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Geotechnical Desktop Study

Beveridge Intermodal Freight Terminal

Reference No. BIFT-SME-GI-RPT-0001
Prepared for Beveridge Property Management Services
8 May 2020

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Table of Contents

Appendices

List of Tables

List of Figures

1 Introduction

1.1 Background

About 1,077 hectares of land in Beveridge has been identified for the proposed Beveridge Intermodal Freight Terminal (BIFT) and associated freight and logistics industrial areas. The proposed site is situated east of Melbourne-Sydney rail line and about 6 km north of E6 Freeway reservation, and not distant from Hume Freeway and Outer Metropolitan Ring Road. The proposed development may comprise rail terminal operation facility, bulk operation facility, and about 28 of industrial lots.

1.2 Objectives

SMEC has been engaged by Beveridge Property Management Services to undertake a geotechnical desktop study pertaining to the BIFT proposed development. This geotechnical desktop study forms part of the early phase development plan of the project.

The objectives of the geotechnical desktop study are to collate and review the available geotechnical data, to identify the geotechnical risks and concerns associated with the proposed development and provide recommendations for further geotechnical assessments.

1.3 Scope of Works

The desktop study includes the following scope of work:

- A review of available geological data, geotechnical investigations and relevant reports from the study area;
- Description of topography, regional geology, soils and expected geotechnical conditions;
- An assessment of past mining event based on relevant publicly available records;
- An assessment of the potential for the presence of acid sulphate soils, by undertaking a review of the acid sulphate soils risk map for the area;
- A site visit by a geotechnical engineer to observe the general site characteristics; and
- An assessment of pertinent geotechnical and geological risks within the study area.

1.4 Source of Information

Table 1 presents the sources of information that have been reviewed and referenced for the geotechnical desktop study.

Table 1: Source of Information References

References
Geological Survey of Victoria, 1:250,000 Map Series ‘Melbourne’ mapsheet (1997, May)
CSIRO Land and Water. (2020, March). *A S R I S - Maps*. Retrieved from Australian Soil Resource Information System: http://www.asris.csiro.au/mapping/viewer.htm
CSIRO Land and Water. (2020, March). *A S R I S - Maps*. Retrieved from Australian Soil Resource Information System: http://www.asris.csiro.au/mapping/viewer.htm
Department of Jobs, Precincts and Regions, Victoria, Australia. (2020, March). *GeoVic* . Retrieved from Earth Resources.
Visualising Victorias Groundwater Maps. (2020, March). Retrieved from Visualising Victorias Groundwater: https://www.vvg.org.au/
MapshareVic, map portabbl (2020, March), Department of Environment, Land, Water and Planning. http://mapshare.vic.gov.au/MapShareVic/

2 Study Area Information

2.1 Site Location & Description

A site study locality plan is presented in Appendix A. A summary of the site descriptions is presented in Table 2.

Table 2: Summary of Site Descriptions

Item	Descriptions
Suburb	Beveridge, Victoria, 3753
Study area	Approximately 1077 hectares (Irregular shape)
Site location	38 km north of Melbourne 3 km south of Wallan
Municipal	Whittlesea Mitchell
Site boundary	North-Eastern Railway (Melbourne-Sydney) along western boundary Merri Creek along eastern boundary Vacant lands to southern and south-eastern boundary. Future Julian Road to the south-eastern boundary; Vacant lands to the northern boundary. Future Hadfield Road to the northern boundary; Beveridge Road runs east-west through the site.
Surrounding land use	Vacant lands, grazing farms and localised dams; Low density residential housing; Regional rail; Reserve area along Merri Creek.
Site setting	The site is irregular in shape with length about 4.8 km in north-south direction and width range between 0.7 km and 3 km in east-west direction; The majority of the site is formed by farms / paddocks / vacant lands subdivided with farm fences; Two farm houses are located within the site. One is situated 1.4 km north of Beveridge Road and west of Merri Creek. Another is situated 0.8 km south of Beveridge Road and 0.7 km west of Merri Creek. Access to the farm houses are via unpaved roads; Trees are scattered across the subject site with denser tree populations near the farm houses, along Merri Creek, along rail corridor, and along local access roads. Approximately 12 localised dams are scattered sporadically across the site; Gas easement runs through the site in north-south direction. A gas substation is located immediately south of Beveridge Road along the gas easement.
Topography	The site topography is generally flat with areas of undulating with localised hills and low areas; Low lying area around Merri Creek; Mount Fraser situated approximately 1.5 km to 2 km west of subject site has a hilltop level recorded at 424 m above sea mean level.

2.2 Anticipated Geological Setting

Reference to the Geological Survey of Victoria maps (Melbourne series at 1:250,000 scale and Kingslake series a 1:63,360), it indicates the subject site is expected to comprise several geological settings. A summary of these geological settings is summarised in Table 3 and it should be read in conjunction with an excerpt geological map presented in Figure 1.

Table 3: Summary Descriptions of Geological Setting

Unit	Site Area	Anticipated Geological Setting	Geological Setting Description
1	Eastern Boundary (Along Merri Creek)	Quaternary Age Alluvial (Q_{ra})	Alluvial deposits from river flow. Typically consist of sand, silt, clay and minor gravel.
		Devonian Age Humevale Siltstone (D_{lh})	Siltstone, minor sandstone bedding. Typically consist of residual soil derived from weathered rock and underlain by sedimentary weathered rock.
2	Majority of Site	Quaternary Age Newer Volcanics (Q_{vn})	Basalt, minor scoria and ash. Typically consist of residual silty clay over weathered basalt rock. Basalt boulders may occasionally present within the residual soil profile.
3	South-Eastern Corner	Quaternary Age Paludal (Q_{rm})	Lagoon and swamp deposits. Typically consist of silt and clays.
4	Northern Section	Quaternary Age Fluvial (Q_{pa})	Sediments, erosion or deposition on the river bed. Typically consist of gravel, sand and silt.

