Test duration (mins)

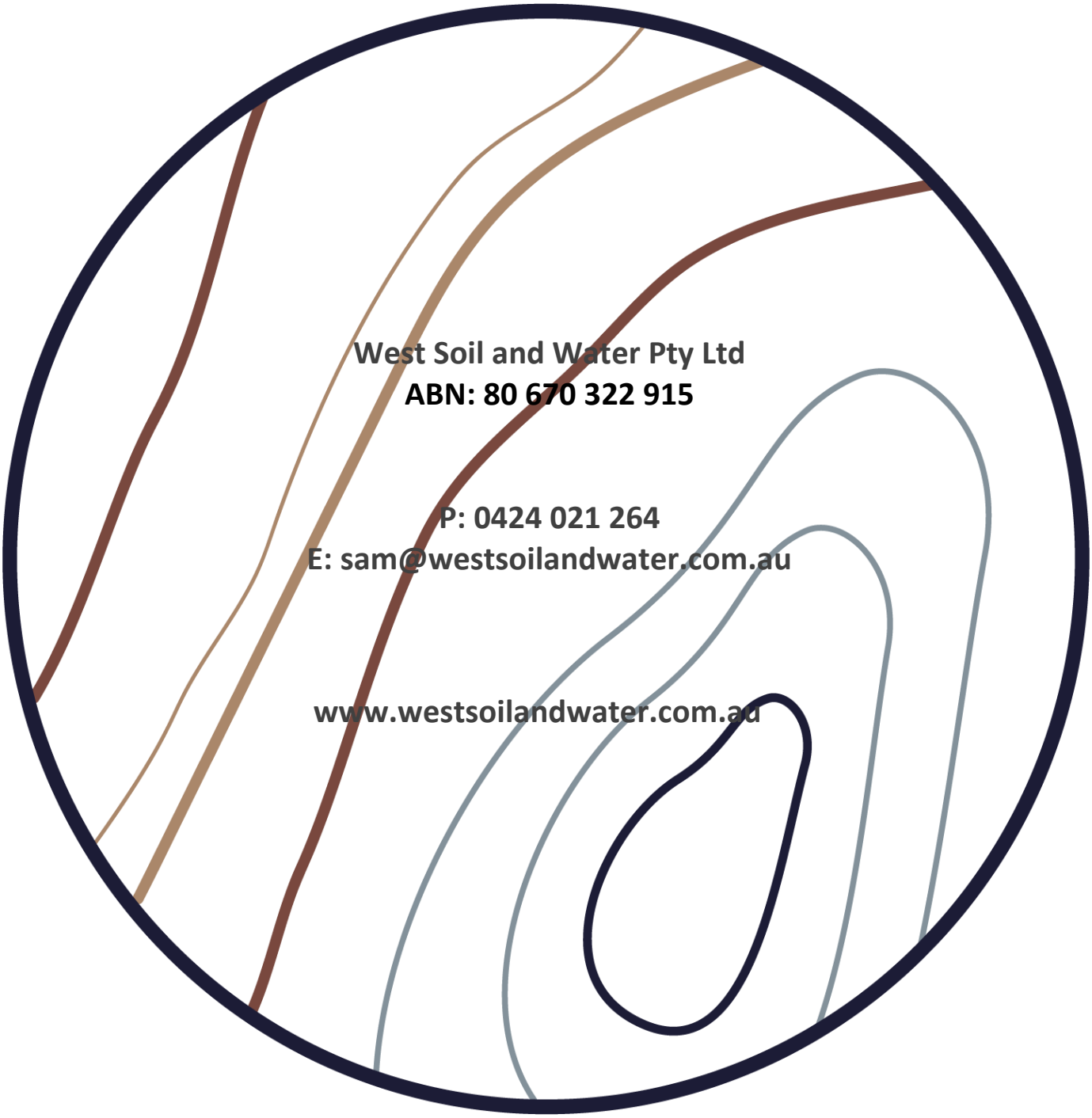
Reading No.	Water infiltrated (L)	Time to infiltrate (min)	Infiltrat. rate (L/min)	Perme-ability (m/day)
1	0.25	0.216666667	1.2E+00	7.1E+00
2	0.25	0.25	1.0E+00	6.1E+00
3	0.25	0.166666667	1.5E+00	9.2E+00
4	0.25	0.216666667	1.2E+00	7.1E+00
5	0.25	0.266666667	9.4E-01	5.8E+00
6	0.25	0.216666667	1.2E+00	7.1E+00
7	0.25	0.266666667	9.4E-01	5.8E+00
8	0.25	0.216666667	1.2E+00	7.1E+00
9	0.25	0.216666667	1.2E+00	7.1E+00



Scientific Notation

Infiltration rates and permeabilities often range over several orders of magnitude. Using standard number notation, there is not enough room in the cells to cope with the possible range of values, and significant figures. Scientific notation is used to get around the problem.

Any number can be expressed as a power of , in the form NEX where N (positive or negative) is a


West Soil and Water Pty Ltd
ABN: 80 670 322 915
P: 0424 021 264
E: sam@westsoilandwater.com.au
www.westsoilandwater.com.au