GEOTECHNICAL INVESTIGATION REPORT

FORTIFY GEOTECH

Proposed Industrial Development

CLIENT

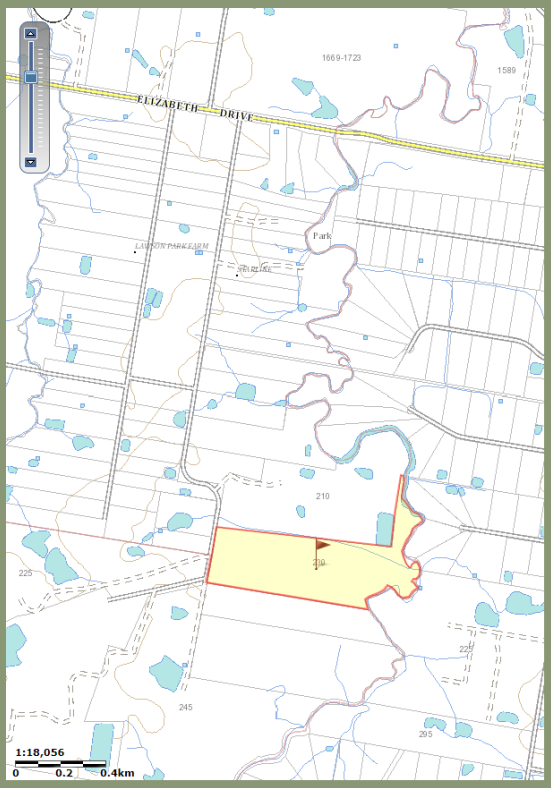
EP Risk Management

ADDRESS

230 Martin Road,
Badgerys Creek, NSW

DATE

December 2025



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11 December 2025
Our ref: JS/S2024 Rev1

EP Risk Management
via email: troy.chatman@eprisk.com.au

Attention: Troy Chatman

Proposed Industrial Development – 230 Martin Road, Badgerys Creek, NSW
Geotechnical Investigation Report

We are pleased to present our geotechnical investigation report for the proposed industrial development, located at 230 Martin Road, Badgerys Creek, NSW.

The report outlines the methods and results of exploration, describes site subsurface conditions, and provides recommendations for building footing design, excavation conditions, preparation of subgrades, stability of cut and fill batters, provides indicative design CBR values, laboratory test results, and site drainage advice.

Yours faithfully
Fortify Geotech

Jeremy Murray
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About us

We work with our clients to provide practical advice and solutions tailored to each project. Our professional services are reliable, responsive and efficient.

Our highly capable Geotechnical Engineers and Geologists have a comprehensive understanding of the industry. We provide the best engineering solution for complicated geotechnical engineering issues. This has earned us a solid reputation with our Construction Industry, Municipal and Government clients

- Residential
- Commercial
- Transport Infrastructure
- Industrial Developments of all sizes.

- Geotechnical Site Investigations and Reporting;
- Engineering Geology;
- Mining/Rock Geotechnics;
- Foundation Engineering;
- Dam Engineering; Embankment Design and Specification;
- Geotechnical Design Recommendations;
- Pavement Engineering and Design;
- Pavement Condition Surveys;
- Slope Stability and Risk Assessments;

- Geotechnical and Hydrological Instrumentation and Monitoring;
- Footing and Excavation Supervision and Certifications;
- Excavated soil/rock assessments and VENM assessments;
- Supervision and Certification of Earthworks and Controlled Fill, including Level 1 supervision;
- Geotechnical Construction Specifications;
- Deep Excavation Support; and
- Slope/Retaining Structure Analysis and Design

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GEOTECH

Proposed Industrial Development – Badgerys Creek

Geotechnical Investigation Report

QUALITY INFORMATION

Revision history

Reference/ Revision	Description	Date	Author	Reviewer
JS/S2024	For issue	09/11/2023	JS	JM
JS/S2024 Rev1	Second Issue	11/12/2025	CB	MN

EP Risk Management

Proposed Industrial Development – 230 Martin Road, Badgerys Creek, NSW

Geotechnical Investigation Report

1 INTRODUCTION

At the request of EP Risk Management, Fortify Geotech Pty Ltd carried out a geotechnical investigation for the proposed industrial development at 230 Martin Road, Badgerys Creek, NSW.

The project is understood to involve the construction of two separate warehouse developments with associated carparking. It is understood that only minor excavations are expected for the proposed development.

The aim of the investigation was to:

i. Identify subsurface conditions including the extent and nature of any fill materials, soil strata, bedrock type and depth, and groundwater presence.

ii. Provide site classification to AS2870 “Residential Slabs & Footings”.

iii. Advise on suitable footings systems, founding depths, allowable bearing pressures and design parameters for piles.

iv. Advise on excavation conditions and suitability of excavated material for use in controlled fill.

v. Advise on stable batter slopes and shoring/support of temporary excavations.

vi. Provide earth/rock pressure parameter values for low retaining wall design.

vii. Advise on pavement subgrade preparation and provide indicative design CBR values.

viii. Provide Atterberg limit test results.

ix. Provide aggressivity test results and exposure classification.

x. Provide earthquake design parameters to AS1170.4-2007.

xi. Advise on site drainage and other geotechnical advice.

2 SITE DESCRIPTION & GEOLOGY

The site is located at 230 Martin Road, Badgerys Creek, NSW. The site has a total area of approximately 24.28 ha and is irregular in shape. The proposed development is only expected to occupy 8.1 ha of the site. The site is bound by an existing industrial development to the north, Martin Road to the west and rural residential developments to the east and south. The proposed site is currently occupied by single storey farm structures on the western end of the site and is otherwise undeveloped. The ground surface slopes very gently to the east and is grass or vegetation covered where not developed. Figure 1 shows the site locality, while Figure 2 is an aerial photograph showing the approximate test pit locations.

Local Geology Maps (Reference 1) indicate the site to be underlain by Quaternary age Alluvial floodplain deposits which consists of silt, very fine- to medium-grained lithic to quartz-rich sand, clay, underlain by Middle Triassic age Bringelly Shale, which consists of shale, carbonaceous claystone, laminite, lithic sandstone and rare coal.

3 INVESTIGATION METHODS

The site investigation was conducted on the 23rd of October 2023. The investigation comprised of twenty (20) test pits, designated TP1 to TP20. The test pits were excavated using a 5.5t Mini Excavator with a bucket attachment terminating at target depths of between 1.9m and 2.4m. The locations of the test pits are shown on Figure 2, and the detailed test pit logs are included in Appendix A.

The soil profiles were visually logged in accordance with the Unified Soil Classification System (USCS). Definitions of geotechnical engineering terms used in the report on the test pit logs, including a copy of the USCS chart, are provided in Appendix B.

4 INVESTIGATION RESULTS

4.1 SUBSURFACE CONDITIONS

The subsurface conditions of the proposed development were investigated by twenty test pits designated TP1-TP20. The test pit logs in Appendix A can be referred to for more detail. Investigation test pits TP1-TP20 found the subsurface profile to comprise:

TABLE 1: Subsurface Conditions

Geological Profile	Typical Depth Interval	Description
TOPSOIL FILL/ TOPSOIL	0m/0.25m to 0.1m/0.5m	SILTY SAND, SILTY GRAVELLY SAND, SANDY SILT, SILTY CLAYEY SAND, SANDY SILTY CLAY, CLAYEY SANDY SILT, SILTY SANDY CLAY SILTY SAND, CLAYEY SILTY SAND; fine grained sand, fine to medium grained sand, fine to coarse grained sand, low to medium plasticity clay, brown, trace grey, grass roots at surface, some roots, trace anthropogenic material (plastic), some fine to medium sized gravels, dry, w~PL, loose to medium dense, medium dense, medium dense to dense, firm
FILL	0m/0.45m to 0.45m/1.6m	GRAVELLY SAND, SANDY GRAVEL, GRAVELLY SANDY CLAY, CLAYEY SILTY SAND, SILTY SANDY CLAY; fine to coarse grained sand, fine to medium grained sand, medium to coarse sized gravels, low to medium plasticity clay, medium plasticity clay, dark brown, brown, dark brown to grey, trace orange, red, black, trace fine to coarse sized gravels, trace anthropogenic material (gravels, brick, plastic), dry, w<PL, w~PL firm, medium dense, medium dense to dense. This material was only encountered in test pits TP13, TP14 & TP15.
ALLUVIAL/ RESIDUALSOILS	0.1m/1.6m to 1.7m/>2.0m	SANDY CLAY, CLAY with SAND, SILTY SANDY CLAY, CLAY trace SAND, SILTY CLAYEY GRAVEL, GRAVELLY SILTY CLAY, GRAVELLY SANDY CLAY, SILTY CLAY, SILTY CLAY trace SAND; low to medium plasticity clay, medium plasticity clay, medium to high plasticity clay, fine grained sand, fine to medium grained sand, fine to coarse grained sand, fine to coarse sized gravels, red to brown, orange to brown, red mottled grey, pale grey mottled red to brown, trace brown, grey mottled red to brown, orange to brown mottled brown and red, grey to brown mottled brown and red to brown, trace red and orange, trace fine to medium sized gravels, trace fine to coarse sized ironstone gravels, w<PL, w~PL, firm to stiff, stiff, stiff to very stiff, very stiff, dense
WEATHERED BEDROCK	Below 1.7m/1.8m	SANDSTONE, SHALE; extremely weathered (XW), excavates as SILTY CLAYEY GRAVEL, GRAVELLY SAND trace CLAY & CLAYEY SANDY GRAVEL. Bedrock was only encountered in test pits TP04, TP08 & TP16.

Table 2 below provides a summary of total depth, depth of topsoil/fill and depth to XW bedrock for all test pits excavated on the site.

Table 2: Test Pit Summary

Test Pit Number	Termination Depth (m)	Depth of Topsoil/Fill (m)	Depth to XW Bedrock (m)
TP01	2	0.3	-
TP02	2	0.3	-
TP03	2	0.4	-
TP04	2	0.4	1.8
TP05	2	0.35	-
TP06	2	0.4	-
TP07	2	0.35	-
TP08	1.9	0.3	1.8
TP09	2	0.5	-
TP10	2	0.4	-
TP11	2	0.4	-
TP12	2	0.3	-
TP13	2	0.8	-
TP14	2.4	1.6	-
TP15	2	0.45	-
TP16	2	0.5	1.7
TP17	2	0.35	-
TP18	2	0.3	-
TP19	2	0.25	-
TP20	2	0.2	-

4.2 GROUNDWATER

Permanent groundwater was not encountered within the investigation depth during the investigation, and the encountered soils were mostly dry, dry to moist, less than the plastic limit or near the plastic limit. The permanent groundwater level is expected to be below the proposed excavation depth. Temporary, perched seepages could be encountered following rainfall within the more pervious soils.

4.3 LABORATORY CBR & ATTERBERG TEST RESULTS

Four representative samples of the soil from test pits, designated TP06/1D, TP11/1D, TP13/1D and TP18/1D were sampled on 23rd of October 2023 and were tested in a NATA laboratory for standard compaction and four-day soaked CBR value. Results of standard compaction and soaked CBR laboratory test performed on the soil sample is summarised in Table 3 below. The CBR test specimens were compacted to a nominal 98%StdMDD at about optimum moisture content and soaked for four days prior to testing.

Table 3 – CBR Result Summary

Sample Location	Depth of sample	Classification of Excavated Material	CBR Value (%)
TP06/1D	0.4m-0.6m	ALLUVIUM; Clay with Sand; medium plasticity clay, fine to medium grained sand, re to brown mottled grey to brown, trace roots, w<PL, very stiff.	3.5
TP11/1D	0.4m-0.6m	ALLUVIUM; Sandy Clay; medium plasticity clay, fine to medium grained sand, red to brown mottled grey and brown, trace roots, w<PL, stiff to very stiff.	1.5
TP13/1D	0.8m-1.0m	FILL; Sandy Clay, medium to high plasticity clay, fine to medium grained sand, orange to brown mottled brown and red, trace fine sized gravels, w<PL, stiff to very stiff.	5.0
TP18/1D	0.45m-0.7m	ALLUVIUM; Sandy Clay, medium plasticity clay, fine to medium grained sand, orange to brown mottled red and grey, trace black, trace fine gravels, w~PL, stiff.	1.5

Three representative samples of the soil from test pits, designated TP06/1D, TP13/1D and TP18/1D were sampled on the 23rd of October 2023 and were tested in a NATA laboratory for Atterberg limits. Results of Atterberg limits test performed on the soil sample is summarised in Table 4 below. The material test report is included in Appendix B.

Table 4 – Laboratory Test Results Summary – Atterberg Limits

Sample No.	TP06/1D	TP13/1D	TP18/1D
Liquid Limit (%)	*47*	*63*	*56*
Plastic Limit (%)	*18*	*23*	*20*
Plasticity Index (%)	*29*	*40*	*36*
Linear Shrinkage (%)	*10.0*	*13.5*	*12.5*

4.4 AGGRESSIVITY TEST RESULTS & EXPOSURE CLASSIFICATION

Four representative samples of the soils from test pits, designated TP12, TP15, TP17 & TP20 were sampled on the 23rd of October 2023 and have been tested in a NATA laboratory for aggressivity (Cl, SO4, pH & EC).

Results of the laboratory test performed on the soil sample is summarised in Table 5 below. The NATA certificates are attached in Appendix C.