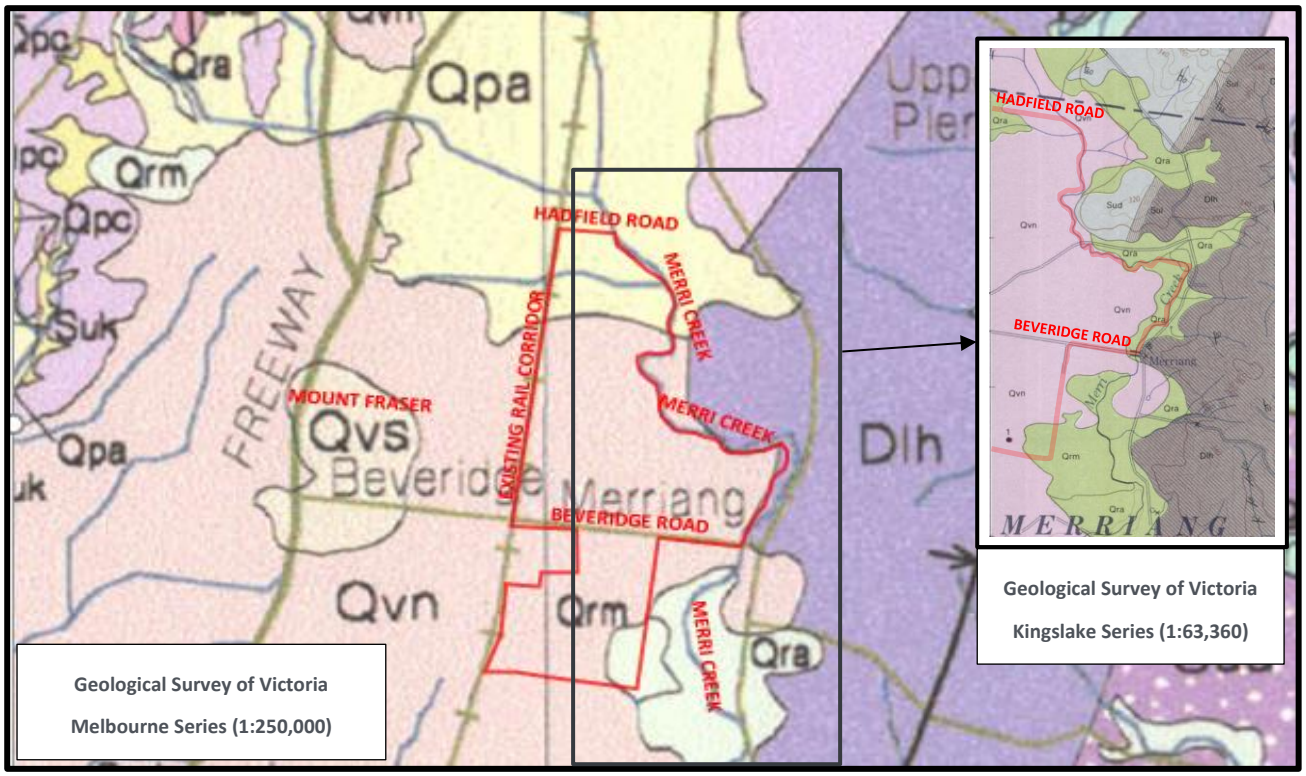


Figure 1: Excerpt of Geological Map (Reference: Geological Survey of Victoria 1:250,000 scale Melbourne Series and 1:63,360 scale Kingslake Serieis).

2.3 Anticipated Groundwater Table

Based on available online GIS system (Visualising Victoria Groundwater Maps, 2020), it indicates the groundwater table is expected to be variable across the site. An interactive map showing the top of groundwater table is presented in Appendix B. The groundwater is expected to be shallower than 5 m below ground level in the north, south-east corner of the site, a localised area in the west and area along the Merri Creek.

In areas the groundwater table is expected to be deeper than 20 m below ground level. According to the available contour plan, these areas have recorded a higher ground elevation (i.e. localised hill) from the surrounding ground.

The groundwater table for the remaining site is expected to be in the order of 5 m to 10 m below ground level.

2.4 Previous Geotechnical Investigation

A geotechnical investigation was previously carried out by a third-party Cardno LanePiper in 2015 (Reference No.: 214470REport01.1). The geotechnical investigation comprised drilling series of boreholes and excavating series of test pits across the site. No data is disclosed herewith without the consent from the owner and/or author of the report.

In general, the encountered subsurface condition is considered consistent with the anticipated geological setting as discussed in Section 2.2. The subsurface generally consist of a thin layer of rootmat / clayey silt, then underlain by variable thickness of silty clay. Majority of test holes terminated above basalt rock. Several test holes did not encounter basalt rock and these test holes were generally located at the northern section and along the Merri Creek corridor. Majority of the site has recorded top of rock between 0.5 m and 2.5 m. Site visit carried out during the geotechnical investigation noted rock outcrops at the ground surface.

Darker clay was encountered at the north-west corner of the subject site.

2.5 Acid Sulphate Soil

A review of the Acid Sulphate Map (CSIRO Land and Water, 2020) indicates the vast majority of the site area has Extremely Low Probability of Occurrence of Acid Sulphate Soils. The south-eastern lobe of the site (specified as 'Open Recreational Space' in the masterplan) has Low Probability of Occurrence of Acid Sulphate Soils. An interactive map obtained from Australian Soil Resource Information System (ASRIS) is presented in Appendix C.

2.6 Historical Mining Activity

A review of the available online GIS system (Department of Jobs, Precincts, and Regions, Victoria, Australia, 2020) indicates that the subject site area has not been subject to historical mining activity. There is a scoria quarry at the south-side of Mount Fraser which situated east of outside subject site.

