



Piara Waters Structure Plan Engineering Servicing Report January 2022

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1. Executive Summary

This report has been prepared by Cossill & Webley Pty Ltd (CW) to accompany the Piara West Structure Plan. It summarises the results of a review of the civil engineering issues which have influenced the form of the Structure Plan to support the future development of the site.

This Engineering Summary Report provides details for each major infrastructure type and a servicing strategy for implementation required for the development. The level of detail is consistent with the requirements of a Structure Plan and acknowledges further more detailed work will be required at the time of land subdivision.

The engineering review covers siteworks, roads, stormwater drainage and utility services.

The investigation has found the land is capable of development in accordance with the proposed Concept Plan and will be supported by the progressive extension of critical infrastructure from existing development to the east. The ground conditions and previous land uses will not limit the proposed urban development of the Site.

The Site is well connected to the surrounding road network via Warton Road to the west and existing local roads to the east, which in turn provide good road access to the broader arterial road system.

CW has prepared a sewer strategy which meets the conveyance requirements of the Water Corporation. Sewerage reticulation for the development will be provided via the extension of reticulation sized gravity mains which ultimately discharge to a proposed pump station to be located in the north-east portion of the Structure Plan area. This Pump Station will convey flows to the broader sewer reticulation network via a pressure main in Armadale Road which will discharge to the Clementine Boulevard Pump Station in Calleya (west of the site).

Water reticulation can be extended off the existing network to the east of the Site, and the electrical supply can be provided via extensions off the existing high voltage network in Warton Road. Telecommunications and gas are also available from the existing development to the east. We understand there is capacity in the existing network to service the proposed development.

The investigations and preparation of this report are largely based on preliminary advice from the various service authorities. The information is current as of January 2022.

2. Introduction

This report has been prepared by Cossill & Webley Pty Ltd (C&W) for the Stockland and summarises the results of an engineering assessment to support the proposed Structure Plan. The proposed lots which are the subject of this Structure Plan is presented below in Figure 1, know herein as “the Site”.



Figure 1 – Structure Plan Area (Nearmap, November 21)

This report covers the engineering infrastructure requirements (siteworks, roads, stormwater drainage and utility services) to support future residential development and assesses the viability of the proposed development.

The investigations and preparation of the report are largely based on preliminary advice from the various service authorities and is current as of December 2021.

3. Site Description

The Site is located 21 km south from the Perth CBD and is within close proximity to Armadale Road and Kwinana Freeway. The Site is bound by Warton Road to the west, Armadale Road to the south, existing development to the east abutting Interdominion View, and future development to the north.

The Site is currently undeveloped and consists of mature trees, vegetation and rural properties. Historical images dating back to 2003 do not indicate there has been any significant change in land use in that time.

4. Geotechnical Considerations

4.1 Geology

The Armadale Sheet of the 1:50,000 Geological Survey of Western Australia's Perth Metropolitan Region Soils Maps indicates the majority of the Site is generally characterised by Bassendean Sand (S8), with sections of Sandy Clay (S10) and Peat-rich Sand in limited pockets (see Figure 2 below). Areas of Sandy Clay will require a minimum depth of clean fill to provide a Class A Site Classification under AS2876 'Residential Slabs and & Footings'.

The depth of clean fill required over the sandy clay regions is likely to be met through the filling of the Site to achieve clearances to groundwater and sewer serviceability. The geology of the Site is consistent with conditions encountered in previous development in the region and is suitable for residential development.

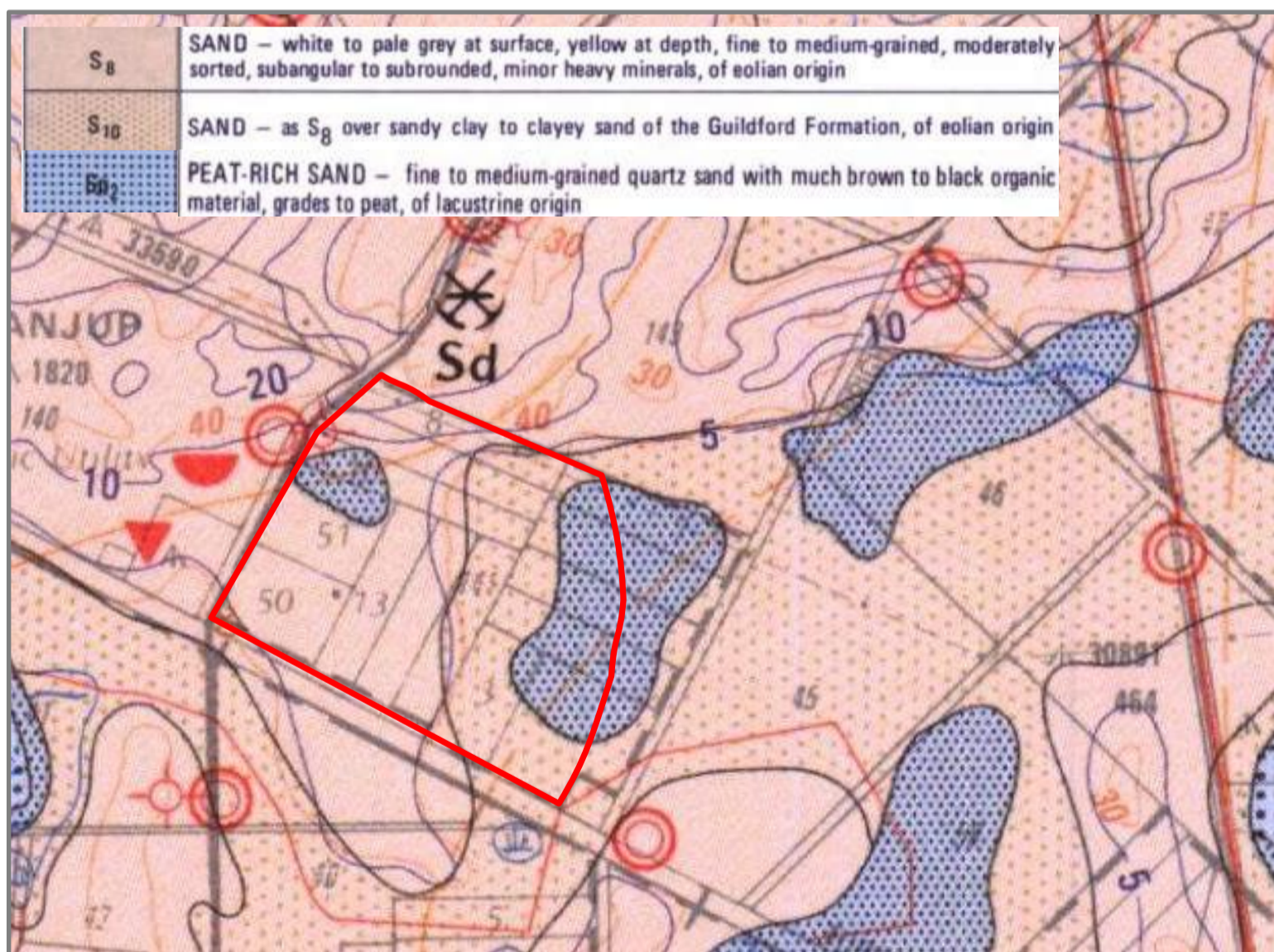


Figure 2 – Geotechnical Information (Geological Survey of WA)

A Technical Memorandum was prepared as part of the due diligence for the acquisition of the Site by Galt Geotechnics in February 2021. Galt undertook a series of test pits and dynamic cone penetrometer tests which confirmed the geology of the Site is generally in accordance with the geological mapping.

Galt confirmed the Site is capable of supporting development, and also confirmed a strategy for stripping and blending thicker topsoil in the middle of the Site for use as deep fill. A copy of Galt's report is presented in Appendix

A for reference.

Galt Geotechnics are currently engaged in providing a comprehensive pre-development geotechnical report for this site, the report will further refine the findings of the Technical memorandum and will provide additional information on the suitability of the existing material and the extents of lacustrine soils and sandy clays as well as additional in situ permeability tests.

4.2 Topography

The Site generally grades from a level at RL38m AHD in the north-west near Warton Road, to a low point at RL24m AHD in the south-east as presented below in Figure 3.

A large dam has been dug out in the south-eastern corner of the Site, which intersects groundwater at approximately RL 25m AHD.

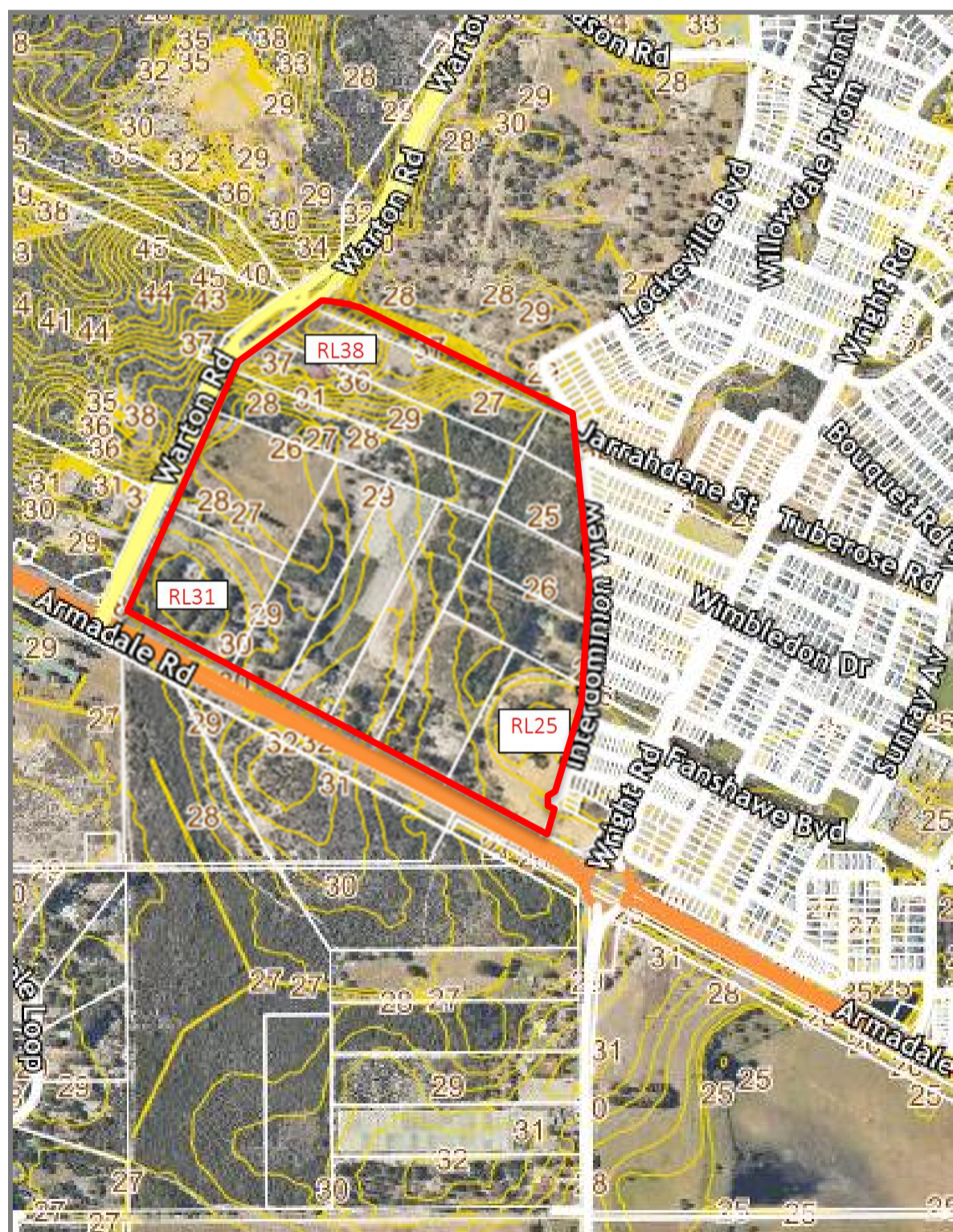


Figure 3 – Existing Topography (MNG Access, November 2021)

4.3 Groundwater

A Local Water Management Strategy (LWMS) has been prepared by JDA which confirms the Average Annual Maximum Groundwater Levels across the Site as presented below in Figure 4.