Table 5 - Laboratory Test Results Summary

Sample No.	Depth of sample (m)	Material Description	pH	Electrical Conductivity (µS/cm)	Chloride, Cl (mg/kg)	Sulphate, SO4 (mg/kg)
TP12	2.0	RESIDUAL; Gravelly Silty Clay	4.6	960	1,300	270
TP15	0.8	ALLUVIAL; Clay with Sand	4.9	1,100	1,300	230
TP17	0.5	ALLUVIAL; Clay with Sand	5.3	150	71	130
TP20	1.0	ALLUVIAL; Sandy Clay	4.6	910	1,000	500

The exposure classification for concrete piles can be determined in accordance with AS2159-2009, Table 6.4.2(C). Soil Conditions B can be used as the tested soils were clayey and above groundwater. All the test results are consistent with an exposure classification for **concrete piles of 'mild'.**

The exposure classification for steel piles can be determined in accordance with AS2159-2009, Table 6.5.2(C). Due to the high electrical conductivity of the soils, the test results are consistent with an exposure classification of '**moderate' for steel piles**.

The exposure classification for steel piles can be determined in accordance with AS2870-2011, Table 5.1 and Table 5.2. The test results are consistent with an exposure classification for concrete **in saline soils of 'A1' and in sulfate soils of 'A2'**.

5 DISCUSSION & RECOMMENDATIONS

5.1 SITE CLASSIFICATION

Due to the presence of uncontrolled fill material to up to 1.6m depth, the site is designated as Class "P" (problem) site in accordance with AS2870 "Residential Slabs & Footings". If the fill is removed, and replaced with controlled fill, or if footings are founded in the natural soil or bedrock below the fill, or in newly placed controlled fill, a Class "H1" (highly reactive) category can be used in design of new footings. The characteristic ground surface movement "Y_s", as defined by AS2870 for the range of extreme dry to extreme wet moisture conditions is estimated to be between 40mm and 50mm.

Deemed-to-comply footing designs provided by AS2870 are applicable specifically to residential-style one and two-storey structures, or buildings with similar loads and superstructure stiffness.

5.2 GEOTECHNICAL DESIGN PARAMETERS

Table 6 provides preliminary coefficients of lateral earth pressure for the soils and rock encountered during the geotechnical investigation. The coefficients provided are based on horizontal ground surface and fully drained conditions.

Table 6: Preliminary Coefficients of Lateral Earth Pressure

Layer	Coefficient of Earth Pressure at Rest (K_0)	Coefficient of Active Earth Pressure (K_a)	Coefficient of Passive Earth Pressure (K_p)
Stiff & Very Stiff Alluvial/Residual Soil	0.577	0.406	2.464

5.3 BUILDING FOOTINGS

AS2870 provides "deemed-to-comply" footing/slab designs, which for a Class "H1" site includes stiffened rafts, stiffened footing slabs, waffle rafts, and strip and/or pad footings with above ground floors. Footings and slabs should be in accordance with the principles of AS2870 (Reference 2).

For structures founded at existing grade, footings, including thickened sections of slabs forming footings should be founded below the topsoil and any fill and founded in stiff natural soils or weathered bedrock. A general suitable founding depth of 0.2m/1.6m is expected (See Table 2). Shallow footings could be founded in any newly placed controlled fill following removal of any topsoil and fill material (see Section 5.7). Alternatively, footings could be founded on piers extending to the underlying weak weathered bedrock at 1.7m/1.8m depth from existing groundsurface levels at some test pit locations (see Table 2).

We recommend the following geotechnical strength reduction factors to be applied to the ultimate capacities of:

- Shallow footings = 0.5 in accordance with AS5100.3- 2017
- Piles = The actual value adopted will depend on design methods adopted, extent of pile testing etc. AS2159-2009 should be consulted for further assessment of this value.

All footings should be inspected by a geotechnical engineer prior to pouring concrete or installing steel reinforcement, to verify the actual ground conditions against the proposed design parameters. Any topsoil, uncontrolled fill, organic materials, and other unsuitable or deleterious material should be stripped beneath the footprint of the shallow footings.

For pile systems, the vertical resistance to imposed footing loads would be provided by a combination of shaft adhesion and end-bearing. Settlements are estimated to be approximately 1% of pier diameters. Recommended allowable end-bearing pressures and shaft adhesion values for various footing systems and likely foundation materials are provided in Table 7.

If designing footings based on engineering principles, recommended allowable end-bearing pressures for various footing systems and likely foundation materials are provided in Table 7.

Table 7 – Recommended Allowable End-Bearing Pressures for Footings

Foundation Material Type	Depth Below Existing Surface Level	Allowable End-Bearing Pressure			Allowable Shaft Adhesion on Bored Piers and Anchors	
		Strips	Pads	Bored Piers	Downward Loading	Uplift
Newly Placed Controlled Fill	-	100kPa	125kPa	N.A	N.A	N.A
Stiff/Medium Dense Natural Soils	*~0.2m/1.6m (See Table 2)*	100kPa	125kPa	150kPa	15kPa	7kPa
Very Stiff/Dense Natural Soils	*~0.3m/1.2m*[1]	150kPa	175kPa	200kPa	20kPa	10kPa
XW Shale & Siltstone Bedrock	*~1.7m/1.8m (TP04, TP08, TP16)*	400kPa	500kPa	600kPa	60kPa	30kPa

[1]*This material was not encountered in test pits TP03, TP08, TP13, TP14, TP15, TP16, TP18 & TP19.*

Notes to Table 7:

1. Ultimate bearing capacities would be three times the allowable values. Ultimate values should be used with the strength reduction factor in Section 5.3 above.

2. The parameters in Table 7 assume that the pile base is clear of debris. If seepage occurs into the pile excavation, dewatering should be conducted prior to pouring concrete, or concrete should be placed using a tremmie.

3. For bored piles, the subsurface profile encountered during pile excavation must be observed by a geotechnical engineer to confirm the design assumptions.

4. All piles shall be designed in accordance with the requirements of AS2159 – 2009 (Reference 3) and in accordance with good engineering practice.

5. Brom's assumption (as cited in Elson, 1984 (Reference 5)) that lateral resistance is zero to a depth of 1.5D, where D is the pile diameter, should be adopted.

All footings should be inspected and approved by an experienced geotechnical engineer to confirm the foundation material and design values, and to ensure the excavations are clean and stable.

Groundslabs can be constructed on the natural soils or newly placed controlled fill, following the removal of any topsoil and uncontrolled fill material. Following excavation to required level, slab areas on soil should be proof-rolled by a pad foot roller to check for any weak, wet or deforming soils that may require replacement. Suitable replacement fill should be compacted in not thicker than 150mm layers to not less than 98%StdMDD.

If required for design of ground slabs, a modulus of subgrade reaction of 30kPa/mm can be assumed for a natural soil or controlled fill foundation.

5.4 EXCAVATION CONDITIONS & USE OF EXCAVATED MATERIAL

It is understood that only minor excavations are anticipated for the development, with some cut to fill earthworks. Such excavations will be through topsoil and alluvial/residual material and into weak weathered bedrock. The topsoil, alluvial/residual material and weak weathered bedrock is readily diggable by backhoe and medium sized excavator to ~1.9m/2.4m depth. Moderately weathered (MW) and less weathered bedrock may be encountered below ~1.9m/2.4m depth and may require large excavators or ripping.

Any low/medium plasticity alluvial and residual soils can be used in controlled fill construction of building platforms, provided any rock particles are broken down to <75mm size and the fill is environmentally suitable for re-use on site. Topsoil, silty soil, existing uncontrolled fill material and any medium to high and high plasticity, clayey soils should not be used in controlled fill construction.

If imported fill is required, a suitable select fill material would include a low or medium plasticity soil such as clayey sand or gravelly clayey sand, containing less than 35% fines less than 0.075mm size (silt and clay), and no particles greater than 75mm size.

5.5 STABLE EXCAVATION BATTERS

Temporary site excavations to 1.5m depth can be formed near vertical, although any loose topsoil and fill should be cut back at 1(H):1(V). If required and space allows, deeper temporary cuts can be formed at 1(H):1(V) or benched at 1.5m intervals in natural soils. A geotechnical engineer should inspect all cut batters during construction to confirm stability. Exposed temporary batters should be protected from the weather by black plastic pinned to the face with link-wire mesh, or similar.

Permanent cut & fill batter slopes should be formed at no steeper than 2(H):1(V) in soil and be protected against erosion by shotcreting, stone pitching or other suitable methods. Alternatively, permanent excavations can be supported by structural retaining walls.

5.6 LOW RETAINING WALLS

Retaining walls constructed in open excavation, with the gap between the excavation face and the wall backfilled later, can be designed for an earth pressure distribution given by:

$$\sigma_h = (K\gamma' h) + Kq$$

where,

σ_h	is the horizontal earth pressure acting on the back of the wall, in kPa
K	is the dimensionless coefficient of earth pressure; this can be assumed to be 0.4 when the top of the wall is unrestrained horizontally, and 0.5 when the top of the wall is restrained (i.e. by building slabs etc.)
γ'	is the effective unit weight of the backfill, and can be assumed to be 20kN/m^3 for a lightly compacted soil backfill
h	is the height of the backfill, in metres
q	is any uniform distributed vertical surcharge acting on the top of the backfill, in kPa

Apart from structural restraints such as floor slabs, resistance to overturning and sliding of retaining walls is provided by frictional and adhesive resistance on the base, and by passive resistance at the toe of the wall. For a natural soil or controlled fill foundation, an ultimate base friction factor (tanδ) of 0.5, base adhesion (c) of 50kPa, and allowable passive earth pressure coefficient K_p=2.5 can be used for calculation of sliding resistance.

Free-draining granular backfill or synthetic fabric drains should be installed behind all walls. These should connect to weep holes and/or a collector drain, and ultimately to the stormwater system. Granular backfill should be wrapped in a suitable filter fabric to minimise infiltration of silt/clay fines

It is recommended that the initial design of any retaining system, or shoring with a single row of anchors or propping, be predicated on a triangular earth pressure distribution, utilizing the earth pressure coefficients delineated in Table 6. The 'Active' earth pressure coefficient (Ka) values may be employed in scenarios where a certain degree of wall movement is deemed acceptable. Conversely, the 'at rest' earth pressure (K_0) values should be utilized in circumstances necessitating minimized wall movement, such as adjacent to existing structures or utilities.

5.7 CONTROLLED FILL CONSTRUCTION

For construction of any new fill foundation platforms and road subgrades, it is recommended that:

- Areas be fully stripped of all topsoil, fill material and soft/loose soils. A general stripping depth of 0.2m/1.6m is expected (See Table 2). Stripped foundations should be proof-rolled by a vibratory pad-foot roller of not less than 10 tonne static mass to check for any weak or wet areas that would require replacement. No fill should be placed until a geotechnical engineer has confirmed the suitability of the foundation.

- Controlled fill comprising suitable site excavated or imported materials of not greater than 75mm maximum particle size, be compacted in not greater than 150mm layers to not less than 98%SMDD at about OMC.

- Fill placement and control testing be overviewed and certified by a geotechnical engineer at Level 1 or 2 involvement of AS3798 – 1996 “Guidelines on Earthworks for Commercial & Residential Developments” (Reference 4).

5.8 PAVEMENT SUBGRADES

Given the low CBR properties of the subgrade soils (as low as 1.5%), it is recommended that all pavement subgrades are stabilised by overlying with a 300mm thick layer of CBR12 select fill. These stabilised subgrades can then use a CBR value of 5% for pavement design. Alternatively, subgrades can be cement/lime stabilised, or the upper 300mm of the subgrade removed and replaced with a fill material with a higher CBR value. Such pavements could be designed based on the CBR value of the fill material. Exposed subgrades should be inspected by a geotechnical engineer to check the recommended design CBR value.

5.9 EARTHQUAKE SITE FACTOR

The Geoscience Australia Earthquake Hazard Map (Reference 6) indicates the earthquake acceleration coefficients (with an annual probability of exceedance of 1/500) for Australia to be used in structural design. These values are equivalent to hazard factor, Z. The Badgerys Creek area has an acceleration coefficient of 0.06g. AS1170.4 – 2007 – Minimum Design Loads on Structures – Part 4 Earthquake Loads (Reference 6) allows a minimum value of 0.08 to be used for the hazard factor, Z.

Section 4.2 of AS1170.4 “Minimum Design Loads on Structures – Part 4: Earthquake Loads” lists the site sub-soil classes to be considered in structural design. The site is classified as a “Class C_e – Shallow Soil Site”.

5.10 SITE DRAINAGE

Permanent groundwater was not encountered within the investigation depth during the investigation, and the encountered soils were mostly dry or dry to moist. The permanent groundwater table is expected to be below the proposed excavations, although temporary perched seepages may be present following rain.

Suitable surface drainage should be provided to ensure rainfall run-off or other surface water cannot pond against buildings or pavements. Drainage should be provided behind all retaining walls, and subsoil drains should be installed along the upslope sides of access roads and carparks.

REFERENCES

Reference 1 MinView – geological map - https://minview.geoscience.nsw.gov.au - Accessed 09/11/2023

Reference 2 Standards Australia, “AS2870 – Residential Slabs & Footings”, 2011.