2.7 Site Classification as per AS2870-2011

Although not strictly applicable to the proposed development, the site classification in accordance with Australian Standards AS2870-2011 provide a means of the soil reactivity characteristic for the site. Based on AS2870-2011, the site is classified as climatic zone 3. As discussed in above sections, majority of site footprint is expected to be covered by basaltic origins. The site with natural soil of basaltic origins can be classified as class H2 ("Highly Reactive Site") to class E ("Extremely Reactive Site"). If there is any uncontrolled fill or engineered fill with a depth of greater than 0.4 m, then a site classification of class P ("Problem Site") may be appropriate.

3 Site Inspection

3.1 General

A site inspection of the study area was carried out by a SMEC personnel on 12 March 2020. A summary of the key findings from the site inspection is provided below and photographic records are included in Appendix D.

It should be noted, access within the site was not possible at the time of site inspection. Most boundaries were not observable being some distance from the road and with dense vegetation blocking any sight. Most observations described below are from stopping along Beveridge Road, driving in an easterly direction. Furthermore, on the date of inspection, rail works were being undertaken resulting in many vehicles around the intersection of the rail line and Beveridge Road and the intersection with Wallan-Whittlesea Road, preventing access to S Station Road (western boundary of the proposed site).

3.2 Geotechnical & Key Observations

The key geotechnical observations from the site inspection are summarised below. The site inspection was used to confirm the preliminary findings made from available maps, reports and data. Table 4 below, provides specific examples correlating to the below descriptions, with photo reference. These observations should be read in conjunction with Appendix D.

- Geological Setting

Basalt was observed at multiple points along Beveridge Road. Rock outcrops and boulders were observed within the site, refer Observation ID01. Rock type was confirmed to be basalt due to the occurrence found on the side of the road (Slightly weathered, vesicular, some Iron stains), refer Observation ID02. On the southern side of the proposed site, there were three rock 'mounds', approximately 40 m in length, refer Observation ID03. Likely in-situ basalt with further boulders placed on top from elsewhere within property. Two more 'mounds' were present further east. With the increased undulations in an easterly direction, there seemed to be more rocky patches exposed from vegetation. Crossing Merri Creek, the banks did not exhibit basalt, instead an orange/brown colour material. Heading north onto Merriang Road, the road has clearly been cut through the increase on topography. This material was appeared to be siltstone from the Devonian age Humevale formation.

- Vegetation

As seen in most site photos in Appendix D, apart from the few rock outcrops and 'mounds' the site is covered by a combination of grasses and shrubs, with moss also growing over rock. The double barbed fence line along Beveridge Road had varying levels of tree density and type, and large bushes.

- Topography

At the time of inspection, the site appeared to be mostly flat in the west before becoming undulating and further downward sloping towards the east, as approaching Merri Creek, see Observation ID04. Close to Merri Creek and on the east side of it, the ground level seemed to rise - as approaching Merriang Road, see Observation ID05.

- Water Features & Drainage

One drain crossing under Beveridge Road was observed, made of concrete and had stagnant water ponded within it. It likely followed north into property, see Observation ID06. Culverts along Beveridge Road varied in significance, see Observation ID07. On the southern side of the site there is a farm dam with low water level, built of soil bunds and basalt boulders, see Observation ID08. Merri Creek can just be observed within the property as a dip in the land. As crossing bridge (outside of proposed site), the creek exhibits very steep eroded banks.

- Utilities

Gas network small compound/facility on southern side of Beveridge Road (not within proposed site), see Observation ID09. High pressure gas lines crossing beneath road, also potentially going north into property, see Observation ID10. Mound in property directly opposite gas compound/facility with gate access. Underground optical fibre also beneath the surface, marker found on east bound side of Beveridge Road, see Observation ID11. Electricity overhead powerlines running east-west direction along the whole west bound side of Beveridge Road as well as extending north-south into the site at this location, see Observation ID12.

Table 4: Observation ID and Descriptions Noted During SMEC Site Inspection

Observation ID	Category	Coordinates of Photo Taken	Description/Area
01	Geology	323560 , 5850864	Location of one of the proposed internal roads
02	Geology	323560 , 5850864	Edge of Beveridge Road
03	Geology	324032 , 5850800	Southern side of Beveridge Road
04	Topography	324032 , 5850800	Facing east
05	Topography	325099 , 5850692	Location of one proposed internal roads between Lot 6 and open recreational space
06	Water Features & Drainage	324245 , 5850899	From northern side of Beveridge Road
07	Water Features & Drainage	323406 , 5850883	East bound road drain
08	Water Features & Drainage	324291 , 5850783	Southern side of Beveridge Road, just before proposed eastern boundary
09	Utilities	323406 , 5850883	Facing south
10	Utilities	323406 , 5850883	Facing north
11	Utilities	323406 , 5850883	Facing north
12	Utilities	324291 , 5850783	Facing east

4 Comments & Recommendations

4.1 Proposed Development

The proposed development plan comprises intermodal terminal facilities, bulk operations facilities, commercial lots and internal access roads. It is envisaged the commercial lots may comprise warehouse type structure. Deep asphalt pavement and/or rigid pavement may be deployed for heavy traffic loading area such as intermodal terminal facilities and bulk operation facilities.

4.2 Key Geotechnical Aspects

The following key geotechnical aspects in Table 5 should be considered for future assessment, planning and design.