The AAMGLs vary from RL26.5m AHD adjacent to Warton Road to RL25.5m AHD to the southeast of the Site.

The LWMS outlines a strategy for the treatment and storage of runoff generated from the proposed development, as well as a strategy for flood mitigation if groundwater should rise in the future. This is further discussed in Section 6 below.

We do not anticipate the existing groundwater levels or the effective disposal of runoff generated from the newly created lots or roads on-site will pose an impediment to development of the Site.

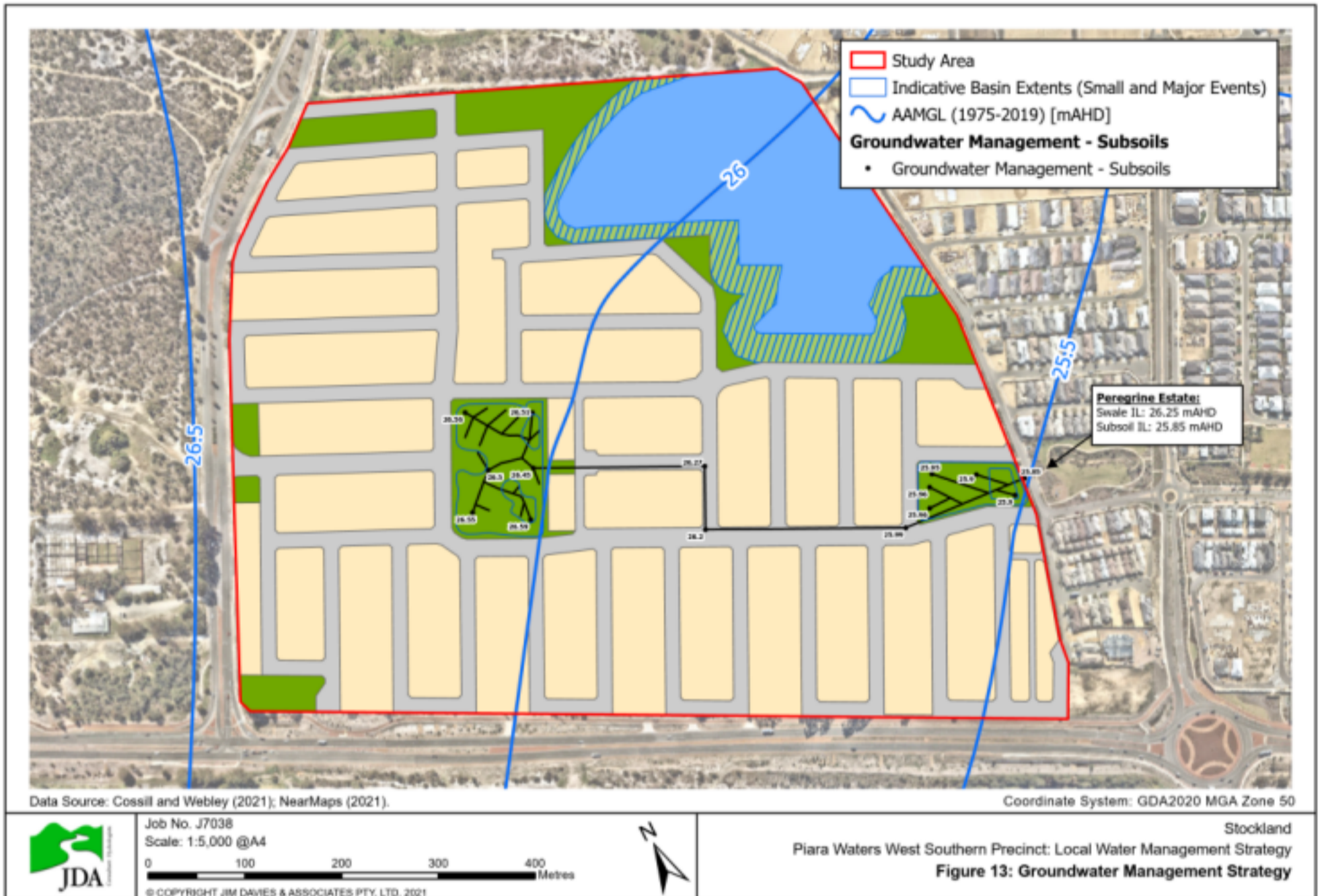


Figure 4 – Average Annual Groundwater Levels (JDA, Dec 2021)

5. Siteworks & Earthworks

Siteworks for residential development will generally comprise the clearing of existing vegetation, earthworks and importation of fill to raise levels. As the Site is located at the upstream end of existing sewer and drainage catchments, clean structural fill will be required to achieve minimum levels for sewer serviceability, cover to drainage pipes and minimum separation to post-development groundwater levels.

The extent of siteworks will be dictated by the density and nature of development. Increased densities and decreasing lot sizes has led to a current trend for Developers to provide fully earthworked level lots which are terraced with retaining walls between lots. This approach provides a number of positive outcomes:

- House building site work costs are reduced,
- Retaining wall layouts are rationalised and designs are consistent with Local Authority specifications,
- It enables lots to be terraced up natural slopes to maintain elevation and views.

However, retention of existing vegetation and topography within the lot areas is limited, particularly in steep areas such as near the 330 kV transmission lines in the northern area of the site, where road and service grades inhibit the

ability to retain vegetation within lots and roads. Existing vegetation within public open spaces and the 330 kV transmission line corridors will be retained wherever possible.

The Site will be designed in accordance with the following objectives:

- Provide adequate separation to groundwater with consideration of expected post-development groundwater rise;
- Provide minimum levels required for drainage and sewer serviceability;
- Provide appropriate siteworks to achieve a Class A Site Classification. This may require removal of peat-rich soils expected in some parts of the Site;
- Allow roads and earthwork levels to be graded to best follow the existing topography and reflect the natural landscape where possible;
- Maintain suitable interface levels at the periphery of the Site.

A preliminary earthworks strategy has been prepared to address the above criteria and is presented in Appendix B for reference.

6. Drainage

6.1 Integrated Urban Water Management

A Local Water Management Strategy has been prepared by JDA Consultant Hydrologists to support the Structure Plan. This report summarises the proposed approach to manage and treat surface water runoff generated from the proposed development, as well as protect the underlying groundwater.

A Water Sensitive Urban Design (WSUD) approach will be adopted to manage stormwater drainage. The objectives of WSUD will include:

- Detention of stormwater rather than rapid conveyance;
- Use of stormwater to conserve potable water;
- Use of vegetation for filtering purposes; and
- Water efficient landscaping.

The main WSUD practices that should be incorporated with the progressive development of the Site are as follows:

6.1.1 Stormwater Management

Stormwater recharge of the shallow aquifer will be maximised through the adoption of 'Best Management Practices', which promote the dispersion and infiltration of runoff as close to the source as possible.

6.1.2 Water Quality Management

Water quality will be implemented through the adoption of Best Management Practices, which promote the disposal of runoff via water pollution control facilities such as vegetated swales and basins, detention storage and gross pollutant traps. Non-structural source controls may also be adopted including regular street sweeping, community education and low fertiliser landscaping regimes to improve water quality across the development.

6.2 Stormwater Collection and Management

The Site ground conditions will be augmented with additional imported fill to support the proposed sewer and

drainage strategies. A preliminary Drainage Catchment Plan is presented in Appendix C which defines the anticipated drainage catchments and proposed treatment and storage basin locations.

Ultimately, we anticipate there will be at least 3 metres separation between the proposed lot levels and the pre-development AAMGLs, hence no subsoil drainage is proposed within the road network. We do however propose to install a subsoil outlet from the central POS basin to the subsoil network in Interdominion View as a contingency measure to control groundwater in the central POS should groundwater levels rise substantially post development. This line is presented in the Drainage Catchment Plan (Appendix C) for reference.

It is anticipated that the first 15mm of runoff within future residential allotments will be contained on-site via soakwells or other infiltration facilities which form part of the building and private open space development. In areas of high urban density, allowance will be made to manage a proportion of the runoff in the council-controlled street drainage network. This could provide a more practical response for higher density sites and allows the runoff from larger storms to be managed away from buildings to areas of Public Open Space.

Runoff from the road network for storms up to the 20%AEP will be conveyed via an underground pipe system to low point infiltration basins within POS areas (as identified in the Drainage Catchment Plan).

Roads and POS will be designed to cater for the surface overflow for more severe storms with building pads constructed at least 500 millimetres above the 1%AEP ARI flood or storage level at any location within the central POS Catchment and 300 millimetres in other catchment areas.

7. Roadworks & Footpaths

A Traffic Impact Assessment has been prepared by Transcore to support the Structure Plan. A summary of the report is provided below.

7.1 Regional Roads

The Site is bound by Armadale Road to the south, and Warton Road to the west.

Armadale Road is a Primary Distributor Road under the control of Main Roads WA. Armadale Road has recently been upgraded by Metropolitan Road Improvement Alliance (MRIA) to a 4-lane road (2 lanes in each direction), which included the upgrade of the signalised intersection at Warton Road. Direct access onto Armadale Road is not proposed.

Warton Road is an Integrator A road and forms part of the Main Roads Restricted Access Vehicle Network to support RAV 4 vehicles. We proposed to access the Site via a full-movement uncontrolled T-intersection onto Warton Road, utilising the existing crossing location.

7.2 Existing Local Roads

The eastern boundary of the Site interfaces with the existing Interdominion View road reserve. This road is 15m wide which is considered suitable, with no additional upgrades anticipated. The projected traffic volumes on Interdominion View are expected to be less than 1,000vpd (refer figure 10 of the TIA) and the current standard of this road as an Access Street D would be able to accommodate the projected traffic from the proposed subdivision.

7.3 Subdivision Roads

The engineering design of roads will be carried out to comply with the Department of Planning's Liveable Neighbourhoods recommendations for design speeds and sight distances and with the requirements of the City of Armadale. Roadworks will generally consist of kerbed and asphalted pavements.

In all cases the road cross-sections will be designed to cater for utility services, on standard verge alignments, street trees, parking embayments where appropriate, off-street and on-street cycling lanes in accordance with the overall pedestrian and cycling network.

In particular, it is proposed that the development roads be designed to suit lower vehicle operating speeds to ensure safer operation and improved pedestrian movement. The lower speeds on local roads will also support initiatives to adopt smaller street truncations and associated intersection curve radii where suitable.

7.4 Footpaths

Footpaths will be provided in accordance with Liveable Neighbourhoods and the City of Armadale standards and will generally consist of one path in every road as a minimum.

8. Water Reticulation

The Site is within the Water Corporation's water supply area, and can be serviced off their existing infrastructure to the east.

Figure 5 below presents the existing Water Corporation infrastructure that will be extended to service the proposed development.



Figure 5 – Existing Water Reticulation (Water Corporation Esinet November 2021)

8.1 Priority Drinking Water

The Site is currently within a P2 Public Drinking Water Source Area under State Planning Policy 2.3 for the Jandakot Groundwater Protection Area which allows for residential development.

A 300m wellhead protection zone exists to the north and south of the site as depicted below in Figure 6. Potentially contaminating land uses such as petrol stations are precluded within the buffer.