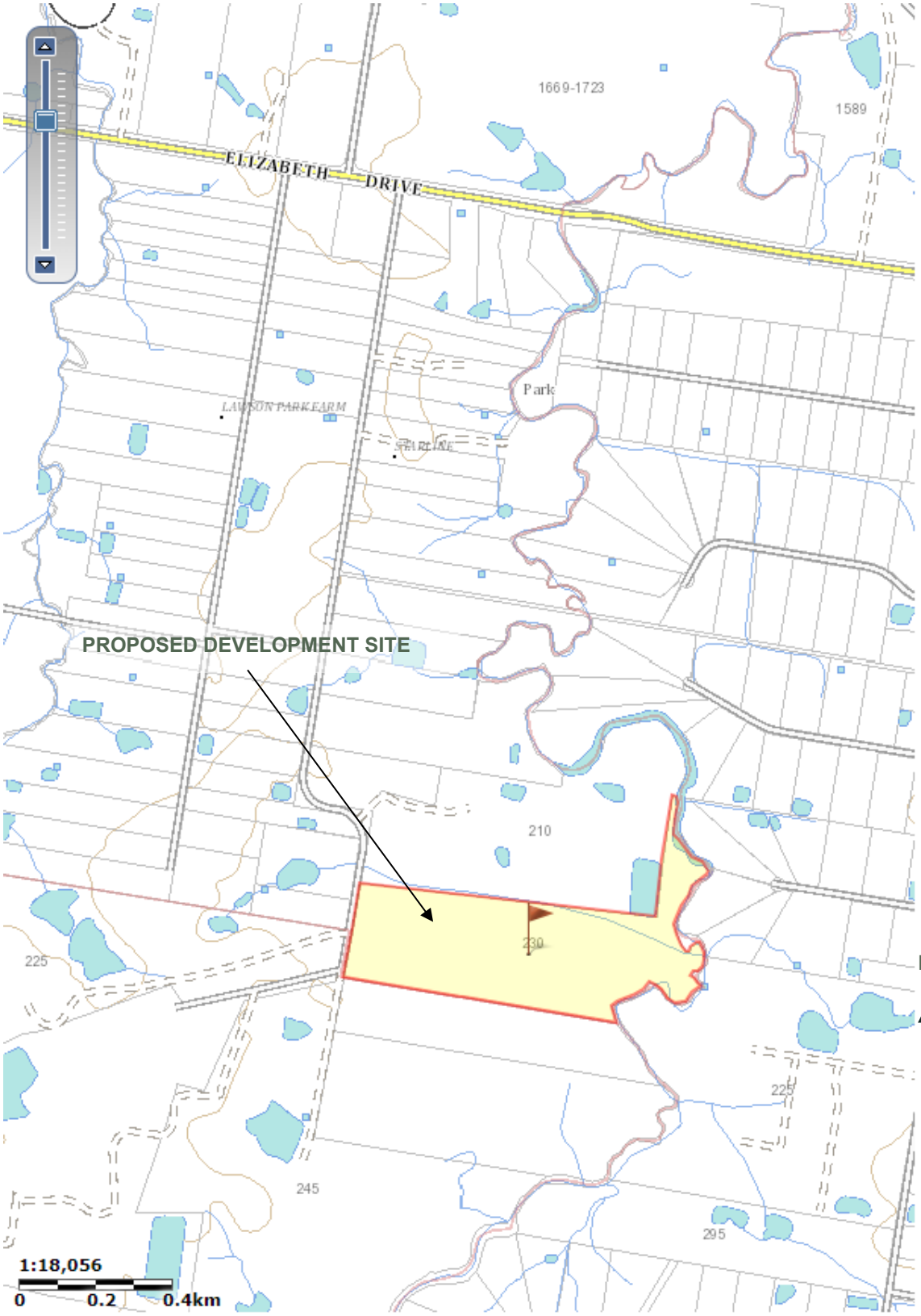
Reference 3 Standards Australia, “AS2159-2009 – Piling – Design and installation”.

Reference 4 AS3798, “Guidelines on earthworks for commercial and residential developments”.

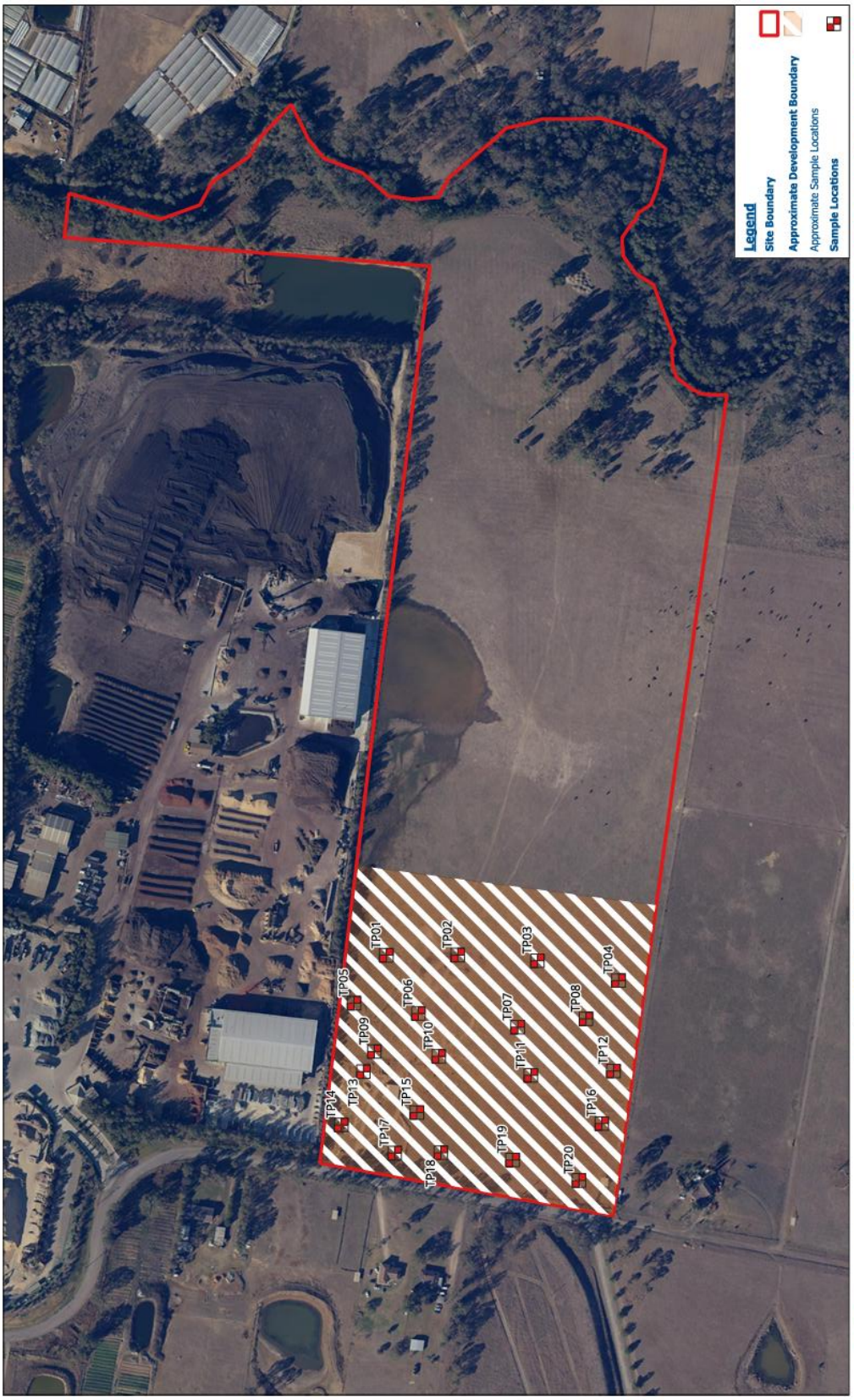
Reference 5 Elson, W. K., 1984, ‘‘Design of laterally-loaded piles.’’ CIRIA Rep. No. 103, Construction Industry Research and Information Association, London, 86.

Reference 6 Geosciences Website: http://www.ga.gov.au/darwin-view/hazards.xhtml# - Accessed on 09/11/2023

Reference 7 Standards Australia, “AS1170.4 – 2007 – Minimum Design Loads on Structures – Part 4 Earthquake Loads”.



SITE LOCALITY	S2024	FIGURE 1



AERIAL PHOTOGRAPH AND APPROXIMATE TEST PIT LOCATIONS	S2024	FIGURE 2

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Appendix A

Test Pit logs TP1 – TP20

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Borehole Log

Borehole No.	**TP01**
Sheet	1 of 1
Job No.	S2024

CLIENT: EP Risk Management Pty Ltd

PROJECT: Proposed Industrial Development
230 Martin Road, Badgerys Creek, NSW

Location : See Report

Collar Level : Not Known
Angle From Vertical : 0°
Bearing : N.A.

Equipment Type : 5.5t Excavator w/ Bucket
Hole Diameter : 300mm

Sample No.	Water	Method/ Casing	RL (m)	Depth (m)	Graphic Log	U.S.C.S.	Material Description, Structure Soil Type: Plasticity or Particle Characteristics, Colour, Secondary and Minor Components, Moisture, Structure	Moisture Condition	Consistency or Relative Density	Field Test Results	Geological Profile
	None Encountered			0.1		SM	**SILTY SAND**; fine grained sand, brown, grass roots at surface, trace anthropogenic material (plastic)	D	L-MD		TOPSOIL FILL
				0.3		SM	**SANDY SILT/SILTY SAND**; fine grained sand, brown, trace grey, some roots	D	MD-D		TOPSOIL
				0.6		Cl	**SILTY SANDY CLAY**; medium plasticity clay, fine grained sand, red to brown, trace brown, trace fine gravels	*w*<PL	VSt		ALLUVIAL
				1.0		Cl	**CLAY with SAND**; medium plasticity clay, fine grained sand, red to brown, trace red, trace fine gravels	*w*<PL	VSt		
				1.1		CL	**SANDY CLAY**; low to medium plasticity clay, fine to meidum grained sand, orange to brown, trace fine gravels	*w*<PL	St		
									St-VSt		
				1.8		Cl	**SANDY CLAY**; medium plasticity clay, fine to medium grained sand, orange to brown mottled grey and brown	*w*~PL	F-St		
				2.0			BOREHOLE TERMINATED AT 2m At Target				
				2.5							

Logged By : JS Date : 23/10/23 | Checked By : Date :

BOREHOLE/EXCAVATION LOG S2024.GPJ EXC.GDT 9/11/23

FORTIFY GEOTECH

Borehole Log

Borehole No.	**TP02**
Sheet	1 of 1
Job No.	S2024

CLIENT: EP Risk Management Pty Ltd

PROJECT: Proposed Industrial Development
230 Martin Road, Badgerys Creek, NSW

Location : See Report

Collar Level : Not Known
Angle From Vertical : 0°
Bearing : N.A.

Equipment Type : 5.5t Excavator w/ Bucket
Hole Diameter : 300mm

Sample No.	Water	Method/ Casing	RL (m)	Depth (m)	Graphic Log	U.S.C.S.	Material Description, Structure Soil Type: Plasticity or Particle Characteristics, Colour, Secondary and Minor Components, Moisture, Structure	Moisture Condition	Consistency or Relative Density	Field Test Results	Geological Profile
	None Encountered			0.1		SM	**SILTY SAND**; fine grained sand, brown, grass roots at surface, trace anthropogenic material (plastic)	D	L-MD		TOPSOIL FILL
				0.3		SM	**SANDY SILT/SILTY SAND**; fine grained sand, brown, trace grey, some roots	D	MD-D		TOPSOIL
				0.7		CI	**SANDY CLAY;** medium plasticity clay, fine to medium grained sand, red to brown, trace orange and grey	*w*<PL	VSt		ALLUVIAL
				1.0		CH	**CLAY with SAND**; medium to high plasticity clay, fine to medium grained sand, red mottled grey, trace fine gravels	*w*<PL	VSt		
				1.3		CH	**CLAY with SAND**; medium to high plasticity clay, fine to medium grained sand, pale grey mottled red to brown, trace orange	*w*~PL	St		
				2.0			BOREHOLE TERMINATED AT 2m At Target				
				2.5							

Logged By : JS Date : 23/10/23 | Checked By : Date :

BOREHOLE/EXCAVATION LOG S2024.GPJ EXC.GDT 9/11/23

FORTIFY GEOTECH

Borehole Log

Borehole No.	**TP03**
Sheet	1 of 1
Job No.	S2024

CLIENT: EP Risk Management Pty Ltd

PROJECT: Proposed Industrial Development
230 Martin Road, Badgerys Creek, NSW

Location : See Report

Collar Level : Not Known
Angle From Vertical : 0°
Bearing : N.A.

Equipment Type : 5.5t Excavator w/ Bucket
Hole Diameter : 300mm

Sample No.	Water	Method/ Casing	RL (m)	Depth (m)	Graphic Log	U.S.C.S.	Material Description, Structure Soil Type: Plasticity or Particle Characteristics, Colour, Secondary and Minor Components, Moisture, Structure	Moisture Condition	Consistency or Relative Density	Field Test Results	Geological Profile
	None Encountered					CL	**SILTY SANDY CLAY**; low to medium plasticity clay, fine to medium grained sand, dark brown, some worms, grass roots at surface	*w*~PL	F		TOPSOIL
				0.4		CI	**CLAY with SAND**; medium plasticity clay, fine grained sand, grey mottled red to brown and brown, trace black, trace fine gravels	*w*~PL	St		ALLUVIAL
				1.0		CH	**CLAY with SAND**; medium to high plasticity clay, fine grained sand, pale grey mottled red, trace fine gravels, trace rootlets	*w*<PL	St-VSt		
				1.8		CI	**SANDY CLAY**; medium plasticity clay, fine to medium grained sand, pale grey mottled red, trace fine gravels	*w*~PL	St		
				2.0			BOREHOLE TERMINATED AT 2m At Target				
				2.5							

Logged By : JS Date : 23/10/23 | Checked By : Date :

BOREHOLE/EXCAVATION LOG S2024.GPJ EXC.GDT 9/11/23

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Borehole Log

Borehole No.	**TP04**
Sheet	1 of 1
Job No.	S2024

CLIENT: EP Risk Management Pty Ltd

PROJECT: Proposed Industrial Development
230 Martin Road, Badgerys Creek, NSW

Location : See Report

Collar Level : Not Known
Angle From Vertical : 0°
Bearing : N.A.