Table 5: Key Geotechnical Aspects

Key Geotechnical Aspects	Comments
Variability Depth to Rock	• The top of basalt rock across the site is expected to vary significantly. Majority of the site is expected top of basalt rock to be between surface and 2.5 m below ground level. There are areas where deeper top of rock are expected such as area to the north and area around Merri Creek; • The variation of depth to rock can be attributed to two main causes being differential weathering and differences in geological age of various surfaces (P.G. Dahlhaus, 1992); • In addition to variable rock depth, rock boulders within residual clay matrixes ('floaters') are also frequently encountered within the Newer Volcanics geology. They are irregularly shaped and normally produced by spheroidal weathering (P.G. Dahlhaus, 1992); • Shallow presence of rock boulders was evidently observed during the site visit;
Alluvial / Fluvial / Swamp Deposits	• Maps and available geotechnical data indicate that the northern section, south-eastern corner and eastern (along Merri Creek) boundary of the site underlain by the recent deposits (i.e. alluvial or fluvial or swamp deposits); • This type of soil material is typically silt and/or clay contents and highly plastic. The consistency of the soil material is generally relatively weaker or softer; • This type of soil material is generally not suitable as founding material and/or subgrade material;
Highly Reactive Clay with High Shrink-Swell	• The local clay originating from residual basalt is likely to be highly to extremely reactive. Similarly, soil derived from alluvial and fluvial deposits may exhibits moderately to highly reactivity. • Highly reactive clay can expand or shrink due to moisture changes, causing significant damage to structures, building foundations, road infrastructures and building facades; • Mature trees were observed sporadically around the site may have large root systems and have locally affected the moistures on-site. The removal or introduction of large trees may potentially create moisture changes of the surrounding soil thus result in soil volume changes and shrink-swell effects.
Slope Stability	• Steep slopes are expected in areas adjacent to Merri Creek; • The presence of weaker / softer material, shallow groundwater and steep slope may result in stability issue; • Consideration of slope stability measures (i.e. flatter slope, retention system, slope surface stabilisation) should be given for any development around the Merri Creek area.
Low Subgrade CBR	• The local clay originating from residual basalt is likely to exhibit relatively low CBR values (i.e. 1% to 2.5%); • Thicker pavement designs or subgrade improvement may be required due to low subgrade CBR; • Non-reactive material may be required as capping material over the reactive subgrade; • Unconsolidated alluvial soils may require subgrade improvements.

Key Geotechnical Aspects	Comments
Settlement	• Presence of variable residual soil thickness, unconsolidated alluvial soils may introduce differential settlements depending on magnitude of vertical loading; • Localised uncontrolled fill (i.e. dam walls, dam lining materials, disturbed ground due to farming activities) may present also introduce differential settlement hazard if remained unchecked.
Excavation	• Subject the proposed development across this area of the site and its topography, it is assumed that some extent of cut and/or fill will be required to level the site; • Excavation techniques would require careful considerations as the rate of which materials can be moved would be the governing factor of construction progress. The main factors that would affect rate of excavation in rock would be the variable weathering grades, the rock joints and defects, the presence of boulders as well as the integrity of rock; • Depending on excavation depths, heavy ripping conditions should be expected requiring use of large plant together with rock breaking equipment to facilitate excavation and removal, as reflected during site observations where rock breakers were utilised; • Variable rock depth may require over-excavation to achieve required founding depths for foundations. Trench excavations may be difficult due to presence of large basalt floaters within clay matrixes;
Underground Services	• Construction of underground services may likely to encounter soil and weathered rock; • Depth to basalt rock is variable and the presence of basalt boulder within clay matrix is common in Newer Volcanic formation; • Consideration shall be given to the variable rock depth and installation approach during the design development phase.

4.3 Foundation System

Depending on the type of structures and subsurface conditions, multiple foundation systems may be necessary. Shallow foundation system which may include strip and pad footings may be adopted for lightly loaded structures. The shallow foundation system may be founded in the residual soil or weathered rock or both. Consideration should be given to differential settlement as a result of foundation founded on different founding material. Shallow footings for structures similar to residential buildings should be designed in accordance with Australian Standards AS2870, which provides requirements for design of footings on reactive clay sites. Alluvial, fluvial and swamp deposits may present low bearing capacity and not suitable as founding material.

Heavily loaded structures may adopt larger pad footings and/or piled foundations socketed in rock. The typical piled foundations may include driven pile, continuous flight auger (CFA) pile and bored pile. The selection of pile type may subject to the subsurface conditions, constructability, pile loading and type of development.

Further design development and geotechnical investigation may be required to inform the appropriate foundation system.

4.4 Preliminary Geotechnical Investigation Specification

The geotechnical investigation should be undertaken in stages as the project progresses into different phases (i.e. conceptual phase, functional phase, etc). The geotechnical investigation specification discuss herewith is for Stage 1 Preliminary Geotechnical Investigation. The objectives of Stage 1 Preliminary Geotechnical Investigation are including:

- To identify the extents of each geological setting;
- To determine the thickness, characteristics and properties of alluvial deposits;
- To determine the thickness, characteristics and properties of basalt rock;
- To identify the presence of residual soil and weathering grade of Siltstone underlying basalt; and
- To identify the groundwater table.

The following geotechnical investigation testing are proposed:

- Drill and sample 10 no. boreholes to 20 m target depth or 10 m into sound basalt rock, whichever occur first;
- Drill and sample 15 no. boreholes to 10 m target depth;
- Install 5 no. groundwater monitoring wells at selected boreholes location;
- Excavate and sample 35 no. test pits to 4 m target depth or earlier refusal; and
- Undertake laboratory testing to determine material engineering properties.

The proposed test location plan is presented in Appendix E.

4.4.1 Borehole

All boreholes shall be advanced using a drill rig and shall be drilled using solid flight auger, wash boring and/or diamond rock coring techniques. The sound basalt rock shall consist of Moderately Weathered (MW) weathering grade or better and shall have a minimum RQD of 50%.

If the borehole encounters weaker / softer material at the proposed target depths, the borehole shall extend to deeper depth to confirm competent soil material is achieved and client shall be contacted for approval. The competent material shall consist of very stiff consistency for cohesive soil and/or dense for granular soil.

Standard Penetration Test (SPT) and/or Undisturbed samples (U63) shall be collected at regular depth 1.5 m depth intervals. The first test shall be carried out at or above 1 m depth. Minimum 1 undisturbed soil samples shall be collected in each borehole. It is recommended the undisturbed soil samples to be collected within the expected soil suction depth intervals (as per Australian Standards AS2870-2011). Should the weaker / softer cohesive soil material be identified during the borehole drilling, undisturbed soil samples shall be collected. Pocket penetrometer test shall be carried out at the undisturbed soil sample. Undisturbed soil samples shall be preserved to avoid moisture variation. Additional SPT/U63 tests shall be carried out if there is a change of soil strata being identified.