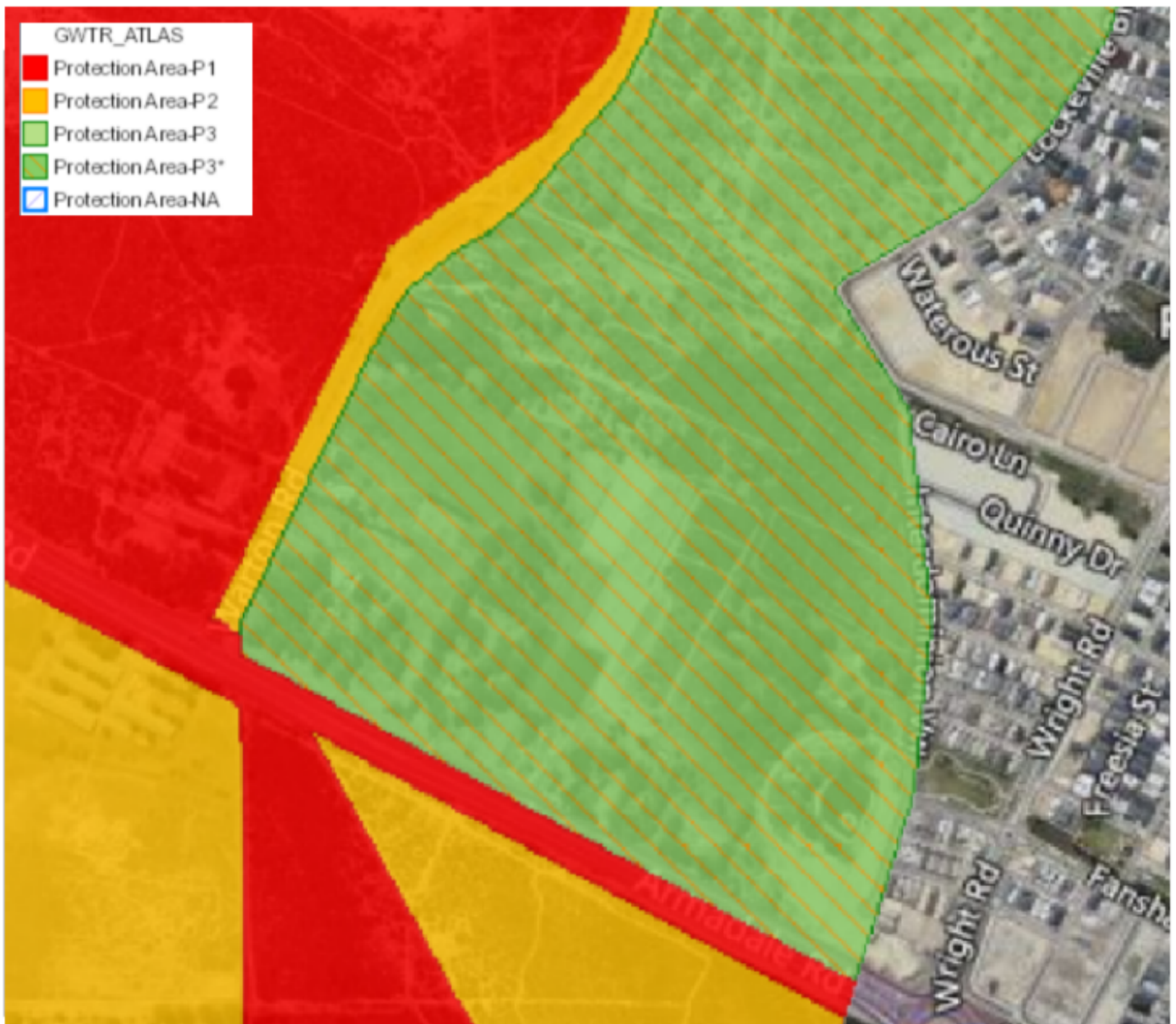


Figure 6 – Priority Drinking Water Protection Zones (DWER ArcGis Maps, November 2021)

9. Wastewater Reticulation

The Site is within the Water Corporation's wastewater licence area for the provision of sewerage reticulation.

Advice from the Water Corporation confirms the Site will be serviced with reticulated sewer discharging to a future pump station to be located in the north-eastern portion of the Structure Plan as presented in the Combined Services Plan presented in Appendix D. This pump station will discharge via a proposed pressure main in Armadale Road to the existing Clementine Boulevard Pump Station approximately 4 kilometres west of the Site in Calleya.

10. Electrical Power Supply

The Site is surrounded by existing power infrastructure to the east, overhead power lines to the south on Armadale Road, a mix of overhead, underground feeder cables and transformers on Warton Road, and overhead 330 kV transmission lines through the northern portion of the Structure Plan area.

Western Power's Network Mapping Tool confirms there is 15-20 MVA capacity remaining in the surrounding network and based on the power demand of 4.7kVa per dwelling, the estimated total power requirement for residential development of the Site is approximately 3MVA, well within the available remaining capacity.

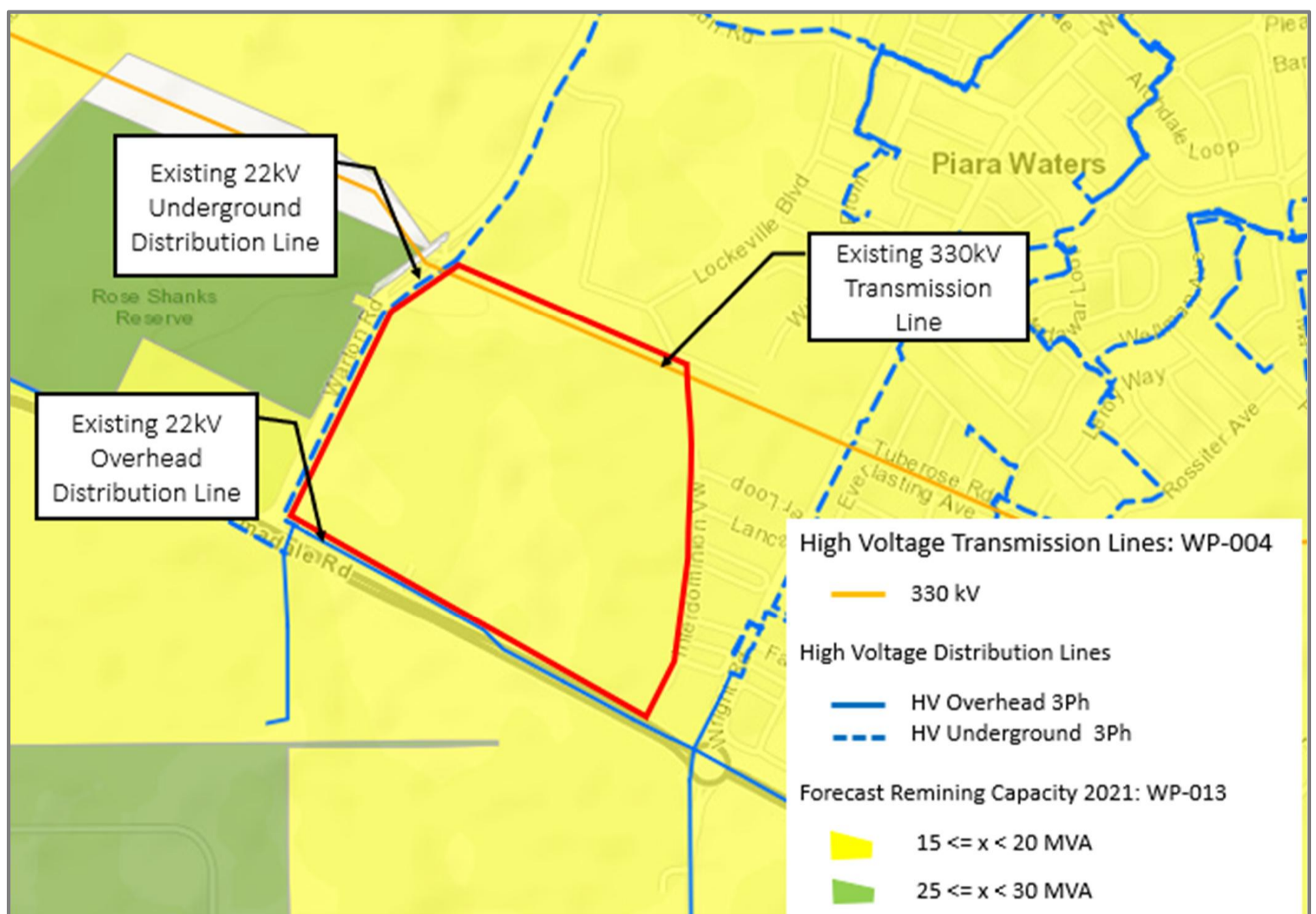


Figure 7 – Western Power Network Mapping Capacity Tool (Western Power, 2021)

The 330 kV transmission lines is protected by a 60 metre wide easement, which will be retained as part of the future development. Public Open Space and road reserves are supported as permissible uses within this easement, which is consistent with the Concept Plan for this area. An EFR/LFI study will be required to assess Western Power's site-specific requirements and determine the extent and type of infrastructure that can be located within the easement.

A series of reinforcing HV feeder cables, switching stations and transformers will be required throughout the Site to meet the requirements of the development.

It is anticipated that no major infrastructure upgrades will be required to service the Site.

11. Gas Supply

High-Pressure gas mains exist around the Site as depicted below in Figure 8. The mains east of the Site within the existing development generally consist of 110mm diameter polyethene reticulation mains. Larger 200mm diameter High-Pressure gas mains exist in the western verge of Warton Road which can be extended to service the proposed development.

No significant infrastructure works to reinforce Atco's network are anticipated to service the proposed development.

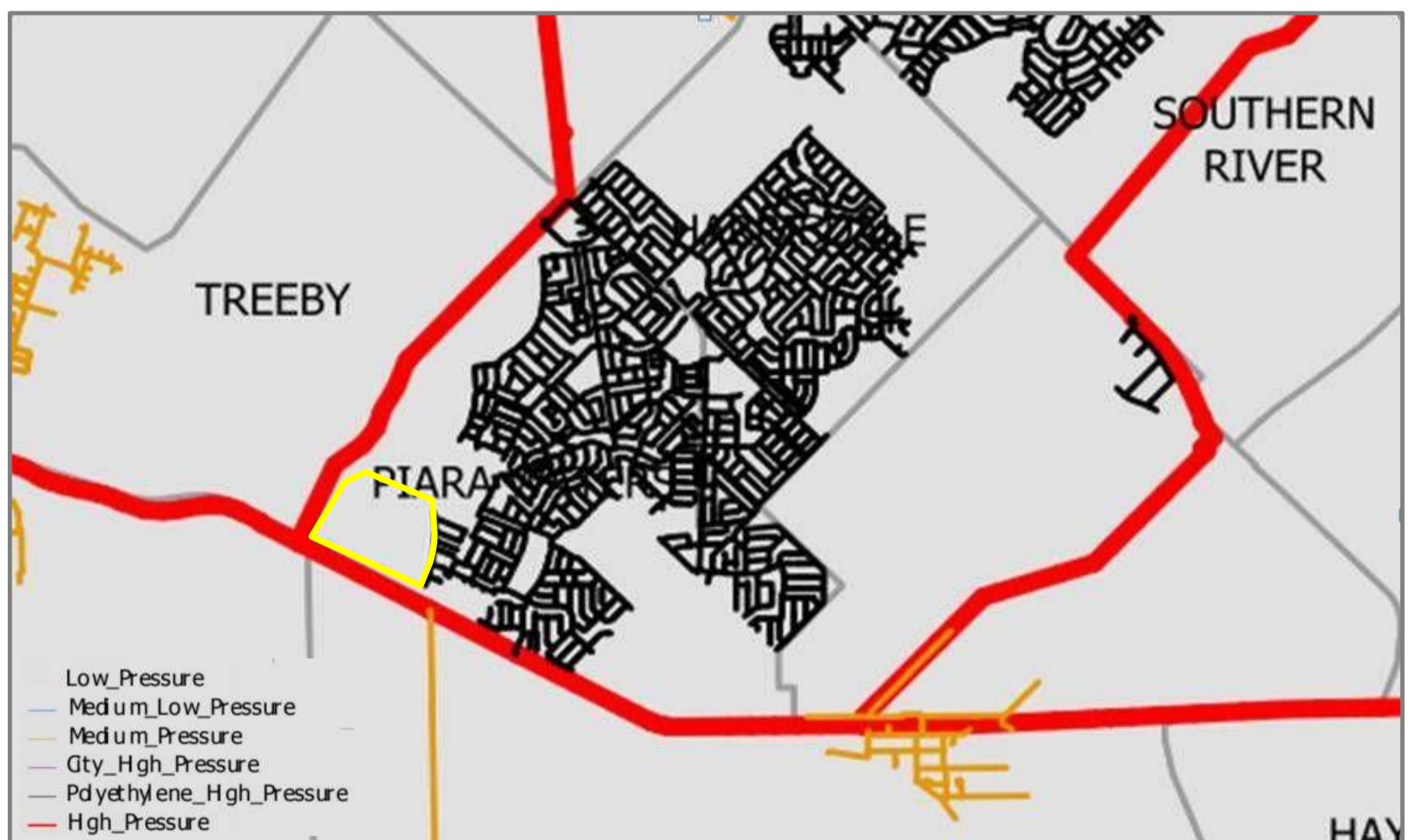


Figure 8 – Location of Existing Gas Infrastructure (ATCO Gas, 2020)