Equipment Type : 5.5t Excavator w/ Bucket
Hole Diameter : 300mm

Sample No.	Water	Method/ Casing	RL (m)	Depth (m)	Graphic Log	U.S.C.S.	Material Description, Structure Soil Type: Plasticity or Particle Characteristics, Colour, Secondary and Minor Components, Moisture, Structure	Moisture Condition	Consistency or Relative Density	Field Test Results	Geological Profile
	None Encountered					SC	**SILTY CLAYEY SAND**; fine to coarse grained sand, low to medium plasticity clay, dark brown, grass roots at surface, some fine to medium sized gravels	D	MD		TOPSOIL
				0.4		CI	**CLAY with SAND**; medium plasticity clay, fine to coarse grained sand, pale brown, trace black, trace fine to medium sized gravels	*w*<PL	VSt		ALLUVIAL
				0.75		CL	**SANDY CLAY**; low to medium plasticity clay, fine to medium grained sand, pale grey mottled orange and brown, trace fine to coarse sized gravels	*w*<PL	St		
				1.0							
				1.2		CL	**SANDY CLAY;** low to medium plasticity clay, fine to medium grained sand, pale grey mottled orange, some ironstone gravels	*w*<PL	St		RESIDUAL
				1.8		GW	**SANDSTONE**; extremely weathered (XW), excavates as CLAYEY SANDY GRAVEL; fine to coarse sized gravels, fine to coarse grained sand, low to medium plasticity clay, pale grey mottled orange, some ironstone gravels	D	D		
				2 2.0			BOREHOLE TERMINATED AT 2m At Target				
				2.5							

Logged By : JS Date : 23/10/23 | Checked By : Date :

BOREHOLE/EXCAVATION LOG S2024.GPJ EXC.GDT 9/11/23

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Borehole Log

Borehole No.	**TP05**
Sheet	1 of 1
Job No.	S2024

CLIENT: EP Risk Management Pty Ltd

PROJECT: Proposed Industrial Development
230 Martin Road, Badgerys Creek, NSW

Location : See Report

Collar Level : Not Known
Angle From Vertical : 0°
Bearing : N.A.

Equipment Type : 5.5t Excavator w/ Bucket
Hole Diameter : 300mm

Sample No.	Water	Method/ Casing	RL (m)	Depth (m)	Graphic Log	U.S.C.S.	Material Description, Structure Soil Type: Plasticity or Particle Characteristics, Colour, Secondary and Minor Components, Moisture, Structure	Moisture Condition	Consistency or Relative Density	Field Test Results	Geological Profile
	None Encountered					ML	**SANDY SILT**; fine grained sand, low plasticity fines, brown to grey, trace fine sized gravels, grass roots at surface	D	MD		TOPSOIL
				0.35		CI	**CLAY with SAND**; medium plasticity clay, fine to coarse grained sand, orange to brown mottled brown and red, trace fine to medium sized gravels	*w*<PL	VSt		ALLUVIAL
				1.0							
				1.1		CL	**SANDY CLAY**; low to medium plasticity clay, fine to coarse grained sand, grey mottled orange to brown and red to brown, trace fine to medium sized gravels	*w*<PL	St		
				1.5		CL	**SANDY CLAY**; low to medium plasticity clay, fine to coarse grained sand, pale grey mottled red to brown and orange, trace fine to medium sized gravels	*w*~PL	St		
				2 2.0			BOREHOLE TERMINATED AT 2m At Target				
				2.5							

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BOREHOLE/EXCAVATION LOG S2024.GPJ EXC.GDT 9/11/23

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Borehole Log

Borehole No.	**TP06**
Sheet	1 of 1
Job No.	S2024

CLIENT: EP Risk Management Pty Ltd

PROJECT: Proposed Industrial Development
230 Martin Road, Badgerys Creek, NSW

Location : See Report

Collar Level : Not Known
Angle From Vertical : 0°
Bearing : N.A.

Equipment Type : 5.5t Excavator w/ Bucket
Hole Diameter : 300mm

Sample No.	Water	Method/ Casing	RL (m)	Depth (m)	Graphic Log	U.S.C.S.	Material Description, Structure Soil Type: Plasticity or Particle Characteristics, Colour, Secondary and Minor Components, Moisture, Structure	Moisture Condition	Consistency or Relative Density	Field Test Results	Geological Profile
	None Encountered					SM	**SILTY SAND**; fine grained sand, brown, grass roots at surface, trace anthropogenic material (plastic)	D	L-MD		TOPSOIL FILL
				0.25		SM	**SANDY SILT/SILTY SAND**; fine grained sand, brown, trace grey, some roots	D	MD-D		TOPSOIL
				0.4		CI	**CLAY with SAND**; medium plasticity clay, fine to medium grained sand, red to brown mottled grey and brown, trace roots	*w*<PL	VSt		ALLUVIAL
				0.95		CI	**SANDY CLAY**; medium plasticity clay, fine to medium grained sand, grey to brown mottled brown and red to brown, trace fine to medium sized gravels	*w*<PL	St-VSt		
				1.0							
				1.7		CL	**SANDY CLAY**; low to medium plasticity clay, fine to medium grained sand, pale grey mottled orange and red	*w*~PL	St-VSt		
				2 2.0			BOREHOLE TERMINATED AT 2m At Target				
				2.5							

Logged By : JS Date : 23/10/23 | Checked By : Date :

BOREHOLE/EXCAVATION LOG S2024.GPJ EXC.GDT 9/11/23

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Borehole Log

Borehole No.	**TP07**
Sheet	1 of 1
Job No.	S2024

CLIENT: EP Risk Management Pty Ltd

PROJECT: Proposed Industrial Development
230 Martin Road, Badgerys Creek, NSW

Location : See Report

Collar Level : Not Known
Angle From Vertical : 0°
Bearing : N.A.

Equipment Type : 5.5t Excavator w/ Bucket
Hole Diameter : 300mm

Sample No.	Water	Method/ Casing	RL (m)	Depth (m)	Graphic Log	U.S.C.S.	Material Description, Structure Soil Type: Plasticity or Particle Characteristics, Colour, Secondary and Minor Components, Moisture, Structure	Moisture Condition	Consistency or Relative Density	Field Test Results	Geological Profile
	None Encountered			0.1		ML	**CLAYEY SANDY SILT**; fine grained sand, low plasticity fines, dark brown, grass roots at surface	D	MD		TOPSOIL
						CL	**SANDY SILTY CLAY**; low to medium plasticity clay, fine grained sand, dark brown, trace fine to medium sized gravels	*w*~PL	F		
				0.35		CI	**CLAY with SAND**; medium plasticity clay, fine to medium grained sand, pale grey mottled red, trace roots	*w*<PL	VSt		ALLUVIAL
				1.0							
				1.1		CH	**CLAY with SAND**; medium to high plasticity clay, fine to medium grained sand, pale grey mottled red, trace roots	*w*<PL	St		
				1.6		CL	**SANDY CLAY**; low to medium plasticity clay, fine to medium grained sand, pale grey mottled red, trace orange, trace fine to coarse sized ironstone gravels	*w*<PL	St-VSt		RESIDUAL
				2 2.0			BOREHOLE TERMINATED AT 2m At Target				
				2.5							

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BOREHOLE/EXCAVATION LOG S2024.GPJ EXC.GDT 9/11/23

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Borehole Log

Borehole No.	**TP08**
Sheet	1 of 1
Job No.	S2024

CLIENT: EP Risk Management Pty Ltd

PROJECT: Proposed Industrial Development
230 Martin Road, Badgerys Creek, NSW

Location : See Report

Collar Level : Not Known
Angle From Vertical : 0°
Bearing : N.A.

Equipment Type : 5.5t Excavator w/ Bucket
Hole Diameter : 300mm

Sample No.	Water	Method/ Casing	RL (m)	Depth (m)	Graphic Log	U.S.C.S.	Material Description, Structure Soil Type: Plasticity or Particle Characteristics, Colour, Secondary and Minor Components, Moisture, Structure	Moisture Condition	Consistency or Relative Density	Field Test Results	Geological Profile
	None Encountered					SM	**CLAYEY SILTY SAND**; fine to coarse grained sand, low plasticity clay, dark brown, trace fine to medium sized gravels	D	MD-D		TOPSOIL
				0.3		CI	**CLAY with SAND**; fine to medium grained sand, medium plasticity clay, pale grey mottled red, trace orange, trace fine to medium sized gravels	*w*<PL	St-VSt		ALLUVIAL
				0.85		CH	**CLAY trace SAND**; medium to high plasticity clay, fine to medium grained sand, pale grey mottled red, trace orange, trace fine to medium sized gravels	*w*<PL	St-VSt		
				1.0							
				1.35		CI	**SANDY CLAY**; medium plasticity clay, fine to medium grained sand, pale grey mottled red, trace orange	*w*<PL	St		
				1.8		SPG	**SANDSTONE**; extremely weathered (XW), excavates as GRAVELLY SAND trace CLAY; fine to medium grained sand, fine to coarse sized gravels, low plasticity clay, pale grey with orange and red, trace ironstone	D	D		WEATHERED BEDROCK
				1.9			BOREHOLE TERMINATED AT 1.9m At Target				
				2.0							
				2.5							

Logged By : JS Date : 23/10/23 | Checked By : Date :

BOREHOLE/EXCAVATION LOG S2024.GPJ EXC.GDT 9/11/23

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Borehole Log

Borehole No.	**TP09**
Sheet	1 of 1
Job No.	S2024

CLIENT: EP Risk Management Pty Ltd

PROJECT: Proposed Industrial Development
230 Martin Road, Badgerys Creek, NSW

Location : See Report

Collar Level : Not Known
Angle From Vertical : 0°
Bearing : N.A.

Equipment Type : 5.5t Excavator w/ Bucket
Hole Diameter : 300mm

Sample No.	Water	Method/ Casing	RL (m)	Depth (m)	Graphic Log	U.S.C.S.	Material Description, Structure Soil Type: Plasticity or Particle Characteristics, Colour, Secondary and Minor Components, Moisture, Structure	Moisture Condition	Consistency or Relative Density	Field Test Results	Geological Profile
	None Encountered					SWG	**SILTY GRAVELLY SAND**; fine to coarse grained sand, fine to coarse sized gravels, brown to grey, some anthropogenic material (wood, plastic, ceramic, gravels)	D	MD		TOPSOIL
				0.5		CH	**CLAY trace SAND**; medium to high plasticity clay, fine grained sand, red to brown mottled grey, trace fine gravels	*w*<PL	St-VSt		ALLUVIAL
				1.0							
				1.2		CI	**SANDY CLAY**; medium plasticity clay, fine to medium grained sand, red to brown mottled grey, trace orange, trace fine sized gravels	*w*~PL	St		
				1.8		CI	**SANDY CLAY**; medium plasticity clay, fine to medium grained sand, pale grey mottled red to brown and orange, trace fine sized gravels	*w*~PL	St-VSt		
				2 2.0			BOREHOLE TERMINATED AT 2m At Target				
				2.5							

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BOREHOLE/EXCAVATION LOG S2024.GPJ EXC.GDT 9/11/23

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Borehole Log

Borehole No.	**TP10**
Sheet	1 of 1
Job No.	S2024

CLIENT: EP Risk Management Pty Ltd

PROJECT: Proposed Industrial Development
230 Martin Road, Badgerys Creek, NSW

Location : See Report

Collar Level : Not Known
Angle From Vertical : 0°
Bearing : N.A.

Equipment Type : 5.5t Excavator w/ Bucket
Hole Diameter : 300mm

Sample No.	Water	Method/ Casing	RL (m)	Depth (m)	Graphic Log	U.S.C.S.	Material Description, Structure Soil Type: Plasticity or Particle Characteristics, Colour, Secondary and Minor Components, Moisture, Structure	Moisture Condition	Consistency or Relative Density	Field Test Results	Geological Profile
	None Encountered					SM	**CLAYEY SILTY SAND**; fine grained sand, low plasticity clay, dark brown, grass roots at surface, trace fine sized gravels	D	MD		TOPSOIL
				0.4		CI	**SANDY CLAY**; medium plasticity clay, fine to medium grained sand, grey mottled red and orange, trace fine sized gravels	*w*<PL	St-VSt		ALLUVIAL
				1.0							
				1.2		CH	**SANDY CLAY**; medium to high plasticity clay, fine to medium grained sand, grey mottled red and orange, trace fine sized gravels	*w*<PL	VSt		
				1.4		CH	**CLAY with SAND**; medium to high plasticity clay, fine to medium grained sand, pale grey mottled red and orange	*w*<PL	VSt		
				1.9		CI	**CLAY with SAND**; medium plasticity clay, fine to medium grained sand, pale grey mottled red and orange	*w*<PL	VSt		
				2 2.0			BOREHOLE TERMINATED AT 2m At Target				
				2.5							

Logged By : JS Date : 23/10/23 | Checked By : Date :

BOREHOLE/EXCAVATION LOG S2024.GPJ EXC.GDT 9/11/23

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Borehole Log

Borehole No.	**TP11**
Sheet	1 of 1
Job No.	S2024

CLIENT: EP Risk Management Pty Ltd

PROJECT: Proposed Industrial Development
230 Martin Road, Badgerys Creek, NSW

Location : See Report

Collar Level : Not Known
Angle From Vertical : 0°
Bearing : N.A.