Bulk samples shall be collected at minimum 15 boreholes locations. The bulk samples shall be collected at the subgrade strata. The retrieve rock samples shall be boxed, labelled, photographed, logged and sealed.

Groundwater (if presence) shall be recorded within the borehole. All the non-standpipes boreholes shall be backfilled and reinstated to the existing surface.

The investigation shall be supervised by a qualified geotechnical engineer / engineering geologist. The soil/rock materials shall be logged in accordance with Australian Standards AS1726. The boreholes co-ordinates shall be recorded.

4.4.2 Groundwater Monitoring Well

It is suggested minimum 5 groundwater monitoring wells shall be installed across the site. Upon completion of the standpipe installation, the standpipes shall be purged/dewatered to establish equilibrium state. Measurement shall be taken before and after the purging/dewatering. A subsequent measurement and groundwater sampling shall be carried out 1 week after the purging/dewatering. The construction details of the groundwater monitoring wells shall be recorded accurately.

4.4.3 Test Pits

Total 35 no. of test pits are proposed. The test pits shall be excavated to 4 m depth or earlier refusal, whichever occur first. Backhoe/excavator shall be deployed for the excavation.

The subsurface conditions shall be logged by a qualified geotechnical engineer / engineering geologist in accordance with Australian Standards AS1726. Any instability of test pit wall and/or presence of groundwater within the test pit shall be recorded. Dynamic Cone Penetration (DCP) testing shall be carried out in adjacent to the test pit to 1.5 m or

prior refusal. Bulk samples shall be collected from test pits at subgrade strata. Additional disturbed samples shall be collected if there is a change of soil strata being identified. Upon completion of the excavation, the test pit shall be backfilled with excavated spoil and compacted. The test pit co-ordinates shall be recorded.

Photographs of the test pit shall be taken at the following occasions:

- Before test pit excavation;
- At the test pit once the excavation achieves its terminated depth;
- Stockpile material; and
- After test pit is backfilled and reinstated to the surface.

4.4.4 Laboratory Testing

The selected samples collected from the geotechnical investigation shall be submitted to NATA Accredited Laboratory for laboratory testing to identify relevant engineering properties. The proposed laboratory test regime shall comprise the following (but not limited to):

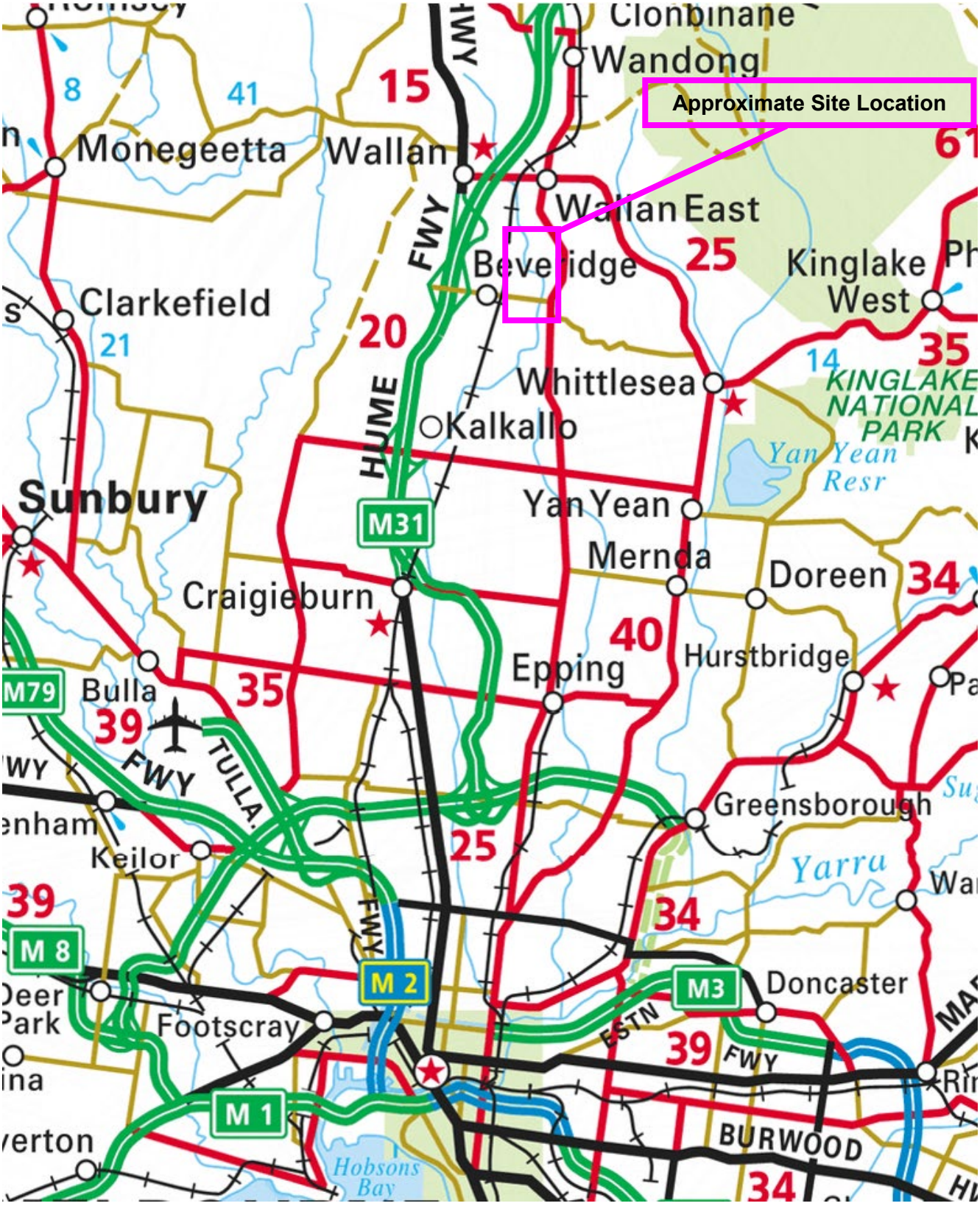
• Moisture Contents	• Atterberg Limit Test
• Particle Size Distribution	• Shrink-Swell Index
• Emerson Class	• Permeability
• Standard Compaction	• CBR
• Aggressivity Test (Soil and Groundwater)	• Point Load Index
• Unconfined Compressive Strength Test	• Consolidation Test
• Triaxial Test	