Figure 8 above indicates the presence of High-pressure gas infrastructure in the western and southern road reserves of Warton and Armadale Road respectively. In reviewing the mapping, excerpt in Figure 9, it is apparent that the western and southern portion of the subject site falls within the trigger distance set out in Development Control policy 43. "Section 3.2 Exceptions" and in particular Section 3.2.1 of the Policy suggests that there are no policy requirements for subdivision and development on land that is not intersected by a pipeline, and not zoned for a "Sensitive", "Industrial", "Heavy Industrial" or "Common Infrastructure Corridor" purpose.

The HP Gas pipeline in this instance does not intersect the subject site and because the proposed development is wholly residential without any portion zoned Industrial, Heavy Industrial or Common Infrastructure and considering a "sensitive land use" is defined as schools, hospitals, aged-care facilities or prisons, the proposed residential subdivision of the site is considered exempt in accordance with the Development Control Policy 43.



Figure 9 – ATCO gas trigger distance mapping (DPLH, 2022)

12. Telecommunications

The Site is within NBN's fixed-line footprint and can, therefore, be serviced with Optic Fibre under their roll-out scheme for Greenfield developments (see Figure 9 below). NBN services exist within 1km of the Site in existing development to the east so backhaul of telecommunications infrastructure to service the Site are not anticipated.

Under the Federal Government's new Telecommunications in New Developments Policy, developers are responsible for contributing to the cost of delivering the NBN network in new developments. This includes contributing to part of the costs of the build (installing pit & pipe) as well as a \$600 per lot deployment charge.

Through the NBN, the ownership issues of delivering the wholesale fibre to the home system have been transferred to the Government with over 100 Retail Service Providers offering services over the network. There are other private communication providers that can also offer similar services.

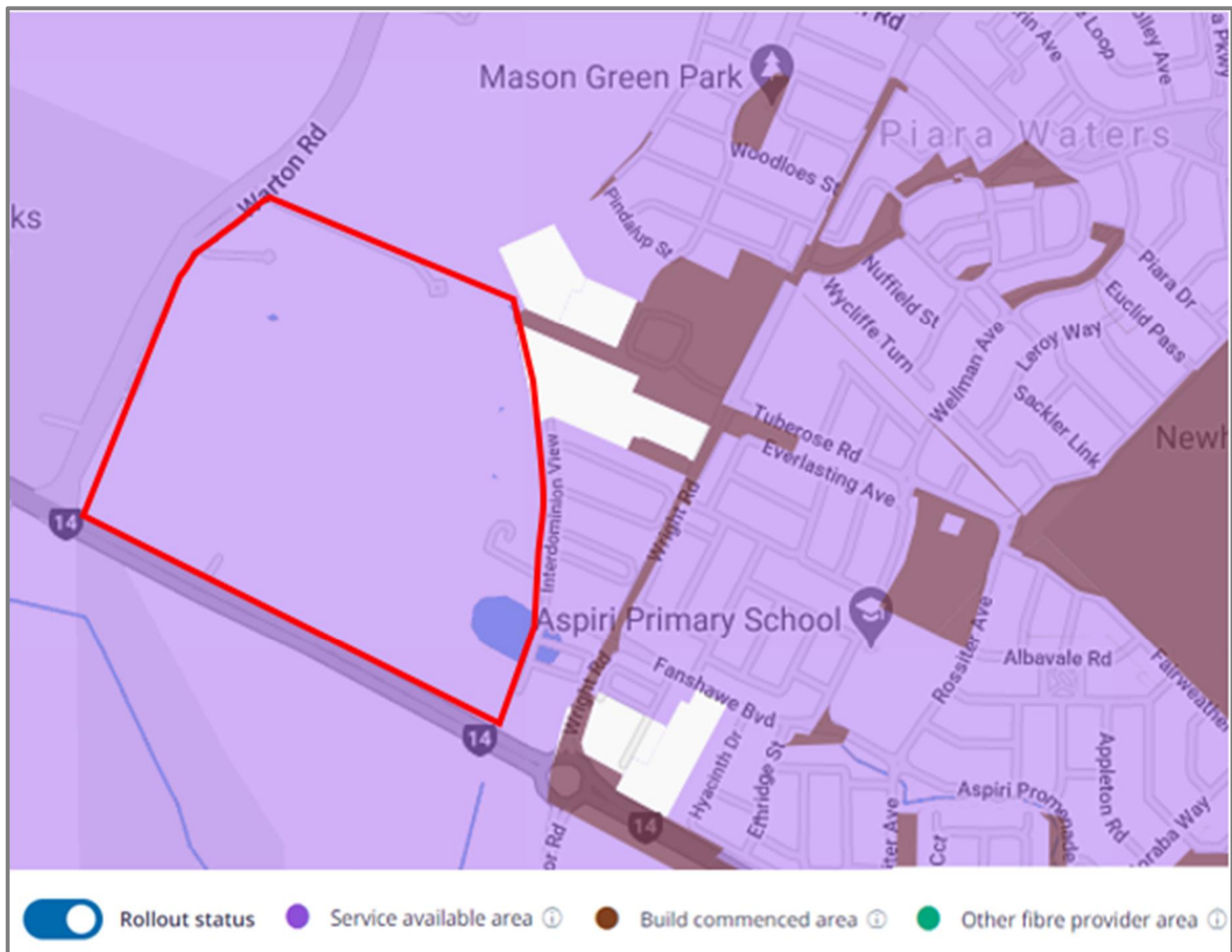


Figure 9 – NBN Fibre Footprint (NBN, 2021)

13. Staging

The staging of subdivision and development will be heavily influenced by market forces. Stockland anticipate the first stage of delivery will be on Warton Road, progressing in a westerly direction with stages consisting of 30 to 50 lots.

We note that earthworks will be required beyond the first stage of lots developed to provision for infrastructure extensions to the east and north.

14. Conclusion

The Site has planned strategies and readily available services which can be extended to service the Site. No substantial off-site upgrades will be required to key infrastructure.

The Structure Plan prepared by CLE generally accords with engineering requirements, the City of Armadale standards and utility provider servicing strategies for the area.

There are no engineering impediments to the development, though co-ordination and co-operation with the relevant Service Authorities will be required as the development progresses.

APPENDIX A

Galt Geotechnics Technical Memorandum

TECHNICAL MEMORANDUM



J2101018 001 TM Rev0

17 February 2021

To: Troy Boekeman

e-mail: troyb@cosweb.com.au

From: Owen Woodland

Sender's email: owen.woodland@galtgeo.com.au

DUE DILIGENCE GEOTECHNICAL STUDY PROPOSED RESIDENTIAL SUBDIVISION VARIOUS LOTS, PIARA WATERS

Dear Troy,

1. INTRODUCTION

This report presents the outcomes of Galt Geotechnics Pty Ltd's (Galt's) due diligence geotechnical study for the proposed residential subdivision at various lots along Warton Road, Piara Waters ("the site"). The location of the site relative to the surrounding area is shown on Figure 1, Site and Location Plan. The site comprises a subset of a larger area proposed for development.

2. PREVIOUS STUDY

CMW Geosciences conducted a geotechnical investigation at the site and the larger area in October and November 2020. The results of this investigation are presented in their report, reference PER2020-0420AB Rev1 dated 17 December 2020.

The outcomes of this report indicates that there are organic soils across the site that require remediation. The purpose of the additional investigation by Galt was to better assess the extent of the organic soils that require remediation and provide volume estimates for remedial earthworks estimates by Cossill & Webley.

3. FIELDWORK

Fieldwork was carried out on 5 February 2021 and comprised:

- ✦ a site walkover by a geotechnical engineer from Galt;
- ✦ excavation of test pits at 18 locations extending to depths of between 1.2 m and 2.7 m; and
- ✦ testing with a dynamic cone penetrometer (DCP) adjacent to each test pit extending to depths of between 0.2 m and 2.0 m.

General

A geotechnical engineer from Galt selected and positioned the test locations, observed the test pitting, logged the materials encountered in the test pits, and carried out the penetrometer testing.

The approximate test locations are shown on Figure 1, Site and Location Plan. Photographs of the site taken during the study are presented in Attachment A.

Details of the tests are presented below in Table 1.

Galt Geotechnics Pty Ltd

Table 1: Summary of Tests (Galt)

Test Name	Test Depth (m) ¹	Reason for Termination	Depth to Groundwater (m)	Stratigraphy
TPG02	2.5	Target Depth	GNE ¹	TOPSOIL: Organic SAND over Organic SAND over SAND
TPG04	2.5			SAND over Organic Silty SAND over Silty SAND over SAND
TPG06	2.7		2.6	TOPSOIL: SAND over SAND
TPG08	2.5		GNE	FILL Gravelly SAND over SAND
TPG09	1.9	Collapse		TOPSOIL: SAND over SAND
TPG10	2.5	Target Depth		TOPSOIL: SAND over SAND over Cemented SAND
TPG12	2.0	Collapse		TOPSOIL: SAND over SAND
TPG14	2.1			TOPSOIL: SAND over SAND over Cemented SAND
TPG15	2.5	Target Depth		TOPSOIL: SAND over SAND
TPG16	1.2	Refusal		TOPSOIL: SAND over SAND over Cemented SAND
TPG17	2.6	Target Depth	2.3	TOPSOIL: Organic Sandy SILT over Silty SAND over SAND
TPG18	1.8	Collapse	1.7	TOPSOIL: Organic SAND over SAND
TPG19	2.5	Target Depth	GNE	TOPSOIL: Organic Silty SAND over SAND
TPG20	2.6		2.1	TOPSOIL: SAND over SAND
TPG21	2.6		2.5	TOPSOIL: Organic SAND over SAND
TPG22	2.6		2.3	TOPSOIL: Organic SAND over Sandy SILT over SAND
TPG23	1.4		GNE	TOPSOIL: Organic Silty SAND over Organic Silty SAND over SAND
TPG24	1.6			

Notes: 1. GNE - Groundwater not encountered

Test Pits

Test pits were excavated using an 8 tonne JCB 3CX tractor mounted backhoe equipped with a 0.45 m wide rock bucket. The backhoe was supplied and operated by ANH Contracting.