Equipment Type : 5.5t Excavator w/ Bucket
Hole Diameter : 300mm

Sample No.	Water	Method/ Casing	RL (m)	Depth (m)	Graphic Log	U.S.C.S.	Material Description, Structure Soil Type: Plasticity or Particle Characteristics, Colour, Secondary and Minor Components, Moisture, Structure	Moisture Condition	Consistency or Relative Density	Field Test Results	Geological Profile
	None Encountered					SM	**CLAYEY SILTY SAND**; fine to medium grained sand, low plasticity clay, dark brown, grass roots at surface, trace roots	D	MD		TOPSOIL
				0.4		CI	**SANDY CLAY**; medium plasticity clay, fine to medium grained sand, red to brown mottled grey and brown, trace roots	*w*<PL	St-VSt		ALLUVIAL
				0.8		CI	**SANDY CLAY**; medium plasticity clay, fine to medium grained sand, pale grey mottled red to brown, trace roots	*w*<PL	St-VSt		
				1.0		CH	**CLAY with SAND**; medium to high plasticity clay, fine grained sand, pale grey mottled red to brown and orange	*w*<PL	VSt		
				1.6		CH	**CLAY with SAND**; medium to high plasticity clay, fine grained sand, pale grey, trace orange and red	*w*<PL	VSt		
				2.0			BOREHOLE TERMINATED AT 2m At Target				
				2.5							

Logged By : JS Date : 23/10/23 | Checked By : Date :

BOREHOLE/EXCAVATION LOG S2024.GPJ EXC.GDT 9/11/23

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Borehole Log

Borehole No.	**TP12**
Sheet	1 of 1
Job No.	S2024

CLIENT: EP Risk Management Pty Ltd

PROJECT: Proposed Industrial Development
230 Martin Road, Badgerys Creek, NSW

Location : See Report

Collar Level : Not Known
Angle From Vertical : 0°
Bearing : N.A.

Equipment Type : 5.5t Excavator w/ Bucket
Hole Diameter : 300mm

Sample No.	Water	Method/ Casing	RL (m)	Depth (m)	Graphic Log	U.S.C.S.	Material Description, Structure Soil Type: Plasticity or Particle Characteristics, Colour, Secondary and Minor Components, Moisture, Structure	Moisture Condition	Consistency or Relative Density	Field Test Results	Geological Profile
	None Encountered					SM	**CLAYEY SILTY SAND**; fine grained sand, low plasticity clay, dark brown, trace orange and grey, grass roots at surface	D	MD		TOPSOIL FILL
				0.3		CI	**CLAY with SAND;** medium plasticity clay, fine to medium grained sand, brown mottled orange and red, trace grey, trace fine to medium sized gravels	*w*<PL	St-VSt		ALLUVIAL
				1.0		GW	**SILTY CLAYEY GRAVEL**; fine to coarse sized gravels, low plasticity clay, pale grey, trace red and orange	*w*<PL	D		RESIDUAL
				1.8		CL	**GRAVELLY SILTY CLAY**; low to medium plasticity clay, fine to coarse sized gravels, pale grey with red and orange	*w*<PL	St-VSt		
				2.0			BOREHOLE TERMINATED AT 2m At Target				
				2.5							

Logged By : JS Date : 23/10/23 | Checked By : Date :

BOREHOLE/EXCAVATION LOG S2024.GPJ EXC.GDT 9/11/23

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Borehole Log

Borehole No.	**TP13**
Sheet	1 of 1
Job No.	S2024

CLIENT: EP Risk Management Pty Ltd

PROJECT: Proposed Industrial Development
230 Martin Road, Badgerys Creek, NSW

Location : See Report

Collar Level : Not Known
Angle From Vertical : 0°
Bearing : N.A.

Equipment Type : 5.5t Excavator w/ Bucket
Hole Diameter : 300mm

Sample No.	Water	Method/ Casing	RL (m)	Depth (m)	Graphic Log	U.S.C.S.	Material Description, Structure Soil Type: Plasticity or Particle Characteristics, Colour, Secondary and Minor Components, Moisture, Structure	Moisture Condition	Consistency or Relative Density	Field Test Results	Geological Profile
	None Encountered					SM	**GRAVELLY SILTY SAND/SANDY SILT**; fine to medium grained sand, fine to coarse sized gravels, grey to brown, trace roots, some anthropogenic material (plastic, metal, brick)	D	L-MD		TOPSOIL FILL
				0.45		SWG	**GRAVELLY SAND/SANDY GRAVEL**; medium to coarse sized gravels, fine to coarse grained sand, dark brown to dark grey, trace anthropogenic material	D	MD-D		FILL
				0.8		CI	**SANDY CLAY**; medium to high plasticity clay, fine to medium grained sand, orange to brown mottled brown and red, trace fine sized gravels	*w*<PL	St-VSt		ALLUVIAL
				1.0							
				1.2		CI	**SANDY CLAY**; medium plasticity clay, fine to medium grained sand, pale grey mottled orange and red, trace fine sized gravels	*w*<PL	St-VSt		
				1.6		CH	**SANDY CLAY**; medium to high plasticity clay, fine to medium grained sand, pale grey mottled orange and red, trace fine sized gravels	*w*<PL	St-VSt		
				1.9		CI	**SANDY CLAY**; medium plasticity clay, fine to medium grained sand, pale grey mottled orange and red, trace fine sized gravels	*w*<PL	St-VSt		
				2 2.0			BOREHOLE TERMINATED AT 2m At Target				
				2.5							

Logged By : JS Date : 23/10/23 | Checked By : Date :

BOREHOLE/EXCAVATION LOG S2024.GPJ EXC.GDT 9/11/23

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Borehole Log

Borehole No.	**TP14**
Sheet	1 of 1
Job No.	S2024

CLIENT: EP Risk Management Pty Ltd

PROJECT: Proposed Industrial Development
230 Martin Road, Badgerys Creek, NSW

Location : See Report

Collar Level : Not Known
Angle From Vertical : 0°
Bearing : N.A.

Equipment Type : 5.5t Excavator w/ Bucket
Hole Diameter : 300mm

Sample No.	Water	Method/ Casing	RL (m)	Depth (m)	Graphic Log	U.S.C.S.	Material Description, Structure Soil Type: Plasticity or Particle Characteristics, Colour, Secondary and Minor Components, Moisture, Structure	Moisture Condition	Consistency or Relative Density	Field Test Results	Geological Profile
	None Encountered					CL	**SILTY SANDY CLAY**; low to medium plasticity clay, fine to coarse grained sand, brown, trace orange, red, black, trace anthropogenic material (brick, plastic)	*w*<PL	F		FILL
				0.8		SM	**CLAYEY SILTY SAND**; fine to medium grained sand, low to medium plasticity clay, dark brown to grey, trace orange, red, trace fine to coarse gravels, trace anthropogenic material	D	MD		
				1.0							
				1.6		Cl	**SANDY CLAY**; medium plasticity clay, fine to medium grained sand, brown mottled orange to brown, trace fine to medium sized gravels	*w*<PL	St-VSt		ALLUVIAL
				2 2.0		Cl	**CLAY with SAND**; medium plasticity clay, fine to coarse grained sand, orange to brown mottled brown and grey, trace fine to medium sized gravels	*w*<PL	St-VSt		
				2.4			BOREHOLE TERMINATED AT 2.4m At Target				
				2.5							

Logged By : JS Date : 23/10/23 Checked By : Date :

BOREHOLE/EXCAVATION LOG S2024.GPJ EXC.GDT 9/11/23

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Borehole Log

Borehole No.	**TP15**
Sheet	1 of 1
Job No.	S2024

CLIENT: EP Risk Management Pty Ltd

PROJECT: Proposed Industrial Development
230 Martin Road, Badgerys Creek, NSW

Location : See Report

Collar Level : Not Known
Angle From Vertical : 0°
Bearing : N.A.

Equipment Type : 5.5t Excavator w/ Bucket
Hole Diameter : 300mm

Sample No.	Water	Method/ Casing	RL (m)	Depth (m)	Graphic Log	U.S.C.S.	Material Description, Structure Soil Type: Plasticity or Particle Characteristics, Colour, Secondary and Minor Components, Moisture, Structure	Moisture Condition	Consistency or Relative Density	Field Test Results	Geological Profile
	None Encountered			0.1		SM	**GRAVELLY SILTY SAND**; fine to coarse grained sand, fine to coarse sized gravels, brown	D	L-MD		TOPSOIL FILL
						Cl	**GRAVELLY SANDY CLAY;** medium plasticity clay, fine to medium grained sand, fine to coarse sized gravels, dark brown, trace anthropogenic material (gravels, plastic), trace red and black	*w*~PL	F		FILL
				0.45		CH	**CLAY with SAND**; medium to high plasticity clay, fine grained sand, red to brown mottled grey, trace fine gravels	*w*<PL	St-VSt		ALLUVIAL
				1.0							
				1.1		Cl	**SANDY CLAY;** medium plasticity clay, fine to medium grained sand, pale grey mottled red to orange, trace orange, trace fine to medium sized gravels	*w*~PL	St		
				1.8		Cl	**GRAVELLY SANDY CLAY**; medium plasticity clay, fine to medium grained sand, fine to medium sized gravels, pale grey mottled red to orange, trace orange, trace fine to medium sized gravels	*w*~PL	St		
				2.0			BOREHOLE TERMINATED AT 2m At Target				
				2.5							

Logged By : JS Date : 23/10/23 | Checked By : Date :

BOREHOLE/EXCAVATION LOG S2024.GPJ EXC.GDT 9/11/23

FORTIFY GEOTECH

Borehole Log

Borehole No.	**TP16**
Sheet	1 of 1
Job No.	S2024

CLIENT: EP Risk Management Pty Ltd

PROJECT: Proposed Industrial Development
230 Martin Road, Badgerys Creek, NSW

Location : See Report

Collar Level : Not Known
Angle From Vertical : 0°
Bearing : N.A.

Equipment Type : 5.5t Excavator w/ Bucket
Hole Diameter : 300mm

Sample No.	Water	Method/ Casing	RL (m)	Depth (m)	Graphic Log	U.S.C.S.	Material Description, Structure Soil Type: Plasticity or Particle Characteristics, Colour, Secondary and Minor Components, Moisture, Structure	Moisture Condition	Consistency or Relative Density	Field Test Results	Geological Profile
	None Encountered					SC	**SILTY CLAYEY SAND**; fine to coarse grained sand, low plasticity clay, dark brown with orange, trace black, trace fine to medium sized gravels, grass roots at surface	D	MD		TOPSOIL FILL
				0.5		CI	**SANDY CLAY**; medium plasticity clay, fine to medium grained sand, grey to brown mottled red and orange, trace fine gravels	*w*<PL	St-VSt		ALLUVIAL
				1.0		CL	**GRAVELLY SANDY CLAY**; low to medium plasticity clay, fine grained sand, fine to coarse sized gravels, pale grey with red and orange	*w*<PL	St-VSt		RESIDUAL
				1.2 1.7		GW	**SHALE**; extremely weathered (XW), excavates as SILTY CLAYEY GRAVEL; fine to coarse sized gravels, low plasticity clay, pale grey mottled red and orange	*w*<PL	D		
				2 2.0			BOREHOLE TERMINATED AT 2m At Target				
				2.5							

Logged By : JS Date : 23/10/23 | Checked By : Date :

BOREHOLE/EXCAVATION LOG S2024.GPJ EXC.GDT 9/11/23

FORTIFY GEOTECH

Borehole Log

Borehole No.	**TP17**
Sheet	1 of 1
Job No.	S2024

CLIENT: EP Risk Management Pty Ltd

PROJECT: Proposed Industrial Development
230 Martin Road, Badgerys Creek, NSW

Location : See Report

Collar Level : Not Known
Angle From Vertical : 0°
Bearing : N.A.

Equipment Type : 5.5t Excavator w/ Bucket
Hole Diameter : 300mm

Sample No.	Water	Method/ Casing	RL (m)	Depth (m)	Graphic Log	U.S.C.S.	Material Description, Structure Soil Type: Plasticity or Particle Characteristics, Colour, Secondary and Minor Components, Moisture, Structure	Moisture Condition	Consistency or Relative Density	Field Test Results	Geological Profile
	None Encountered					SM	**CLAYEY SILTY SAND/SANDY SILT**; fine to medium grained sand, low plasticity clay, dark brown, trace roots, grass roots at surface, trace fine to coarse sized gravels	D	MD		TOPSOIL FILL
				0.35		CI	**CLAY with SAND**; medium plasticity clay, fine to medium grained sand, pale grey mottled red to brown, trace fine to medium sized gravels	*w*<PL	VSt		ALLUVIAL
				1 1.0		CH	**CLAY with SAND**; medium to high plasticity clay, fine to medium grained sand, pale grey mottled red to brown, trace fine to medium sized gravels	*w*<PL	VSt		
				1.5		CL	**GRAVELLY SANDY CLAY**; medium plasticity clay, fine to coarse grained sand, fine to coarse sized gravels, grey and red to brown, trace orange	*w*<PL	VSt		
				2 2.0			BOREHOLE TERMINATED AT 2m At Target				
				2.5							

Logged By : JS Date : 23/10/23 | Checked By : Date :

BOREHOLE/EXCAVATION LOG S2024.GPJ EXC.GDT 9/11/23

FORTIFY GEOTECH

Borehole Log

Borehole No.	**TP18**
Sheet	1 of 1
Job No.	S2024

CLIENT: EP Risk Management Pty Ltd

PROJECT: Proposed Industrial Development
230 Martin Road, Badgerys Creek, NSW

Location : See Report

Collar Level : Not Known
Angle From Vertical : 0°
Bearing : N.A.