The final type and quantity of laboratory testing shall be assessed and confirmed upon completion of the geotechnical investigation.

4.4.5 Reporting

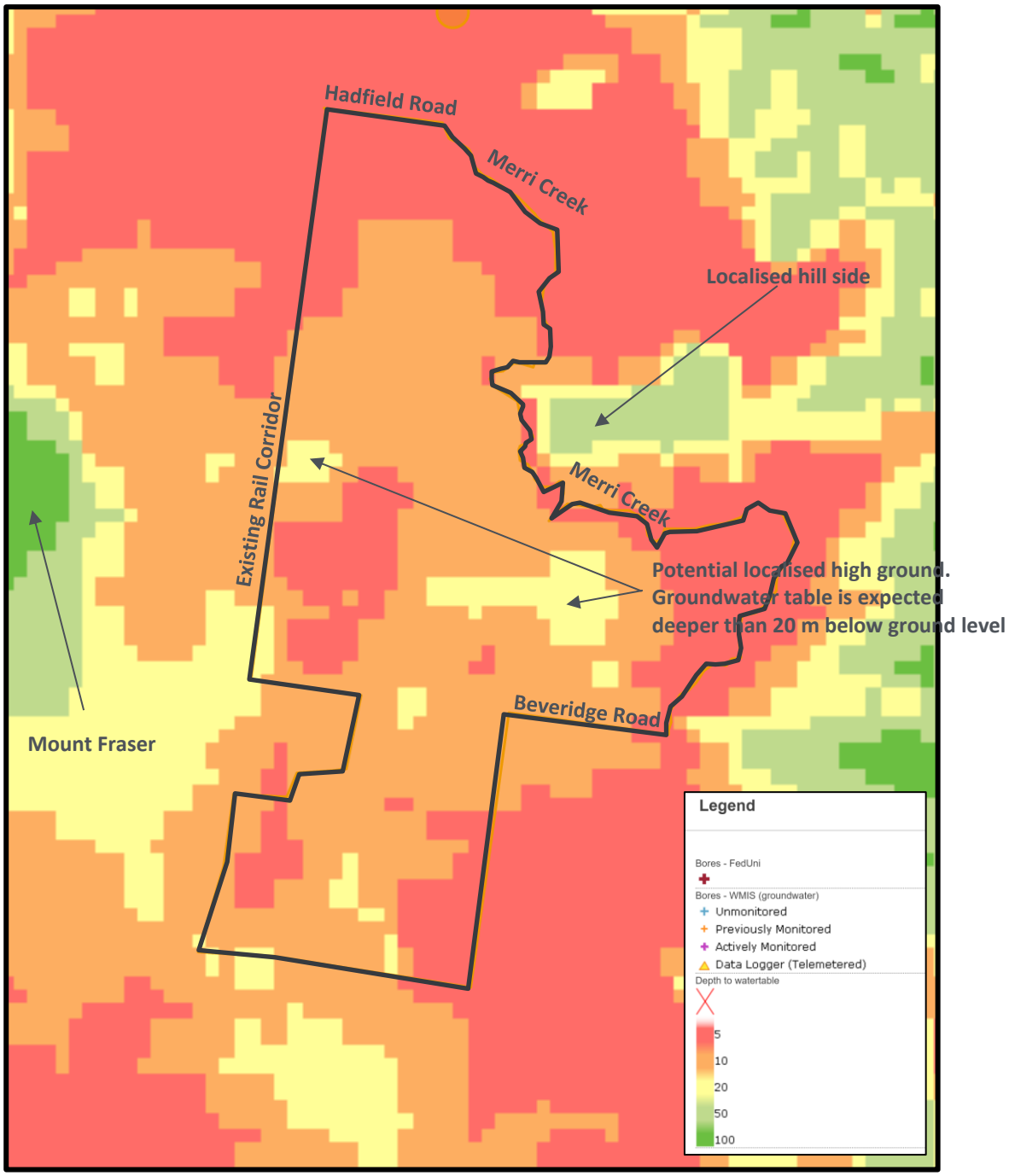
An interpretive report shall be prepared with preliminary comments and recommendations pertaining to the design and construction of the proposed development.

Appendix A Locality Plan



REFERENCE NO: 30041930 – Appendix A	SOURCE REFERENCE: https://online.melway.com.au/melway/	**Site Locality Map** **Beveridge Intermodal Freight Terminal** **Geotechnical Desktop Study**	SMEC Member of the Surbana Jurong Group
PREPARED BY: NB / ZW	DATE: March 2020		