Test pit reports are presented in Attachment B, along with a method of soil and rock description and a list of explanatory notes and abbreviations used in the reports.

Dynamic Cone Penetrometer Testing

Dynamic cone penetrometer (DCP) tests were carried out in accordance with AS 1289.6.3.2. Tests were carried out adjacent to each test pit and results of the tests are presented in Attachment C.

4. SITE CONDITIONS

4.1 Geology

The Armadale Sheet of the 1:50,000 Environmental Geology Series map indicates that the site is underlain by the following geological units:

- ✦ Bassendean sand across the majority of the site; and
- ✦ Peaty Sand through the centre-north of the site.

The findings of our investigation (and those of CMW's) are in general accordance with the geological mapping.

4.2 Subsurface Soil Conditions

The findings of our (and CMW's) investigations indicate that the site can be summarised as comprising:

Central Part of the Site (Blue Shading on Figure 1)

- ✦ TOPSOIL: Organic Sandy SILT (ML) / Organic Silty SAND (SP-SM) – non-plastic, low liquid limit, black, 15-50% fine to medium grained sand, with organics, dry, very soft to firm or very loose to loose, present from the ground surface to depths of up to 0.5 m; overlying
- ✦ ORGANIC SAND/SAND (SP-SM) or Silty SAND (SM) – fine to medium grained, sub-angular to sub-rounded, brown to dark brown, 5-15% non-plastic fines, trace organics (~2%), dry, medium dense to dense, present to depths of around 1.5 m; overlying
- ✦ SAND (SP) – fine to medium grained, sub-angular to sub-rounded, grey, brown or white, sub-angular to sub-rounded, trace fines, moist to wet, medium dense to dense, present to the maximum investigated depth of 2.6 m.

Balance of the Site

- ✦ TOPSOIL: SAND (SP) – fine to medium grained, sub-angular to sub-rounded, grey to dark brown, trace fines, trace organics, trace rootlets, dry, very loose to medium dense, present from the ground surface to a depth of around 0.3 m; overlying
- ✦ SAND (SP) – fine to medium grained, sub-angular to sub-rounded, grey becoming pale brown, trace fines, dry becoming moist and wet with depth, medium dense to dense, present to the maximum investigated depth of 2.7 m.

Variations to these general conditions exist and the individual test pit reports should be referred to for additional detail including specific layer thicknesses at test locations.

4.3 Groundwater

The Perth Groundwater Atlas (2007) indicates that the maximum historical groundwater level at the site is around RL 28.5 m AHD. This is around the existing site surface level at some areas of the site.

We encountered groundwater at depths of between 1.7 m and 2.6 m below ground.

5. RECOMMENDATIONS AND OUTCOMES

Based on the outcomes of CMW's report and our investigation, the key outcomes are as follows:

- ✦ A topsoil strip of around 0.3 m will be required across the site (both in the blue shaded area and elsewhere). This is more than is "typical" and is likely due to the lower-lying and swampy nature of the site in the past and possibly due to previous agricultural activities.
- ✦ On the basis of a site area of about 6.5 ha, we estimate this to be around 19,500 m³ of topsoil stripped across the site, and that around 80% of this (~15,600 m³) will be suitable for blending with clean sand fill and used as structural fill. Screening will be required prior to blending (on a screen deck with a maximum aperture of 40 mm).
- ✦ A preliminary blend ratio of 3:1 (parts clean sand to screened topsoil) should be assumed but will need to be confirmed with organic content and in-situ permeability tests. The geotechnical engineer for the earthworks should carry out organic content testing on blended material and carry out in-situ infiltration testing on compacted trial pads.
- ✦ Based on the material encountered at TGP17, TGP19, TGP23, TGP24 and CMW's test pits TP04 and TP05 (in the centre of the low-lying area), this is likely to be where the ~20% unusable topsoil is concentrated. This will largely comprise silty sand, organic silty sand and silty sand. It may be possible to treat this material by blending, but it would be best to assume that it can only be re-used in non-structural areas.

- ✦ Below the topsoil, the site is generally underlain by sand, but the central low-lying area (shaded blue on Figure 1) is underlain by organic and silty soils. This seems to be centred around TPG17 and CMW test pit TP04, where organic silt was encountered. We estimate that the area is around 1 ha. and that an average 0.7 m of material (~7,000 m³) will require treatment. The actual thicknesses vary up to 1.5 m but is generally less. The silty material must be removed to expose the underlying sand.
- ✦ Excavations of the organic material to full thickness may be close to or below groundwater level, which may require the use of pioneering layers to allow for earthworks to be carried out.
- ✦ The organic/silty materials at the site would need to be disposed of off-site or possibly retained for use in non-structural areas (i.e. POS).
- ✦ The ASS potential of these materials has not been assessed.

6. CLOSURE

We draw your attention to Attachment D of this report, "Understanding your Report". The information provided within is intended to inform you as to what your realistic expectations of this report should be. Guidance is also provided on how to minimize risks associated with groundworks for this project. This information is provided not to reduce the level of responsibility accepted by Galt, but to ensure that all parties who rely on this report are aware of the responsibilities each assumes in so doing.

GALT GEOTECHNICS PTY LTD



Owen Woodland CPEng
Geotechnical Engineer



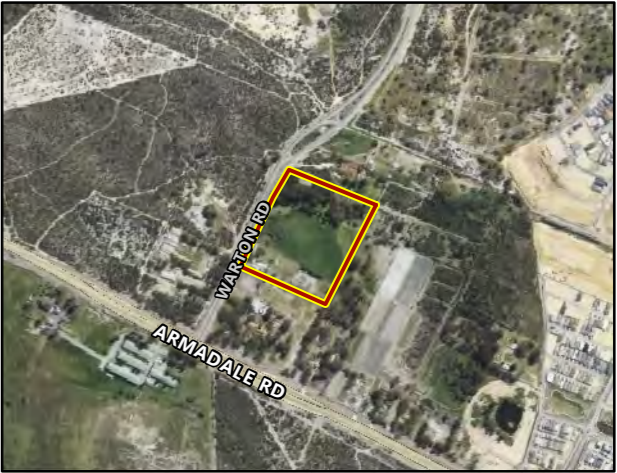
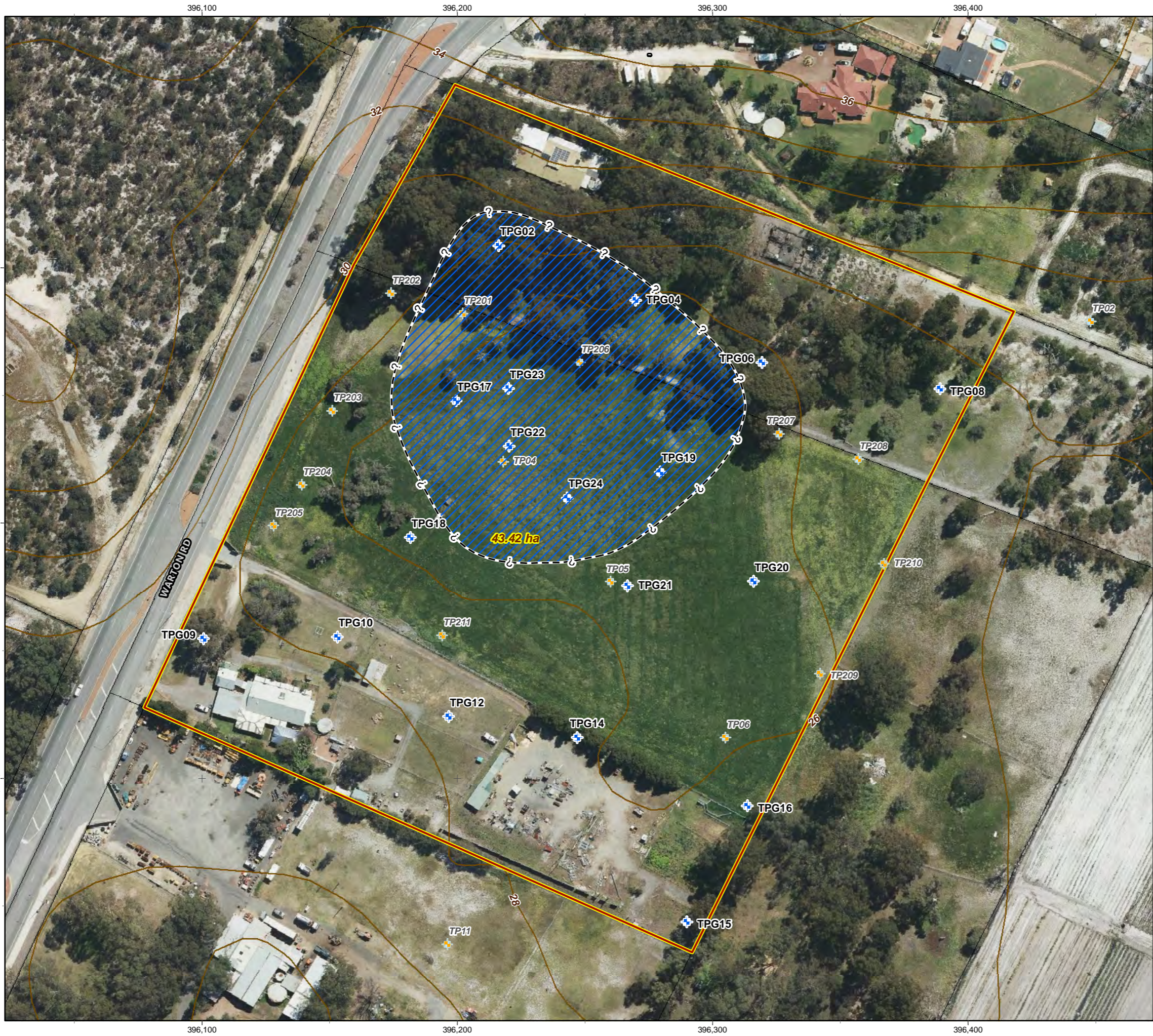
Sean Coffey
Geotechnical Engineer

Attachments: FIGURE 1 – Site and Location Plan
 A – Site Photographs
 B – Test Pit Reports
 C – Dynamic Cone Penetrometer Test Results
 D – Understanding Your Report

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FIGURE 1

Site and Location Plan



Legend

Site Boundary

PREVIOUS TEST LOCATIONS

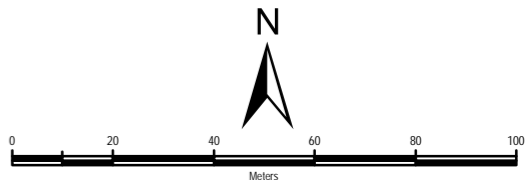
CMW (December 2020)

Test Pit

TEST LOCATIONS

Test Pit

Approximate area of site where topsoil is underlain by silty and organic sand materials, which will need to be removed and replaced with structural fill



NOTES
Aerial Imagery and Cadastre sourced from Landgate/SLIP



SCALE	1:1,500	(A3)
DRAWN	DAC	
DATE DRAWN	10/02/2021	
CHECKED	PA	
DATE CHECKED	10/02/2021	
PROJECTION	GDA 1994 MGA Zone 50	



Galt Geotechnics Pty Ltd
ACN : 138 490 865
Tel : +61 (0)8 6272-0200
Address : 50 Edward Street
Osborne Park WA 6017

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CLIENT	COSSIL & WEBLEY		
PROJECT	GEOTECHNICAL INVESTIGATION		
LOCATION	VARIOUS LOTS WEST PIARA WATERS		
TITLE	SITE & LOCATION PLAN		
Job No	J2101018	Fig No	FIGURE 1
Rev	A		