Equipment Type : 5.5t Excavator w/ Bucket
Hole Diameter : 300mm

Sample No.	Water	Method/ Casing	RL (m)	Depth (m)	Graphic Log	U.S.C.S.	Material Description, Structure Soil Type: Plasticity or Particle Characteristics, Colour, Secondary and Minor Components, Moisture, Structure	Moisture Condition	Consistency or Relative Density	Field Test Results	Geological Profile
	None Encountered					SM	**CLAYEY SILTY SAND**; fine to medium grained sand, low plasticity clay, dark brown, grass roots at surface	D	L-MD		TOPSOIL FILL
			0.3			CL	**SANDY CLAY**; low to medium plasticity clay, fine to medium grained sand, brown, trace orange and grey	*w*~PL	F-St		ALLUVIAL
			0.45			CI	**SANDY CLAY**; medium plasticity clay, fine to medium grained sand, orange to brown mottled red and grey, trace black, trace fine gravels	*w*~PL	St		
			1.05	1.0		CL	**SANDY CLAY**; low to medium plasticity clay, fine to medium grained sand, pale grey mottled orange and red, trace fine to coarse sized gravels, ironstone gravels	*w*<PL	St-VSt		
			1.8			CI	**GRAVELLY SANDY CLAY**; medium plasticity clay, fine to medium grained sand, fine to coarse sized gravels, pale grey mottled orange and red, ironstone gravels	*w*<PL	St-VSt		RESIDUAL
			2	2.0			BOREHOLE TERMINATED AT 2m At Target				
			2.5								

Logged By : JS Date : 23/10/23 | Checked By : Date :

BOREHOLE/EXCAVATION LOG S2024.GPJ EXC.GDT 9/11/23

FORTIFY GEOTECH

Borehole Log

Borehole No.	**TP19**
Sheet	1 of 1
Job No.	S2024

CLIENT: EP Risk Management Pty Ltd

PROJECT: Proposed Industrial Development
230 Martin Road, Badgerys Creek, NSW

Location : See Report

Collar Level : Not Known
Angle From Vertical : 0°
Bearing : N.A.

Equipment Type : 5.5t Excavator w/ Bucket
Hole Diameter : 300mm

Sample No.	Water	Method/ Casing	RL (m)	Depth (m)	Graphic Log	U.S.C.S.	Material Description, Structure Soil Type: Plasticity or Particle Characteristics, Colour, Secondary and Minor Components, Moisture, Structure	Moisture Condition	Consistency or Relative Density	Field Test Results	Geological Profile
	None Encountered					SM	**CLAYEY SILTY SAND**; fine to medium grained sand, low plasticity clay, dark brown, grass roots at surface	D	L-MD		TOPSOIL FILL
				0.25		CL	**SANDY CLAY;** low to medium plasticity clay, fine to medium grained sand, brown, trace orange and grey	*w*~PL	F-St		ALLUVIAL
				0.45		CL	**SANDY CLAY;** low to medium plasticity clay, fine to medium grained sand, grey mottled orange and red to brown, trace black, trace fine gravels	*w*<PL	St-VSt		
				1 1.0		CL	**SANDY CLAY**; low to medium plasticity clay, fine to medium grained sand, grey mottled orange and red to brown, trace black, trace fine to coarse gravels	*w*~PL	F-St		
				1.3		CL	**SILTY CLAY**; low to medium plasticity clay, pale grey mottled red and orange, trace fine to coarse sized gravels	*w*~PL	St-VSt		
				2 2.0			BOREHOLE TERMINATED AT 2m At Target				
				2.5							

Logged By : JS Date : 23/10/23 | Checked By : Date :

BOREHOLE/EXCAVATION LOG S2024.GPJ EXC.GDT 9/11/23

FORTIFY GEOTECH

Borehole Log

Borehole No.	**TP20**
Sheet	1 of 1
Job No.	S2024

CLIENT: EP Risk Management Pty Ltd

PROJECT: Proposed Industrial Development
230 Martin Road, Badgerys Creek, NSW

Location : See Report

Collar Level : Not Known
Angle From Vertical : 0°
Bearing : N.A.

Equipment Type : 5.5t Excavator w/ Bucket
Hole Diameter : 300mm

Sample No.	Water	Method/ Casing	RL (m)	Depth (m)	Graphic Log	U.S.C.S.	Material Description, Structure Soil Type: Plasticity or Particle Characteristics, Colour, Secondary and Minor Components, Moisture, Structure	Moisture Condition	Consistency or Relative Density	Field Test Results	Geological Profile
	None Encountered			0.2		CL	**SILTY SANDY CLAY**; low to medium plasticity clay, fine to medium grained sand, brown with grey, grass roots at surface	D	F		TOPSOIL FILL
				0.4		CL	**SANDY CLAY**; low to medium plasticity clay, fine to medium grained sand, grey mottled red to brown, trace fine gravels	*w*<PL	St		ALLUVIAL
				1.0		CI	**SANDY CLAY**; medium plasticity clay, fine to medium grained sand, grey mottled red, trace roots	*w*<PL	VSt		
				1.1		CH	**SANDY CLAY**; medium to high plasticity clay, fine to medium grained sand, pale grey mottled red and orange, trace fine to medium sized gravels	*w*<PL	St-VSt		
				1.7		CI	**SILTY CLAY trace SAND**; medium plasticity clay, fine to medium grained sand, pale grey with red and orange, trace fine to coarse sized gravels	*w*<PL	VSt		
				2.0			BOREHOLE TERMINATED AT 2m At Target				
				2.5							

Logged By : JS Date : 23/10/23 | Checked By : Date :

BOREHOLE/EXCAVATION LOG S2024.GPJ EXC.GDT 9/11/23

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Appendix B

CBR & Atterberg Limit Laboratory Test Results

Material Test Report

J & A Geotech Testing Pty Ltd

Canberra Laboratory
Unit 2, 25 Dacre Street Mitchell ACT 2911
Phone: (02) 6255 5363
Email: scott.miller@jageotech.com.au

Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Scott Miller
Lab Manager

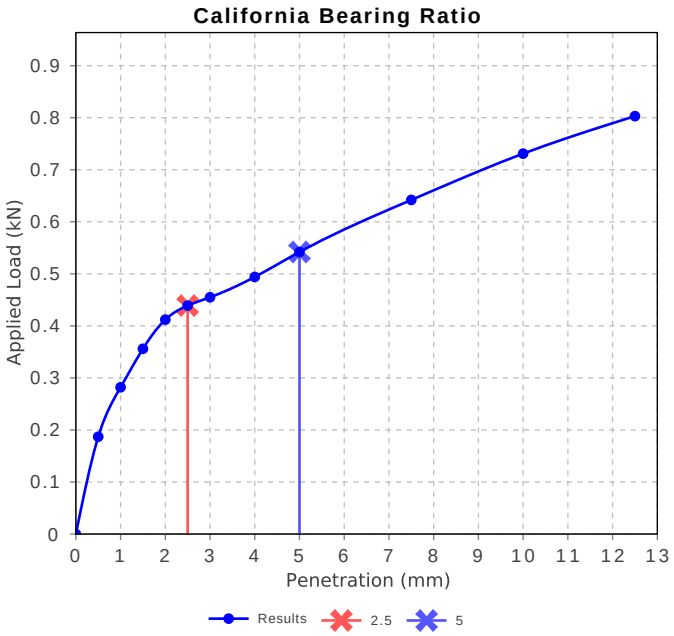
NATA Accredited Laboratory Number: 19979

Report Number:	**CP231703-1**
Issue Number:	1
Date Issued:	07/11/2023
Client:	Fortify Geotech Pty Ltd
	PO Box 9225, Deakin ACT 2600
Contact:	Allison Baillie
Project Number:	CP231703
Project Name:	230 Martin Road
Project Location:	Badgerys Creek NSW
Client Reference:	S2024
Work Request:	9255
Sample Number:	CS9255A
Date Sampled:	23/10/2023
Dates Tested:	26/10/2023 - 06/11/2023
Sampling Method:	Sampled by Client
	The results apply to the sample as received
Preparation Method:	AS 1289.1.1 - Sampling and preparation of soils
Site Selection:	Selected by Client
Sample Location:	**TP06/1D, Depth: 0.4m-0.6m**

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	2.5 mm		
CBR %	**3.5**		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity	Visual		
Maximum Dry Density (t/m^3)	1.71		
Optimum Moisture Content (%)	19.0		
Laboratory Density Ratio (%)	98.0		
Laboratory Moisture Ratio (%)	100.0		
Dry Density after Soaking (t/m^3)	1.64		
Field Moisture Content (%)	19.6		
Moisture Content at Placement (%)	18.8		
Moisture Content Top 30mm (%)	26.8		
Moisture Content Rest of Sample (%)	21.8		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours	72.4		
Swell (%)	2.0		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	0.0		

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	47		
Plastic Limit (%)	18		
Plasticity Index (%)	**29**		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	**10.0**		
Cracking Crumbling Curling	Cracking		



Material Test Report

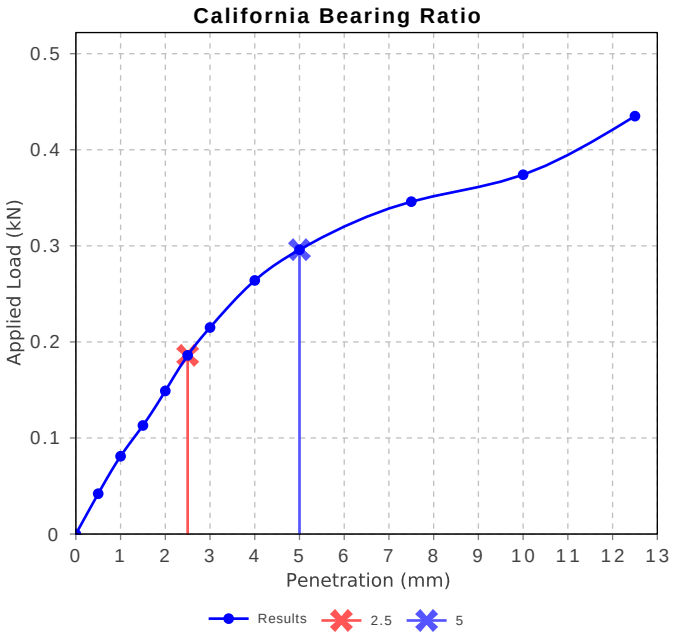
J & A Geotech Testing Pty Ltd

Canberra Laboratory
Unit 2, 25 Dacre Street Mitchell ACT 2911
Phone: (02) 6255 5363
Email: scott.miller@jageotech.com.au
Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Scott Miller
Lab Manager
NATA Accredited Laboratory Number: 19979

Report Number:	**CP231703-1**
Issue Number:	1
Date Issued:	07/11/2023
Client:	Fortify Geotech Pty Ltd
	PO Box 9225, Deakin ACT 2600
Contact:	Allison Baillie
Project Number:	CP231703
Project Name:	230 Martin Road
Project Location:	Badgerys Creek NSW
Client Reference:	S2024
Work Request:	9255
Sample Number:	CS9255B
Date Sampled:	23/10/2023
Dates Tested:	26/10/2023 - 06/11/2023
Sampling Method:	Sampled by Client
	The results apply to the sample as received
Preparation Method:	AS 1289.1.1 - Sampling and preparation of soils
Site Selection:	Selected by Client
Sample Location:	**TP11/1D, Depth: 0.4m-0.6m**

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	5 mm		
CBR %	**1.5**		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity	Visual		
Maximum Dry Density (t/m^3)	1.58		
Optimum Moisture Content (%)	21.0		
Laboratory Density Ratio (%)	97.5		
Laboratory Moisture Ratio (%)	100.0		
Dry Density after Soaking (t/m^3)	1.50		
Field Moisture Content (%)	17.7		
Moisture Content at Placement (%)	21.2		
Moisture Content Top 30mm (%)	34.5		
Moisture Content Rest of Sample (%)	25.8		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours	72.4		
Swell (%)	3.0		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	0.0		



Material Test Report

J & A Geotech Testing Pty Ltd

Canberra Laboratory
Unit 2, 25 Dacre Street Mitchell ACT 2911
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Email: scott.miller@jageotech.com.au
Accredited for compliance with ISO/IEC 17025 - Testing