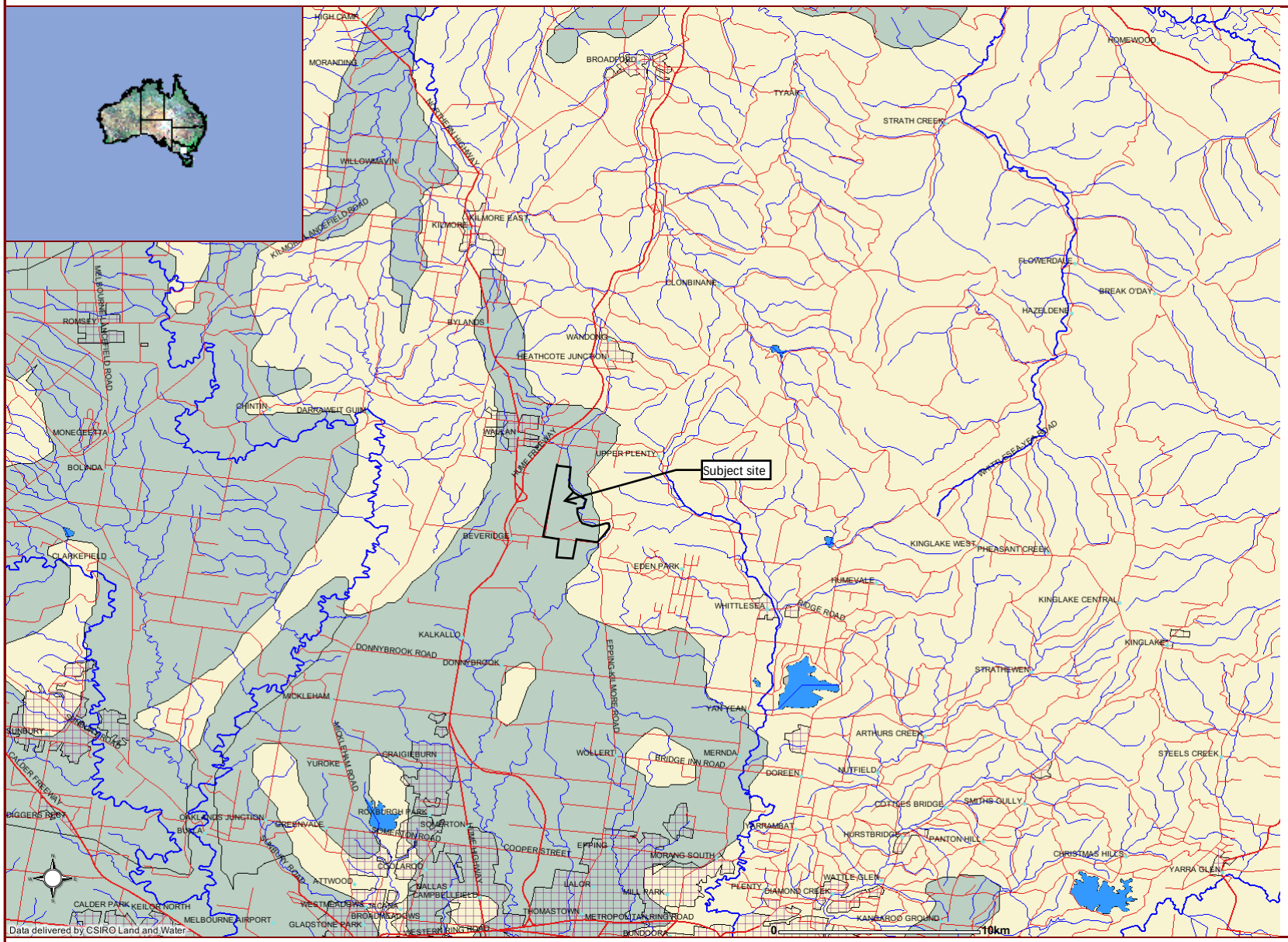
Appendix B Groundwater Table Interactive Map



(Source: Visualising Victoria's Groundwater)

Appendix C Acid Sulfate Soils

ASRIS



Locations

Roads (1:250K)

- Highway
- Other Roads

Streams

- Major
- Minor

Builtup Areas

Inland Water Bodies

ASS Reference Sites

National ASS Atlas

- A1 High Probability/High Confidence
- A2 High Probability/Moderate Confidence
- A3 High Probability/Low Confidence
- A4 High Probability/Very Low Confidence
- A- High Probability/Confidence Unknown
- B1 Low Probability/High Confidence
- B2 Low Probability/Moderate Confidence
- B3 Low Probability/Low Confidence
- B4 Low Probability/Very Low Confidence
- B- Low Probability/Confidence Unknown
- C1 Extremely Low Probability/High Confidence
- C2 Extremely Low Probability/Moderate Confidence
- C3 Extremely Low Probability/Low Confidence
- C4 Extremely Low Probability/Very Low Confidence
- C- Extremely Low Probability/Confidence Unknown

Base-Map

Zachary Wong SMEC

1 Apr 2020

Appendix D Site Inspection Photographs

Observation ID01	REFERENCE: 30041930-Geotechnical-App D-Fig 1	**Site Walkover Observations** **Beveridge Intermodal Freight Terminal** **Geotechnical Desktop Study**	SMEC Member of the Surbana Jurong Group
PREPARED BY: ZW / NB	DATE: March 2020		

Observation ID02	REFERENCE:	30041930-Geotechnical-App D-Fig 2	**Site Walkover Observations** **Beveridge Intermodal Freight Terminal** **Geotechnical Desktop Study**
PREPARED BY: ZW / NB	DATE:	March 2020	

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Observation ID03	REFERENCE:	30041930-Geotechnical-App D-Fig 3	**Site Walkover Observations** **Beveridge Intermodal Freight Terminal** **Geotechnical Desktop Study**
PREPARED BY: ZW / NB	DATE:	March 2020	

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Observation ID04	REFERENCE:	30041930-Geotechnical-App D-Fig 4	**Site Walkover Observations** **Beveridge Intermodal Freight Terminal** **Geotechnical Desktop Study**
PREPARED BY: ZW / NB	DATE:	March 2020	

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Observation ID05	REFERENCE:	30041930-Geotechnical-App D-Fig 5	**Site Walkover Observations** **Beveridge Intermodal Freight Terminal** **Geotechnical Desktop Study**
PREPARED BY: ZW / NB	DATE:	March 2020	