ATTACHMENT A

Site Photographs



Photograph 1: Test pitting underway at the site



Photograph 2: Typical thick topsoil/organic soil test pit



Photograph 3: Looking south across the site



Photograph 4: Looking north across the site

ATTACHMENT B

Test Pit Reports

METHOD OF SOIL DESCRIPTION BOREHOLE AND TEST PIT REPORTS



GRAPHIC LOG & SOIL CLASSIFICATION SYMBOLS

Graphic	USCS	Soil Name
		FILL (various types)
		COBBLES / BOULDERS
	GP	GRAVEL (poorly graded)
	GW	GRAVEL (well graded)
	GC	Clayey GRAVEL
	GM	Silty GRAVEL
	SP	SAND (poorly graded)
	SW	SAND (well graded)
	SC	Clayey SAND

Graphic	USCS	Soil Name
	SM	Silty SAND
	ML	SILT (low liquid limit)
	MH	SILT (high liquid limit)
	CL	CLAY (low plasticity)
	CI	CLAY (medium plasticity)
	CH	CLAY (high plasticity)
	OL	Organic SILT (low liquid limit)
	OH	Organic SILT (high liquid limit)
	Pt	PEAT

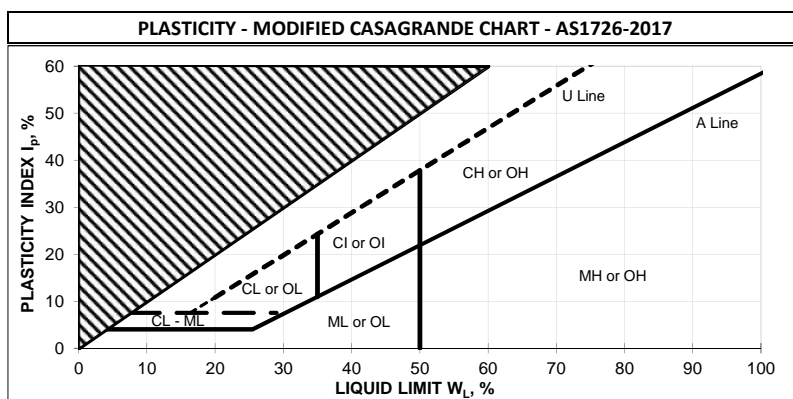
NOTE: Dual classification given for soils with a fines content between 5% and 12%.

SOIL CLASSIFICATION AND INFERRED STRATIGRAPHY

Soil descriptions are based on AS1726-2017. Material properties are assessed in the field by visual/tactile methods in combination with field and laboratory testing techniques (where used).

NOTE: AS 1726-2017 defines a fine grained soil where the total dry mass of fine fractions (<0.075 mm particle size) exceeds 35%.

PARTICLE SIZE		
Soil Name	Particle Size (mm)	
BOULDERS	>200	
COBBLES	63 to 200	
GRAVEL	Coarse	19 to 63
	Medium	6.7 to 19
	Fine	2.3 to 6.7
SAND	Coarse	0.6 to 2.36
	Medium	0.21 to 0.6
	Fine	0.075 to 0.21
FINES	SILT	0.002 to 0.075
	CLAY	<0.002



RESISTANCE TO EXCAVATION		
Symbol	Term	Description
VE	Very easy	All resistances are relative to the selected method of excavation
E	Easy	
F	Firm	
H	Hard	
VH	Very hard	

MOISTURE CONDITION	
Symbol	Term
D	Dry
M	Moist
W	Wet

CEMENTATION	
Cementation	Description
Weakly cemented	Soil may be easily disaggregated by hand in air or water
Moderately cemented	Effort is required to disaggregate the soil by hand in air or water

CONSISTENCY		
Symbol	Term	Undrained Shear Strength (kPa)
VS	Very Soft	0 to 12
S	Soft	12 to 25
F	Firm	25 to 50
St	Stiff	50 to 100
VSt	Very Stiff	100 to 200
H	Hard	>200

ORGANIC SOILS	
Material	Organic Content % of dry mass
Inorganic soil	<2%
Organic soil	2% to 25%
Peat	>25%

DENSITY		
Symbol	Term	Density Index (%)
VL	Very Loose	<15
L	Loose	15 to 35
MD	Medium Dense	35 to 65
D	Dense	65 to 85
VD	Very Dense	>85

EXPLANATORY NOTES TO BE READ WITH BOREHOLE AND TEST PIT REPORTS



METHOD OF DRILLING OR EXCAVATION

AC	Air Core	E	Excavator	PQ3	PQ3 Core Barrel
AD/T	Auger Drilling with TC-Bit	EH	Excavator with Hammer	PT	Push Tube
AD/V	Auger Drilling with V-Bit	HA	Hand Auger	R	Ripper
AT	Air Track	HMLC	HMLC Core Barrel	RR	Rock Roller
B	Bulldozer Blade	HQ3	HQ3 Core Barrel	SON	Sonic Rig
BH	Backhoe Bucket	N	Natural Exposure	SPT	Driven SPT
CT	Cable Tool	NMLC	NMLC Core Barrel	WB	Washbore
DT	Diatube	PP	Push Probe	X	Existing Excavation

SUPPORT

T	Timbering
---	-----------

PENETRATION EFFORT (RELATIVE TO THE EQUIPMENT USED)

VE	Very Easy	E	Easy	F	Firm
H	Hard	VH	Very Hard		

WATER

▶	Water Inflow	▼	Water Level
◀	Water Loss (complete)		
◁	Water Loss (partial)		

SAMPLING AND TESTING

B	Bulk Disturbed Sample	P	Piston Sample
BLK	Block Sample	PBT	Plate Bearing Test
C	Core Sample	U	Undisturbed Push-in Sample
CBR	CBR Mould Sample		U50: 50 mm diameter
D	Small Disturbed Sample	SPT	Standard Penetration Test
ES	Environmental Soil Sample		Example: 3, 4, 5 N=9
EW	Environmental Water Sample		3,4,5: Blows per 150 mm
G	Gas Sample		N=9: Blows per 300 mm after
HP	Hand Penetrometer		150 mm seating interval
LB	Large Bulk Disturbed Sample	VS	Vane Shear; P = Peak
M	Mazier Type Sample		R = Remoulded (kPa)
MC	Moisture Content Sample	W	Water Sample

ROCK CORE RECOVERY

$$\text{TCR} = \text{Total Core Recovery (\%)} = \frac{\text{CRL}}{\text{TCL}} \times 100$$

$$\text{RQD} = \text{Rock Quality Designation (\%)} = \frac{\text{ALC} > 100}{\text{TCL}} \times 100$$

TCL Length of Core Run







CRL Length of Core Recovered

ALC>100 Total Length of Axial Lengths of Core Greater than 100 mm Long

Job Number: J2101018
Client: Cossill & Webley
Project: Due Diligence Study
Location: Various Lots, West Piara Waters

Contractor: ANH Contracting
Machine: JCB 3CX
Operator: Neil
Bucket:

Date: 05/02/2021
Logged: PA
Checked Date: 12/02/2021
Checked By: ORW

Excavation					Sampling		Field Material Description						
METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY	DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
E			0.0					SP	TOPSOIL: Organic SAND, fine to medium grained, dark grey, trace fines, trace organics (~2-5%)	D			
							SP	Organic SAND/SAND: fine to medium grained, brown, trace fines, trace organics					
								SAND: fine to medium grained, sub-angular to sub-rounded, grey to white, trace fines					
							SP						
			2.0							M			
			2.5							M - W			
									Hole terminated at 2.50 m Target depth Groundwater not encountered				
			3.0										

Sketch & Other Observations



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

Job Number: J2101018
Client: Cossill & Webley
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METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
E			0.0					SP	SAND: fine to medium grained, sub-angular to sub-rounded, grey, trace fines, trace roots	D	VL	
			SP					Organic Silty SAND: fine to medium grained, dark grey to black, trace organics (~2-5%), ~15% non plastic fines	L - MD			
			SM					Silty SAND: fine to medium grained, grey to white, trace fines	D			
			1.0					SP	SAND: fine to medium grained, sub-angular to sub-rounded, grey to white, trace fines	M		
			2.0						Becoming grey to pale brown			
		2.5					Hole terminated at 2.50 m Target depth Groundwater not encountered					
		3.0										

Sketch & Other Observations





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E			0.0				SP	TOPSOIL: Organic SAND, fine to medium grained, sub-angular to sub-rounded, dark grey, trace fines, trace organics and roots	D	VL		
							SAND: fine to medium grained, sub-angular to sub-rounded, grey, trace fines	MD				
								D				
			3.0					Hole terminated at 2.70 m Target depth Groundwater not encountered	M - W			


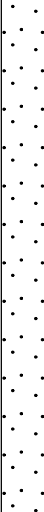
Sketch & Other Observations



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Client: Cossill & Webley	Machine: JCB 3CX	Logged: PA
Project: Due Diligence Study	Operator: Neil	Checked Date: 12/02/2021
Location: Various Lots, West Piara Waters	Bucket:	Checked By: ORW

Excavation					Sampling		Field Material Description				
METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
E			0.0				SP	TOPSOIL: SAND, fine to medium grained, sub-angular to sub-rounded, dark grey, trace fines, trace organics and roots	D	VL	
							SAND: fine to medium grained, sub-angular to sub-rounded, grey, trace fines, trace roots	MD			
			2.5					Hole terminated at 2.50 m Target depth Groundwater not encountered			
			3.0								

Sketch & Other Observations



Comments:

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METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
E			0.0				SP	FILL: Gravelly SAND, fine to medium grained, sub-angular to sub-rounded, brown, 30-40% fine to coarse grained gravel, trace fines, trace roots		VD	
			0.5				SP	SAND: fine to medium grained, sub-angular to sub-rounded, grey to white, trace fines, trace organics in top 200 mm		D	
			1.0								
			1.5								
			2.0					Hole terminated at 1.90 m Collapse Groundwater not encountered			
			2.5								
			3.0								
			3.5								

Sketch & Other Observations




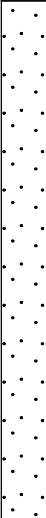
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METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY	DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
E			0.0				SP	TOPSOIL: SAND; fine to medium grained, dark grey, trace fines, trace organics		MD		
							SAND: fine to medium grained, sub-angular to sub-rounded, grey to white, trace fines; trace grass roots to 1.2 m					
						SP						
							Becoming pale brown					
			2.5					Hole terminated at 2.50 m Target depth Groundwater not encountered				
			3.0									

Sketch & Other Observations




Comments:

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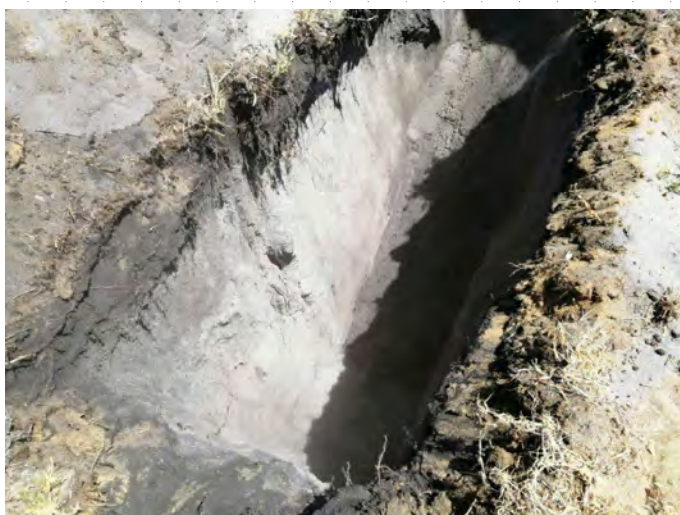
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E			0.0				SP	TOPSOIL: SAND, fine to medium grained, dark grey, trace fines, trace organics	D	L - MD	
			0.5					SAND: fine to medium grained, sub-angular to sub-rounded, grey to white, trace fines			
			1.0				SP				
			1.5								
			2.0					Hole terminated at 2.00 m Collapse Groundwater not encountered			
			2.5								
			3.0								
			3.5								