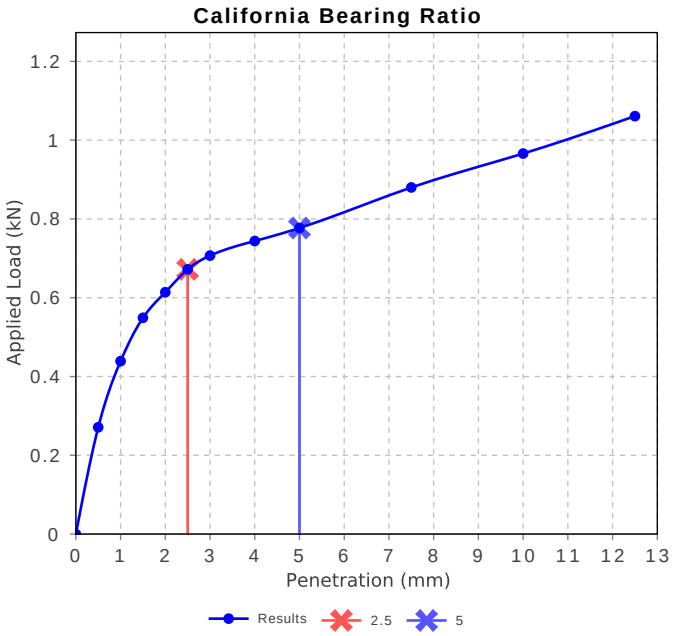
Approved Signatory: Scott Miller
Lab Manager
NATA Accredited Laboratory Number: 19979

Report Number:	**CP231703-1**
Issue Number:	1
Date Issued:	07/11/2023
Client:	Fortify Geotech Pty Ltd
	PO Box 9225, Deakin ACT 2600
Contact:	Allison Baillie
Project Number:	CP231703
Project Name:	230 Martin Road
Project Location:	Badgerys Creek NSW
Client Reference:	S2024
Work Request:	9255
Sample Number:	CS9255C
Date Sampled:	23/10/2023
Dates Tested:	26/10/2023 - 06/11/2023
Sampling Method:	Sampled by Client
	The results apply to the sample as received
Preparation Method:	AS 1289.1.1 - Sampling and preparation of soils
Site Selection:	Selected by Client
Sample Location:	**TP13/1D, Depth: 0.8m-1.0m**

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	2.5 mm		
CBR %	**5**		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity	Visual		
Maximum Dry Density (t/m^3)	1.56		
Optimum Moisture Content (%)	26.5		
Laboratory Density Ratio (%)	97.5		
Laboratory Moisture Ratio (%)	100.0		
Dry Density after Soaking (t/m^3)	1.50		
Field Moisture Content (%)	27.5		
Moisture Content at Placement (%)	26.4		
Moisture Content Top 30mm (%)	32.6		
Moisture Content Rest of Sample (%)	28.4		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours	72.5		
Swell (%)	1.5		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	0.0		

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	63		
Plastic Limit (%)	23		
Plasticity Index (%)	**40**		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	**13.5**		
Cracking Crumbling Curling	Cracking		



Material Test Report

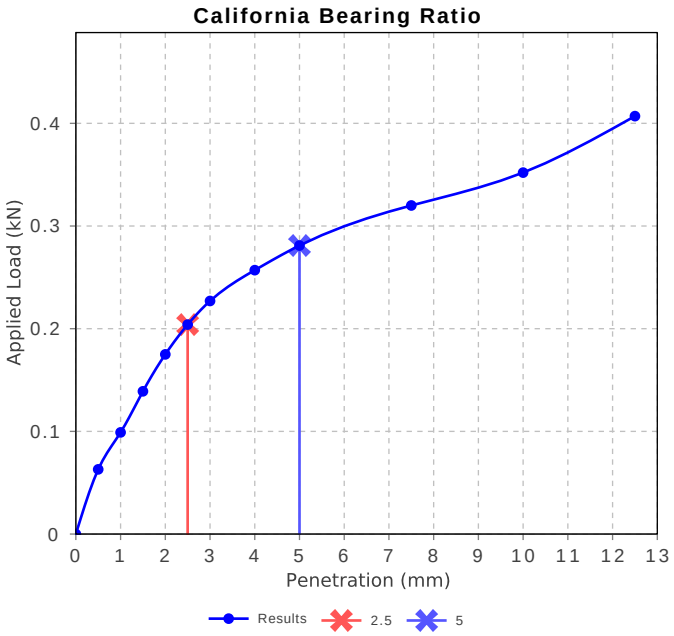
J & A Geotech Testing Pty Ltd

Canberra Laboratory
Unit 2, 25 Dacre Street Mitchell ACT 2911
Phone: (02) 6255 5363
Email: scott.miller@jageotech.com.au
Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Scott Miller
Lab Manager
NATA Accredited Laboratory Number: 19979

Report Number:	**CP231703-1**
Issue Number:	1
Date Issued:	07/11/2023
Client:	Fortify Geotech Pty Ltd
	PO Box 9225, Deakin ACT 2600
Contact:	Allison Baillie
Project Number:	CP231703
Project Name:	230 Martin Road
Project Location:	Badgerys Creek NSW
Client Reference:	S2024
Work Request:	9255
Sample Number:	CS9255D
Date Sampled:	23/10/2023
Dates Tested:	26/10/2023 - 06/11/2023
Sampling Method:	Sampled by Client
	The results apply to the sample as received
Preparation Method:	AS 1289.1.1 - Sampling and preparation of soils
Site Selection:	Selected by Client
Sample Location:	**TP18/1D, Depth: 0.45m-0.7m**

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	2.5 mm		
CBR %	**1.5**		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity	Visual		
Maximum Dry Density (t/m^3)	1.62		
Optimum Moisture Content (%)	22.5		
Laboratory Density Ratio (%)	98.5		
Laboratory Moisture Ratio (%)	100.0		
Dry Density after Soaking (t/m^3)	1.57		
Field Moisture Content (%)	21.7		
Moisture Content at Placement (%)	22.7		
Moisture Content Top 30mm (%)	34.7		
Moisture Content Rest of Sample (%)	24.6		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours	72.2		
Swell (%)	1.5		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	0.0		



Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	56		
Plastic Limit (%)	20		
Plasticity Index (%)	**36**		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	**12.5**		
Cracking Crumbling Curling	Cracking		

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GEOTECH

Appendix C

Aggressivity Laboratory Test Results

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

CERTIFICATE OF ANALYSIS 336593

Client Details

Client	Fortify Geotech
Attention	Jerome Sami
Address	Unit 2 / 538 Gardneners Rd, ALEXANDRIA, NSW, 2015

Sample Details

Your Reference	**S2024 - 230 Martin Road, Badgery's Creek**
Number of Samples	4 Soil
Date samples received	31/10/2023
Date completed instructions received	31/10/2023

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Please refer to the last page of this report for any comments relating to the results.

Report Details

Date results requested by	07/11/2023
Date of Issue	07/11/2023

NATA Accreditation Number 2901. This document shall not be reproduced except in full.

Accredited for compliance with ISO/IEC 17025 - Testing. **Tests not covered by NATA are denoted with ***

Results Approved By
Diego Bigolin, Inorganics Supervisor

Authorised By
Nancy Zhang, Laboratory Manager

Misc Inorg - Soil					
Our Reference		336593-1	336593-2	336593-3	336593-4
Your Reference	UNITS	TP12	TP15	TP17	TP20
Depth		2m	0.8m	0.5m	1m
Date Sampled		23/10/2023	23/10/2023	23/10/2023	23/10/2023
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	03/11/2023	03/11/2023	03/11/2023	03/11/2023
Date analysed	-	03/11/2023	03/11/2023	03/11/2023	03/11/2023
pH 1:5 soil:water	pH Units	4.6	4.9	5.3	4.6
Electrical Conductivity 1:5 soil:water	µS/cm	960	1,100	150	910
Chloride, Cl 1:5 soil:water	mg/kg	1,300	1,300	71	1,000
Sulphate, SO4 1:5 soil:water	mg/kg	270	230	130	500

Method ID	Methodology Summary
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Inorg-002	Conductivity and Salinity - measured using a conductivity cell at 25°C in accordance with APHA latest edition 2510 and Rayment & Lyons.
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B. Waters samples are filtered on receipt prior to analysis. Alternatively determined by colourimetry/turbidity using Discrete Analyser.

QUALITY CONTROL: Misc Inorg - Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			03/11/2023	[NT]	[NT]	[NT]	[NT]	03/11/2023	[NT]
Date analysed	-			03/11/2023	[NT]	[NT]	[NT]	[NT]	03/11/2023	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	[NT]	[NT]	[NT]	[NT]	102	[NT]
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	<1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	10	Inorg-081	<10	[NT]	[NT]	[NT]	[NT]	108	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	10	Inorg-081	<10	[NT]	[NT]	[NT]	[NT]	108	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

The recommended maximums for analytes in urine are taken from “2018 TLVs and BEIs”, as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.

Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Where matrix spike recoveries fall below the lower limit of the acceptance criteria (e.g. for non-labile or standard Organics <60%), positive result(s) in the parent sample will subsequently have a higher than typical estimated uncertainty (MU estimates supplied on request) and in these circumstances the sample result is likely biased significantly low.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

Report Comments

Samples were out of the recommended holding time for this analysis pH/EC.

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Appendix D

Engineering Terms and Definition

DESCRIPTION AND CLASSIFICATION OF SOILS

The methods of description and classification of soils used in this report are based on the Australian Standard 1726 – 1993, Geotechnical site investigations. In general, descriptions cover the following properties – soil type, colour, secondary grain size, structure, inclusions, strength or density and geological description.

Soil types are described according to the predominating particle size, qualified by the grading of other particles present (e.g. sandy clay) on the following basis:

Classification	**Particle Size**
Clay	Less than 0.002mm
Silt	0.002mm to 0.06mm
Sand	0.06mm to 2.00mm
Gravel	2.00mm to 60.00mm
Cobbles	60mm (63mm) to 200mm
Boulders	>200mm

Soils are also classified according to the Unified Soil Classifications System which is included in this Appendix. Rock types are classified by their geological names.

Cohesive soils are classified on the basis of strength either by laboratory testing or engineering examination. The terms are defined as follows:

Consistency	**Shear Strength su(kPa) (Representative Undrained Shear)**	
Very soft	< 12	<2 (~SPT “N”)
Soft	12 - 25	2-4
Firm	25 - 50	4-8
Stiff	50 – 100	8-15
Very Stiff	100 – 200	15-30
Hard	> 200	>30

Non-cohesive soils are classified on the basis of relative density, generally from the results of in-situ standard penetration tests as below:

Term	**Relative Density (%)**	**SPT Blows/300mm ‘N’**
Very loose	< 15	<4
Loose	15-35	4-10
Medium dense	35-65	10-30
Dense	65-85	30-50
Very Dense	>85	>50

SAMPLING

Sampling is carried out during drilling to allow engineering examination (and laboratory testing where required) of soil or rock.

Disturbed samples taken during drilling provide information on colour, type, inclusions and depending upon the degree of disturbance, some information on strength and structure.

Undisturbed samples are generally taken by one of two methods:

1. Driving or pushing a thin walled sample tube into the soil and withdrawing with a sample of soil in a relatively undisturbed state.

2. Core drilling using a retractable inner tube (R.I.T.) core barrel.

Such samples yield information on structure and strength in additions to that obtained from disturbed samples and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Details of the type and method of sampling are given in the report.

PENETRATION TESTING

The relative density of non-cohesive soils is generally assessed by in-situ penetration tests, the most common of which is the standard penetration test. The test procedure is described in Australian Standard 1289 “Testing Soils for Engineering Purposes” Testing Soils for Engineering Purposes” – Test No. F3.1.

The standard penetration test is carried out by driving a 50mm diameter split tube penetrometer of standard dimensions under the impact of a 63 kg hammer having a free fall of 750mm.

The “N” value is determined as the number of blows to achieve 300mm of penetration (generally after disregarding the first 150mm penetration through possibly disturbed material). The results of these tests can be related empirically to the engineering properties of the soil.

The test is also used to provide useful information in cohesive soils under certain conditions, a good quality disturbed sample being recovered with each test. Other forms of in situ testing are used under certain conditions and where this occurs, details are given in the report.

DEFINITIONS OF ROCK, SOIL, AND DEGREES OF CHEMICAL WEATHERING

GENERAL DEFINITIONS – ROCK AND SOIL

ROCK In engineering usage, rock is a natural aggregate of minerals connected by strong and permanent cohesive forces.

Note: Since “strong” and “permanent” are subject to different interpretations, the boundary between rock and soil is necessarily an arbitrary one.

SOIL In engineering usage, soil is a natural aggregate of mineral grains which can be separated by such gentle mechanical means as agitation in water, can be remoulded and can be classified according to the Unified Soil Classification System. Three principal classes of soil recognized are:

Residual soils: soils which have been formed in-situ by the chemical weathering of parent rock. Residual soil may retain evidence of the original rock texture or fabric or, when mature, the original rock texture may be destroyed.

Transported soils: soils which have been moved from their places of origin and deposited elsewhere. The principal agents of erosion, transport and deposition are water, wind and gravity. Two important types of transported soil in engineering geology and materials investigations are:

Colluvium – a soil, often including angular rock fragments and boulders, which has been transported downslope predominantly under the action of gravity assisted by water. The principle forming process is that of soil creep in which the soil moves after it has been weakened by saturation. It may be water borne for short distances.

Alluvium – a soil which has been transported and deposited by running water. The larger particles (sand and gravel size) are water worn.

Lateritic soils: soils which have formed in situ under the effects of tropical weathering include all reddish residual and non residual soils which genetically form a chain of material ranging from decomposed rock through clay to sesqui-oxide rich crusts. The term does not necessarily imply any compositional, textural or morphological definition; all distinctions useful for engineering purposes are based on the differences in geotechnical characteristics.