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Observation ID06	REFERENCE:	30041930-Geotechnical-App D-Fig 6	**Site Walkover Observations** **Beveridge Intermodal Freight Terminal** **Geotechnical Desktop Study**
PREPARED BY: ZW / NB	DATE:	March 2020	

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Observation ID07	REFERENCE: 30041930-Geotechnical-App D-Fig 7	**Site Walkover Observations** **Beveridge Intermodal Freight Terminal** **Geotechnical Desktop Study**	SMEC Member of the Surbana Jurong Group
PREPARED BY: ZW / NB	DATE: March 2020		

Observation ID08	REFERENCE: 30041930-Geotechnical-App D-Fig 8	**Site Walkover Observations** **Beveridge Intermodal Freight Terminal** **Geotechnical Desktop Study**	SMEC Member of the Surbana Jurong Group
PREPARED BY: ZW / NB	DATE: March 2020		

Observation ID09	REFERENCE:	30041930-Geotechnical-App D-Fig 9	**Site Walkover Observations** **Beveridge Intermodal Freight Terminal** **Geotechnical Desktop Study**
PREPARED BY: ZW / NB	DATE:	March 2020	

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Observation ID10	REFERENCE:	30041930-Geotechnical-App D-Fig 10	**Site Walkover Observations** **Beveridge Intermodal Freight Terminal** **Geotechnical Desktop Study**
PREPARED BY: ZW / NB	DATE:	March 2020	

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Observation ID11	REFERENCE:	30041930-Geotechnical-App D-Fig 11	**Site Walkover Observations** **Beveridge Intermodal Freight Terminal** **Geotechnical Desktop Study**
PREPARED BY: ZW / NB	DATE:	March 2020	

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Observation ID12	REFERENCE:	30041930-Geotechnical-App D-Fig 12	**Site Walkover Observations** **Beveridge Intermodal Freight Terminal** **Geotechnical Desktop Study**
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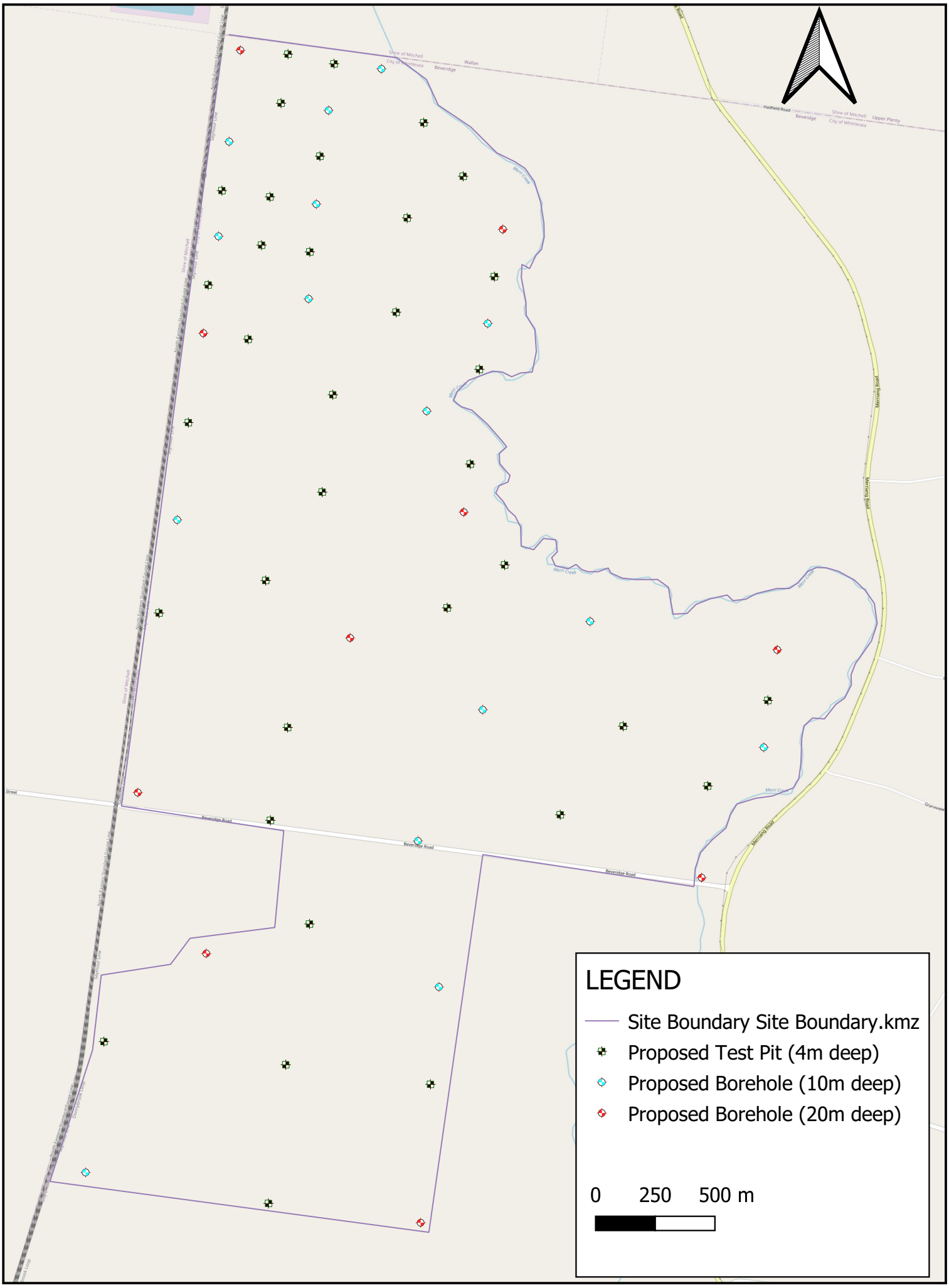
Appendix E Stage 1 Geotechnical Investigation Plan



PROPOSED STAGE 1 PRELIMINARY GEOTECHNICAL INVESTIGATION

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