Sketch & Other Observations




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METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	STRUCTURE AND ADDITIONAL OBSERVATIONS
E			0.0				SP	TOPSOIL: SAND, fine to medium grained, dark grey to grey, trace fines, trace organics	VL	
			0.5					SAND: fine to medium grained, sub-angular to sub-rounded, grey, trace fines	MD	
			1.0						D	
			1.5				SP			
			2.0					Cemented SAND: fine to medium grained, sub-angular to sub-rounded, brown to dark brown, trace fines, trace organics, moderately cemented	M	
			2.5					Hole terminated at 2.10 m Collapse Groundwater not encountered		
			3.0							
			3.5							

Sketch & Other Observations



Comments:

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METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY	DENSITY
E			0.0				SP	TOPSOIL: Organic SAND, fine to medium grained, dark grey, trace organics, with roots (~10 mm thick)			
			0.5					SAND: fine to medium grained, sub-angular to sub-rounded, white, trace fines		L - MD	
			1.0							D	
			1.5				SP				
			2.0								
			2.5							M	
			3.0					Hole terminated at 2.50 m Target depth Groundwater not encountered			
			3.5								

Sketch & Other Observations



Comments:

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			0.0				SP	TOPSOIL: SAND, fine to medium grained, dark grey, trace fines, trace organics		VL	
	E		0.5				SP	SAND: fine to medium grained, sub-angular to sub-rounded, grey, trace fines		MD	
	F-H		1.0					Cemented SAND: fine to medium grained, sub-angular to sub-rounded, brown, trace fines, trace organics		D - VD	
			1.5					Hole terminated at 1.20 m Refusal Groundwater not encountered			
			2.0								
			2.5								
			3.0								
			3.5								

Sketch & Other Observations



Comments:

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Excavation					Sampling		Field Material Description				
METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	STRUCTURE AND ADDITIONAL OBSERVATIONS
E			0.0					ML	TOPSOIL: Organic Sandy SILT: non-plastic, blac, 50-60% fine to medium grained sand, trace organics (>2%)	VS	
			0.5						Silty SAND: fine to medium grained, sub-angular to sub-rounded, brown to dark brown, 10-20% low plasticity fines	F - St	
			1.0					SM		D	
			1.5							MD	
			2.0					SP	SAND: fine to medium grained, sub-angular to sub-rounded, white, trace fines	M	
			2.5							M - W	
			3.0						Hole terminated at 2.60 m Target depth Groundwater encountered at 2.3 m		
			3.5								

Sketch & Other Observations



Comments:

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METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY	DENSITY
E			0.0				SP	TOPSOIL: Organic SAND, fine to medium grained, sub-angular to sub-rounded, dark grey, trace fines, trace organics (~2-5%)	VL - L		
			0.5					SAND: fine to medium grained, sub-angular to sub-rounded, grey becoming pale brown, trace fines	D		
			1.0				SP		MD - D		
			1.5						D - M		
			2.0						M		
			2.0					Hole terminated at 1.80 m Collapse Groundwater encountered at 1.7 m	M - W		
			2.5								
			3.0								
			3.5								

Sketch & Other Observations



Comments:

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METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	STRUCTURE AND ADDITIONAL OBSERVATIONS
E			0.0					SP	TOPSOIL: Organic Silty SAND, fine to medium grained, dark grey to black, ~15-20% low plasticity fines, trace organics (>2%)	VL	
			0.5						SAND: fine to medium grained, sub-angular to sub-rounded, grey, trace fines, trace grass roots	MD	
			1.0						Pocket of cemented sand, brown, with fines, within grey sand matrix	D - VD	
			1.5						No roots	D	
			2.0					SP	Small pocket of dark grey sand, trace organics		
			2.5						Hole terminated at 2.50 m Target depth Groundwater not encountered	M	
			3.0								
			3.5								

Sketch & Other Observations



Comments:

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Checked By: ORW

Excavation				Sampling		Field Material Description				
METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	STRUCTURE AND ADDITIONAL OBSERVATIONS
E			0.0				SP	TOPSOIL: SAND, fine to medium grained, grey, trace fines, trace organics and roots	VL	
			0.5					SAND: fine to medium grained, sub-angular to sub-rounded, grey, trace fines	MD	
			1.0						D - VD	
			1.5				SP		D	
			2.0					Becoming brown to dark brown, trace organics		
			2.5						M	
			3.0					Hole terminated at 2.60 m Target depth Groundwater encountered at 2.1 m		
			3.5							

Sketch & Other Observations



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

Job Number: J2101018
Client: Cossill & Webley
Project: Due Diligence Study
Location: Various Lots, West Piara Waters

Contractor: ANH Contracting
Machine: JCB 3CX
Operator: Neil
Bucket:

Date: 05/02/2021
Logged: PA
Checked Date: 12/02/2021
Checked By: ORW

Excavation					Sampling		Field Material Description				
METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY	STRUCTURE AND ADDITIONAL OBSERVATIONS
E			0.0					TOPSOIL: Organic Silty SAND/SAND, fine to medium grained, blac, trace organics, 5-15% non-plastic fines	VL		
									MD		
			0.5					SAND: fine to medium grained, sub-angular to sub-rounded, grey, trace fines	D - VD		
			1.0						D		
			1.5				SP				
			2.0					Becoming brown to dark brown, weakly cemented in zones to 2.0 m, trace organics	M		
			2.5						W		
			3.0					Hole terminated at 2.60 m Target depth Groundwater encountered at 2.5 m			
			3.5								

Sketch & Other Observations



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

Job Number: J2101018
Client: Cossill & Webley
Project: Due Diligence Study
Location: Various Lots, West Piara Waters

Contractor: ANH Contracting
Machine: JCB 3CX
Operator: Neil
Bucket:

Date: 05/02/2021
Logged: PA
Checked Date: 12/02/2021
Checked By: ORW

Excavation					Sampling		Field Material Description				
METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	STRUCTURE AND ADDITIONAL OBSERVATIONS
E			0.0					SM	TOPSOIL: Organic Silty SAND/SAND, fine to medium grained, black, trace organics (~2-5%), ~15-20% non-plastic fines, partially desiccated	VL - L	
			0.5					ML	Sandy SILT: non-plastic, brown, fine to medium grained sand, trace organics, desiccated	F - St	
			1.0						SAND: fine to medium grained, sub-angular to sub-rounded, brown, with fines, trace organics	MD	
			1.5					SP			
			2.0						Becoming white, no organics	M	
			2.5							M - W	
			3.0						Hole terminated at 2.60 m Target depth Groundwater encountered at 2.3 m		
			3.5								

Sketch & Other Observations



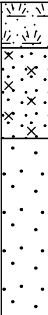
Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

Job Number: J2101018
Client: Cossill & Webley
Project: Due Diligence Study
Location: Various Lots, West Piara Waters

Contractor: ANH Contracting
Machine: JCB 3CX
Operator: Neil
Bucket:

Date: 05/02/2021
Logged: PA
Checked Date: 12/02/2021
Checked By: ORW

Excavation					Sampling		Field Material Description				
METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	STRUCTURE AND ADDITIONAL OBSERVATIONS
E			0.0					SP	TOPSOIL: Organic Silty SAND: fine to medium grained, black, trace organics, 20-30% non-plastic fines, desiccated	VL	
			0.5					SM-SP	Organic SAND/SAND: fine to medium grained, sub-angular to sub-rounded, brown, 5-15% non-plastic fines, trace organics	MD	
			1.0					SP	SAND: fine to medium grained, sub-angular to sub-rounded, grey to pale brown, trace fines	D	
			1.5						Hole terminated at 1.40 m Target depth Groundwater not encountered		
			2.0								
			2.5								
			3.0								
			3.5								

Sketch & Other Observations



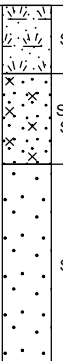
Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

Job Number: J2101018
Client: Cossill & Webley
Project: Due Diligence Study
Location: Various Lots, West Piara Waters

Contractor: ANH Contracting
Machine: JCB 3CX
Operator: Neil
Bucket:

Date: 05/02/2021
Logged: PA
Checked Date: 12/02/2021
Checked By: ORW

Excavation					Sampling		Field Material Description						
METHOD	EXCAVATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY	DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
E			0.0					SP	TOPSOIL: Organic Silty SAND: fine to medium grained, black, trace organics (>2%), ~ 15-25% non-plastic fines, partially desiccated	D	VL		
			0.5					SM-SP	Organic SAND/SAND: fine to medium grained, sub-angular to sub-rounded, brown, 5-15% non-plastic fines, trace organics (~2%)		MD - D		
			1.0					SP	SAND: fine to medium grained, sub-angular to sub-rounded, brown to grey, trace fines		M		
			1.5										
			2.0					Hole terminated at 1.60 m Target depth Groundwater not encountered					
			2.5										
			3.0										

Sketch & Other Observations



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

ATTACHMENT C

Dynamic Cone Penetrometer Test Results

DYNAMIC CONE PENETROMETER FIELD TEST DATA
(AS 1289.6.3.2)

Client: Cossill & Webley
Project: Due Diligence Geotechnical Study
Location: Various Lots, West Piara Waters

Job No: J2101018
Date: 5-Feb-21
Engineer: PA



Test No:									
Location:	TGP02	TGP04	TGP06	TGP08	TGP09	TGP10	TGP12	TGP14	TGP15
Depth (mm)	No of Penetrometer Blows per 100 mm Depth Interval								
0-100	0	0	0	0	7	1	1	0	0
100-200	1	2	1	1	8HB	2	2	2	1
200-300	3	3	2	2		3	2	3	2
300-400	3	2	3	3		2	2	6	1
400-500	3	1	5	2		2	3	6	3
500-600	4	3	7	3		2	2	6	2
600-700	2	7	8	3		3	2	4	2
700-800	5	7	6	2		2	2	4	2
800-900	5	6	5	2		2	2	5	3
900-1000				2		3	2		3
1000-1100									
1100-1200									
1200-1300									
1300-1400									
1400-1500									
1500-1600									
1600-1700									
1700-1800									
1800-1900									

Test No:									
Location:	TGP16	TGP17	TGP18	TGP19	TGP20	TGP21	TGP22	TGP23	TGP24
Depth (mm)	No of Penetrometer Blows per 100 mm Depth Interval								
0-100	0	0	0	1	0	0	0	1	1
100-200	2	5	2	3	3	3	1	5	3
200-300	2	3	2	4	4	4	3	2	7
300-400	4	2	5	6	8	4	2	3	6
400-500	7	3	5	7	12	10	3	4	7
500-600	10	2	4	8	13	10+	5	5	8
600-700	8	3	4	8	10		5	4	6
700-800	10+	4	4	9	9		4	4	6
800-900		3	5	9	9		4	4	5
900-1000		3					4	3	5
1000-1100		3							
1100-1200		3							
1200-1300		3							
1300-1400		2							
1400-1500		3							
1500-1600		3							
1600-1700		3							
1700-1800		4							
1800-1900		3							
1900-2000		4							

Dynamic Cone Penetrometer tests done in accordance with AS 1289.6.3.2

HB: Hammer bounce (refusal)

0 = Penetration due to hammer weight only

R: Refusal

ATTACHMENT D

Understanding Your Report

UNDERSTANDING YOUR REPORT

GALT FORM PMP11 Rev3

1. EXPECTATIONS OF THE REPORT

This document has been prepared to clarify what is and is not provided in your report. It is intended to inform you of what your realistic expectations of this report should be and how to manage your risks associated with the conditions on site.