ROCK WEATHERING DEFINITIONS

Extremely Weathered (EW)	Rock substance affected by weathering to the extent that the rock exhibits soil properties, i.e. it can be remoulded and can be classified according to the Unified Classification System, but the texture of the original rock is still evident.
Highly Weathered (HW)	Rock substance affected by weathering to the extent that limonite staining or bleaching affects the whole of the rock substance and other signs of the chemical or physical decomposition are evident. Porosity and strength may be increased or decreased compared to the fresh rock usually as a result of iron leaching or deposition. The colour and strength of the original fresh rock substance is no longer recognisable.
Moderately Weathered (MW)	Rock substance affected by weathering to the extent that staining extends throughout the whole of the rock substance and the original colour of the fresh rock is no longer recognisable.
Slightly Weathered (SW)	Rock substance affected by weathering to the extent that partial staining or discolouration of the rock substance, usually by limonite, has taken place. The colour and texture of the fresh rock is recognisable.
Fresh (Fr)	Rock substance unaffected by weathering.

The degrees of rock weathering may be gradational. Intermediate stages are described by dual symbols with the prominent degree of weathering first (e.g. EW-HW).

The various degrees of weathering do not necessarily define strength parameters as some rocks are weak, even when fresh, to the extent that they can be broken by hand across the fabric, and some rocks may increase in strength during the weathering process.

Fresh drill cores of some rock types, such as basalt and shale may disintegrate after exposure to the atmosphere due to slaking, desiccation, expansion or contraction, stress relief or a combination of any of these factors.

AN ENGINEERING CLASSIFICATION OF SEDIMENTARY ROCKS

This classification system provides a standardised terminology for the engineering description of the sandstone and shales in the Sydney area, but the terms and definitions may be used elsewhere when applicable. Where other rock types are encountered, such as in dykes, standard geological descriptions are used for rock types and the same descriptions as below are used for strength, fracturing and weathering.

Under this system rocks are classified by Rock Type, Strength, Stratification Spacing, Degree of Fracturing and Degree of Weathering. These terms do not cover the full range of engineering properties. Descriptions of rock may also need to refer to other properties (e.g. durability, abrasiveness, etc) where these are relevant.

ROCK TYPE DEFINITIONS

ROCK TYPE	DEFINITION
Conglomerate:	More than 50% of the rock consists of gravel sized (greater than 2mm) fragments.
Sandstone:	More than 50% of the rock consists of sand sized (0.06 to 2mm) grains.
Siltstone:	More than 50% of the rock consists of silt-sized (less than 0.06mm) granular particles and the rock is not laminated.
Claystone:	More than 50% of the rock consists of silt or clay sized particles and the rock is not laminated.
Shale:	More than 50% of the rock consists of silt or clay sized particles and the rock is laminated.

Rocks possessing characteristics of two groups are described by their predominant particle size with reference also to the minor constituents, e.g. clayey sandstone, sandy shale.

STRATIFICATION SPACING

Term	Separation of Stratification Planes
Thinly Laminated	< 6mm
Laminated	6mm to 20mm
Very thinly bedded	20mm to 60mm
Thinly bedded	60mm to 0.2m
Medium bedded	0.2m to 0.6m
Thickly bedded	0.6m to 2m
Very thickly bedded	> 2m

DEGREE OF FRACTURING

This classification applies to diamond drill cores and refers to the spacing of all types of natural fractures along which the core is discontinuous. These include bedding plane partings, joints and other rock defects, but exclude known artificial fractures such as drilling breaks.

Term	Description
Fragmented:	The core is comprised primarily of fragments of length less than 20mm, and mostly of width less than the core diameter
Highly Fractured:	Core lengths are generally less than 20mm – 40mm with occasional fragments.
Fractured:	Core lengths are mainly 30mm – 100mm with occasional shorter and longer section.
Slightly Fractured:	Core lengths are generally 300mm – 1000mm with occasional longer sections and occasional sections of 100mm – 300mm.
Unbroken:	The core does not contain any fracture.

ROCK STRENGTH

Rock strength is defined by the Point Load Strength Index (Is 50) and refers to the strength of the rock substance in the direction normal to the bedding. The test procedure is described by the International Society of Rock Mechanics.

Term	Point Load Index Is(50) MPa	Field Guide	Approx qu MPa*
Extremely Weak:	0.03	Easily remoulded by hand to a material with soil properties.	0.7
Very Weak:	0.1	May be crumbled in the hand. Sandstone is “sugary” and friable.	2.4
Weak:	0.3	A piece of core 150mm long x 50mm dia. May be broken by hand and easily scored with a knife. Sharp edges of core may be friable and break during handling.	7
Medium Strong:	1	A piece of core 150mm long x 50mm dia. can be broken by hand with considerable difficulty. Readily scored with knife.	24
Strong: (SW)	3	A piece of core 150mm long x 50mm dia. core cannot be broken by unaided hands, can be slightly scratched or scored with knife.	70
Very Strong (SW)	10	A piece of core 150mm long x 50mm dia. may be broken readily with hand held hammer. Cannot be scratched with pen knife.	240
Extremely Strong (Fr)	>10	A piece of core 150mm long x 50mm dia. is difficult to break with hand held hammer. Rings when struck with a hammer.	>240

The approximate unconfined compressive strength (qu) shown in the table is based on an assumed ration to the point load index of 24:1. This ratio may vary widely.

Unified Soil Classification System (Metricated)
Data for Description Indentification and Classification of Soils

DESCRIPTION

MAJOR DIVISIONS			Group Symbol	Graphic Symbol	TYPICAL NAME	DESCRIPTIVE DATA
COARSE GRAINED SOILS: More than 50% by dry mass, less than 60mm is greater than 0.06mm.	GRAVELS: More than 50% of coarse grains are greater than 2.0mm	GRAVELLY SOILS	GW		Well graded gravels and gravel-sand mixtures, little or no fines	Give typical name, indicate approximate percentages of sand and gravel, maximum size, angularity, surface condition and hardness of the coarse grains, local or geological name and other pertinent descriptive information, symbols in parenthesis. For undisturbed soils add information on stratification, degree of compactness, cementation, moisture conditions and drainage characteristics. EXAMPLE: Silty Sand, gravelly, about 20% hard, angular gravel particles, 10mm maximum size, rounded and sub angular sand grains coarse to fine, about 15% non-plastic fines with low dry strength, well compacted and moist in place, light brown alluvial sand, (SM)
			GP		Poorly graded gravels and gravel sand mixtures, little or no fines	
			GM		Silty gravels, gravel-sand-silt mixtures	
			GC		Clayey gravels gravel-sand-clay mixtures	
	SANDS: More than 50% of coarse grains are greater than 2.0mm	SANDY SOILS	SW		Well graded sands and gravelly sands, little or no fines	
			SP		Poorly graded sands and gravelly sands, little or no fines	
			SM		Silty sand, sand-silt mixtures	
			SC		Clayey sands, sand-clay mixtures	
FINE GRAINED SOILS: More than 50% by dry mass, less than 60mm is less than 0.06mm	Liquid Limit less than 50%		ML		Inorganic silts, very fine sands, rock flour, silty or clayey fine sands.	Give typical name, indicate degree and character of plasticity, amount and maximum size of coarse grains, colour in wet condition, odour if any, local or geological name and r pertinent descriptive information, symbols in parenthesis. For undisturbed soil add information on structure, stratification, consistancy in undisturbed and remoulded states, moisture and drainage conditions. EXAMPLE Clayey Silt, brown, low plasticity, small percentage of fine sand, numerous vertical root-holes, firm and dry in place, fill, (ML).
			CL		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.	
			OL		Organic silts and organic silty clays of low plasticity	
	Liquid Limit more than 50%		MH		Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts.	
			CH		Inorganic clays of high plasticity, fat clays.	
			OH		Organic clays of medium to high plasticity.	
			Pt		Peat muck and other highly organic soils.	

FIELD IDENTIFICATION

Determine approximate percentages of material over 60mm size, maximum size, shape, surface texture, hardness of material, geological description. Identify on estimated percentage mass of the various fractions.

COARSE GRAINED SOILS — More than half of the material less than 60mm is larger than 0.06mm

0.06mm is about the smallest particle visible to the naked eye

GRAVELS AND SANDS

GRADATIONS		NATURE OF FINES	DRY STRENGTH	Group Symbol
GOOD	Wide range in grain size	"Clean" materials (not enough fines to band coarse grains)	None	GW
POOR	Predominantly one size or range of sizes			GP
GOOD TO FAIR	"Dirty" materials (Excess of fines)	Fines are non-plastic (1)	None to medium	GM
		Fines are plastic (1)		GC
GOOD	Wide range in grain size	"Clean" materials (not enough fines to band coarse grains)	None	SW
POOR	Predominantly one size or range of sizes			SP
GOOD TO FAIR	"Dirty" materials (Excess of fines)	Fines are non-plastic (1)	None to medium	SM
		Fines are plastic (1)		SC

FINE GRAINED SOILS — More than half of the material less than 50mm is less than 0.06mm

SILT AND CLAY FRACTION

Fraction smaller than 0 20mm AS sieve size

DRY STRENGTH	DILATANCY	TOUGHNESS	Group Symbol
None to low	Quick to slow	None	ML
Medium to high	None to very slow	Medium	CL
Low to medium	Slow	Low	OL
Low to medium	Slow to none	Low to medium	MH
High to very high	None	High	CH
Medium to high	None to very slow	Low to medium	OH

Readily identified by colour, odour, spongy feel and generally by fibrous texture — Pt*

LABORATORY CLASSIFICATION

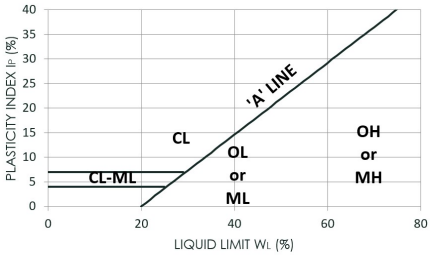
Use the gradation curve of material passing 60mm for classification of fractions according to criteria given under "Major Division".

	% [2] < 0.06mm	PLASTICITY OF FINE FRACTION			NOTES
GW	0-5	-	>4	Between 1 and 3	1. Identify Fines by the method given for fine grained soils.
GP	0-5	-	Fails to comply with above		2. Borderline classifications occur when the percentage of fines (fraction smaller than 0.06mm size) is greater than 5% and less than 12%.
GM	12-50	Below 'A' line and Ip >7	-	-	Borderline classifications require the use of dual symbols eg SP-SM GW-GC
GC	12-50	Above 'A' line and Ip > 7	-	-	
SW	0-5	-	>6	between 1 and 3	
SP	0-5	-	Fails to comply with above		
SM	12-50	Below 'A' line or Ip < 4	-	-	
SC	12-50	Above 'A' line and Ip > 7	-	-	

More than 50% passing 0.06mm

ML	Below 'A' line
CL	Above 'A' line
OL	Below 'A' line
MH	Below 'A' line
CH	Above 'A' line
OH	Below 'A' line

*Effervescence with H2O2



PLASTICITY CHART
FOR CLASSIFICATION OF FINE GRAINED SOILS

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GEOTECH

Appendix E

Limitations

Limitations in the Use and Interpretation of this Geotechnical Report

Our Professional services were performed, our findings obtained, and our recommendations prepared in accordance with generally accepted engineering principles and practices. This warranty is in lieu of all other warranties, either expressed or implied.

The geotechnical report was prepared for the use of the Owner in the design of the subject facility and should be made available to potential contractors and/or the Contractor for information on factual data only. This report should not be used for contractual purposes as a warranty of interpreted subsurface conditions such as those indicated by the interpretive boring and test pit logs, cross- sections, or discussion of subsurface conditions contained herein.

The analyses, conclusions and recommendations contained in the report are based on site conditions as they presently exist and assume that the exploratory borings, test pits, and/or probes are representative of the subsurface conditions of the site. If, during construction, subsurface conditions are found which are significantly different from those observes in the exploratory borings and test pits, or assumed to exist in the excavations, we should be advised at once so that we can review these conditions and reconsider our recommendations where necessary. If there is a substantial lapse of time between the submission of this report and the start of work at the site, or if conditions have changed due to natural causes or construction operations at or adjacent to the site, this report should be reviewed to determine the applicability of the conclusions and the recommendations considering the changed conditions and time lapse.

The Summary Boring Logs are our opinion of the subsurface conditions revealed by periodic sampling of the ground as the borings progressed. The soil descriptions and interfaces between strata are interpretive and actual changes may be gradual.

The boring logs and related information depict subsurface conditions only at the specific locations and at the particular time designated on the logs. Soil conditions at the other locations may differ from conditions occurring at these boring locations. Also, the passage of time may result in a change in the soil conditions at these boring locations.

Groundwater levels often vary seasonally. Groundwater levels reported on the boring logs or in the body of the report are factual data only for the dates shown.

Unanticipated soil conditions are commonly encountered on construction sites and cannot be fully anticipated by merely taking soil samples, borings or test pits. Such unexpected conditions frequently require that additional expenditures be made to attain a properly constructed project. It is recommended that the Owner consider providing a contingency fund to accommodate such potential extra costs.

This firm cannot be responsible for any deviation from the intent of this report including, but not restricted to, any changes to the scheduled time of construction, the nature of the project or the specific construction methods or means indicated in this report: nor can our firm be responsible for any construction activity on sites other than the specific site referred to in this report.