Geotechnical engineering and environmental science are less exact than other engineering and scientific disciplines. We include this information to help you understand where our responsibilities begin and end. You should read and understand this information. Please contact us if you do not understand the report or this explanation. We have extensive experience in a wide variety of projects and we can help you to manage your risk.

2. THIS REPORT RELATES TO PROJECT-SPECIFIC CONDITIONS

This report was developed for a unique set of project-specific conditions to meet the needs of the nominated client. It took into account the following:

- ✦ the project objectives as we understood them and as described in this report;
- ✦ the specific site mentioned in this report; and
- ✦ the current and proposed development at the site.

It should not be used for any purpose other than that indicated in the report. You should not rely on this report if any of the following conditions apply:

- ✦ the report was not written for you;
- ✦ the report was not written for the site specific to your development;
- ✦ the report was not written for your project (including a development at the correct site but other than that listed in the report); or
- ✦ the report was written before significant changes occurred at the site (such as a development or a change in ground conditions).

You should always inform us of changes in the proposed project (including minor changes) and request an assessment of their impact.

Where we are not informed of developments relevant to your report, we cannot be held responsible or liable for problems that may arise as a consequence.

Where design is to be carried out by others using information provided by us, we recommend that we be involved in the design process by being engaged for consultation with other members of the project team. Furthermore, we recommend that we be able to review work produced by other members of the project team that relies on information provided in our report.

3. SOIL LOGS

Our reports often include logs of intrusive and non-intrusive investigation techniques. These logs are based on our interpretation of field data and laboratory results. The logs should only be read in conjunction with the report they were issued with and should not be re-drawn for inclusion in other documents not prepared by us.

4. THIRD PARTY RELIANCE

We have prepared this report for use by the client. This report must be regarded as confidential to the client and the client's professional advisors. We do not accept any responsibility for contents of this document from any party other than the nominated client. We take no responsibility for any damages suffered by a third party because of any decisions or actions they may make based on this report. Any reliance or decisions made by a third party based on this report are the responsibility of the third party and not of us.

5. CHANGE IN SUBSURFACE CONDITIONS

The recommendations in this report are based on the ground conditions that existed at the time when the study was undertaken. Changes in ground conditions can occur in numerous ways including anthropogenic events (such as construction or contaminating activities on or adjacent to the site) or natural events (such as floods, groundwater fluctuations or earthquakes). We should be consulted prior to use of this report so that we can comment on its reliability. It is important to note that where ground conditions have changed, additional sampling, testing or analysis may be required to fully assess the changed conditions.

6. SUBSURFACE CONDITIONS DURING CONSTRUCTION

Practical constraints mean that we cannot know every minute detail about the subsurface conditions at a particular site. We use professional judgement to form an opinion about the subsurface conditions at the site. Some variation to our evaluated conditions is likely and significant variation is possible. Accordingly, our report should not be considered as final as it is developed from professional judgement and opinion.

The most effective means of dealing with unanticipated ground conditions is to engage us for construction support. We can only finalise our recommendations by observing actual subsurface conditions encountered during construction. We cannot accept liability for a report's recommendations if we cannot observe construction.

7. ENVIRONMENTAL AND GEOTECHNICAL ISSUES

Unless specifically mentioned otherwise in our report, environmental considerations are not addressed in geotechnical reports. Similarly, geotechnical issues are not addressed in environmental reports. The investigation techniques used for geotechnical investigations can differ from those used for environmental investigations. It is the client's responsibility to satisfy themselves that geotechnical and environmental considerations have been taken into account for the site.

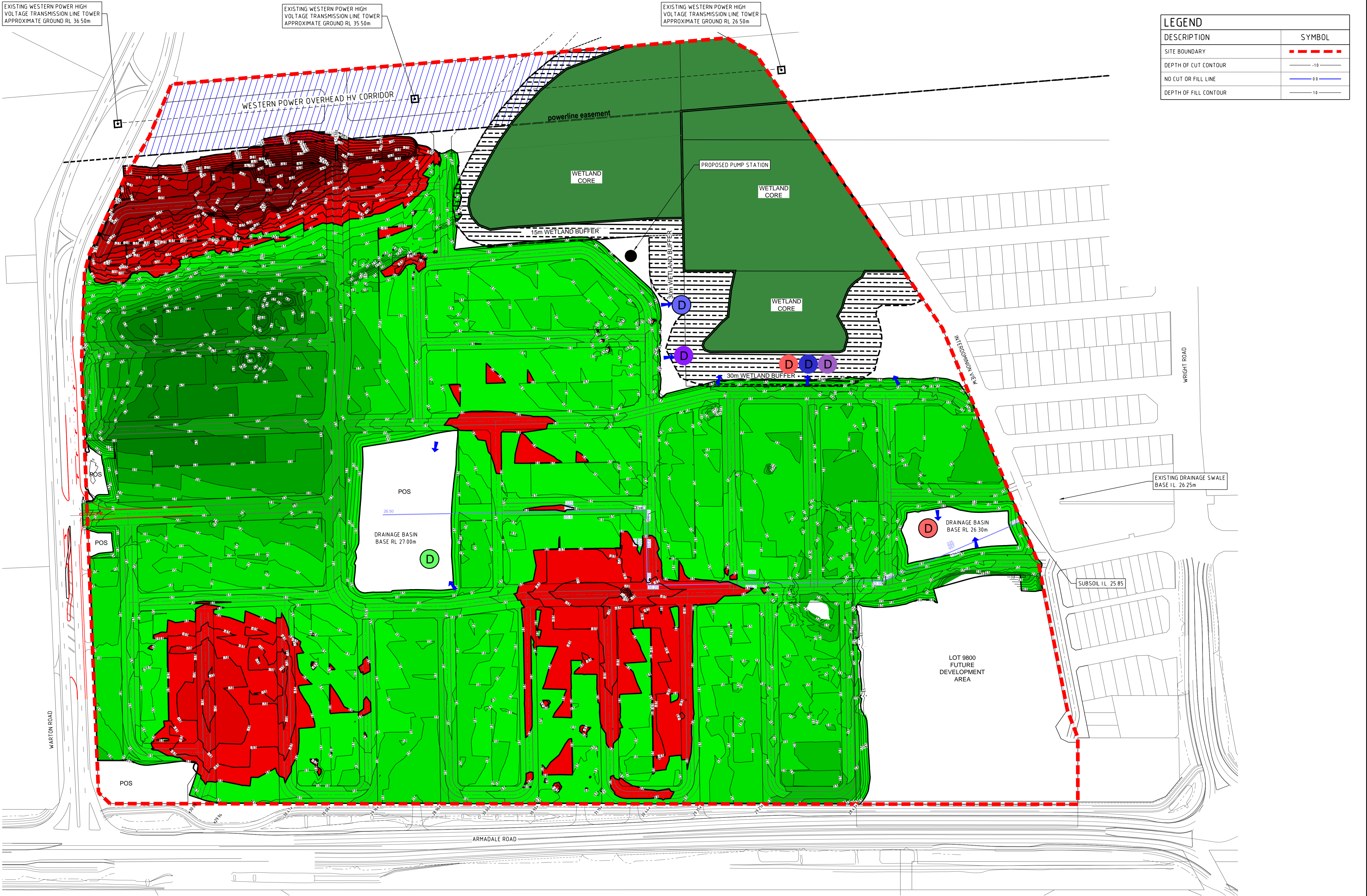
Geotechnical advice presented in a Galt Environmental report has been provided by Galt Geotechnics under a sub-contract agreement. Similarly, environmental advice presented in a Galt Geotechnics report has been provided by Galt Environmental under a sub-contract agreement.

Unless specifically noted otherwise, no parties shall draw any inferences about the applicability of the Western Australian state government landfill levy from the contents of this document.

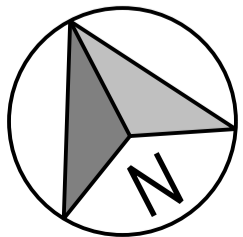
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APPENDIX B

PRELIMINARY EARTHWORKS STRATEGY



F	17.12.21	WBR	-	-	EARTHWORKS BOUNDARY REVISED
E	19.11.21	WBR	-	-	EARTHWORKS BOUNDARY REVISED
D	09.06.21	WBR	-	-	ISSUED FOR LSP APPROVAL
C	20.05.21	WBR	-	-	ISSUED FOR INFORMATION
B	04.05.21	WBR	-	-	CONTOUR BATTERS ADDED TO POS
REV	DATE	DRN	CKD	APP	AMENDMENT



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CLIENT

APPROVED

CHECK PRINT

DESIGNED

WBR

SCALE

1:1500

PROJECT

PIARA WEST

TITLE

**PRELIMINARY EARTHWORKS
CUT AND FILL PLAN**

WAPC No.

N/A

DRAWING No.

6464-00-201

REVISION

F

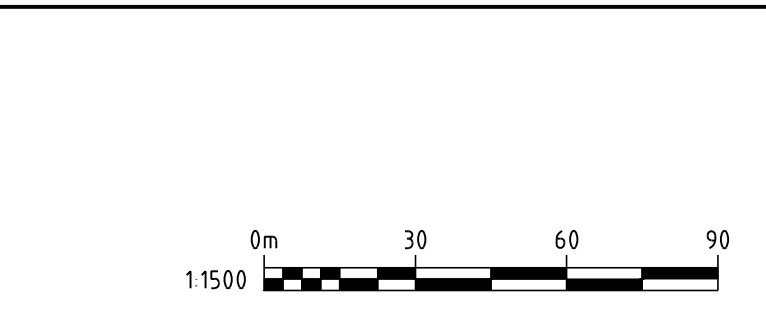
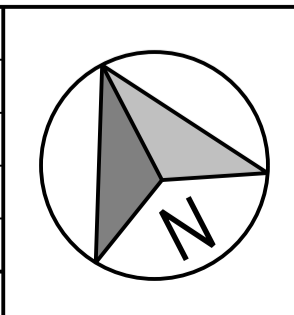
ORIGINAL SIZE
A1

APPENDIX C

PRELIMINARY DRAINAGE STRATEGY



G	17.12.21	WBR	-	-	CATCHMENT BOUNDARIES REVISED
F	19.11.21	WBR	-	-	CATCHMENT BOUNDARIES REVISED
E	09.06.21	WBR	-	-	ISSUED FOR LSP APPROVAL
D	20.05.21	WBR	-	-	ISSUED FOR INFORMATION
C	04.05.21	WBR	-	-	CONTOUR BATTERS ADDED TO POS
REV	DATE	DRN	CKD	APP	AMENDMENT



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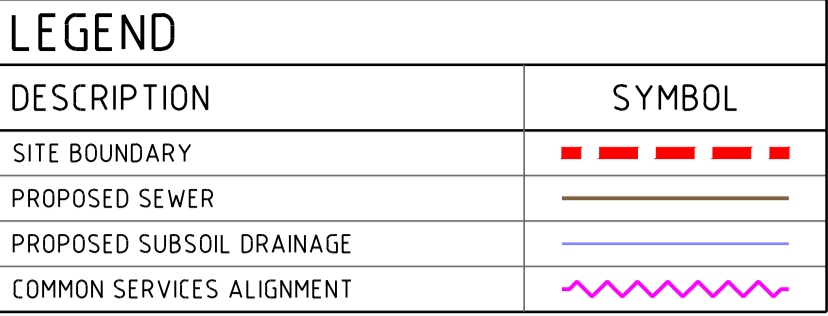
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PROJECT
PIARA WEST
TITLE
PRELIMINARY DRAINAGE
CATCHMENT PLAN
WAPC No.
N/A
DRAWING No.
6464-00-710
REVISION
G

ORIGINAL SIZE
A1

APPENDIX D

COMBINED SERVICES STRATEGY



ORIGINAL
A1
SIZE