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Report on
Geotechnical Investigation

Jindabyne Central School
Part Lot 101 DP1019527, Jindabyne

Prepared for
NSW Department of Education - School Infrastructure
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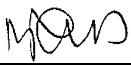
The undersigned, on behalf of Douglas Partners Pty Ltd, confirm that this document and all attached drawings, logs and test results have been checked and reviewed for errors, omissions and inaccuracies.

	Signature		Date
Author		Shannon Goodsell	11 June 2021
Reviewer		Michael Jones	10 December 2021

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Report on Geotechnical Investigation
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1. Introduction

This report presents the results of an intrusive geotechnical investigation (Stage 2) undertaken for the proposed Jindabyne Central School (JCS) at part of Lot 101 DP 1019725, Jindabyne (hereinafter referred to as 'the site').

Geotechnical and contaminated land desktop assessments (Stage 1) were commissioned in an email dated 6 November 2020 by Christine Yorkston of NSW Department of Education - School Infrastructure NSW (SINSW). The Stage 2 geotechnical and contaminated land limited intrusive investigation works were proposed as a variation to and based on the findings of the Stage 1 desktop assessments and were commissioned in an email dated by Neil Hogan in an email dated 30 March 2021 of SINSW.

It is understood that the report will be used to support the schematic design and detailed design phases, complete necessary due diligence and for inclusion in planning application submissions for the proposed development.

The investigation included the excavation of twenty-eight (28) test pits and laboratory testing of selected samples. The details of the field work are presented in this report, together with comments and recommendations on site preparation and earthworks, excavation conditions and support, groundwater, foundations and pavements. Advice on seismicity and aggressivity is also provided.

DP has also concurrently undertaken a contamination assessment with limited sampling which has been reported separately.

This report must be read in conjunction with the notes entitled *About this Report* which are included in Appendix A.

2. Proposed Development

Development details were only in the preliminary stage at the time of the investigation; however it is understood that the development of the site will most likely comprise the construction of a future school with buildings, pavements and sports field and courts. At this stage of the investigation, it is not known whether there will be basement levels or significant retaining walls constructed at the site.

3. Site Description

The site comprises an irregular shaped area of approximately 9 ha and is located within the north-western part of Lot 101 DP1019527, Jindabyne. Most of the site is part of a former golf course and the

remaining parts of the golf course are located to the north-east of the site. Part of the site also comprises former and present residential areas. Barry Way is located to the west of the site and a service road to the Jindabyne Sports and Recreation Centre is located to the south of the site and open space is located to the north and east of the site. The maximum north-south dimensions and east-west dimensions are approximately 550 m and 200 m, respectively. The site generally slopes from west to east with surface levels ranging from approximately 1000 m to 985 m AHD. A more detailed site description of the original site is presented in the desktop geotechnical assessment report (DP, 2021). Further observations of the updated site boundaries are outlined in Section 3.1. Figure 1 below shows the proposed extent of the site for the JCS.

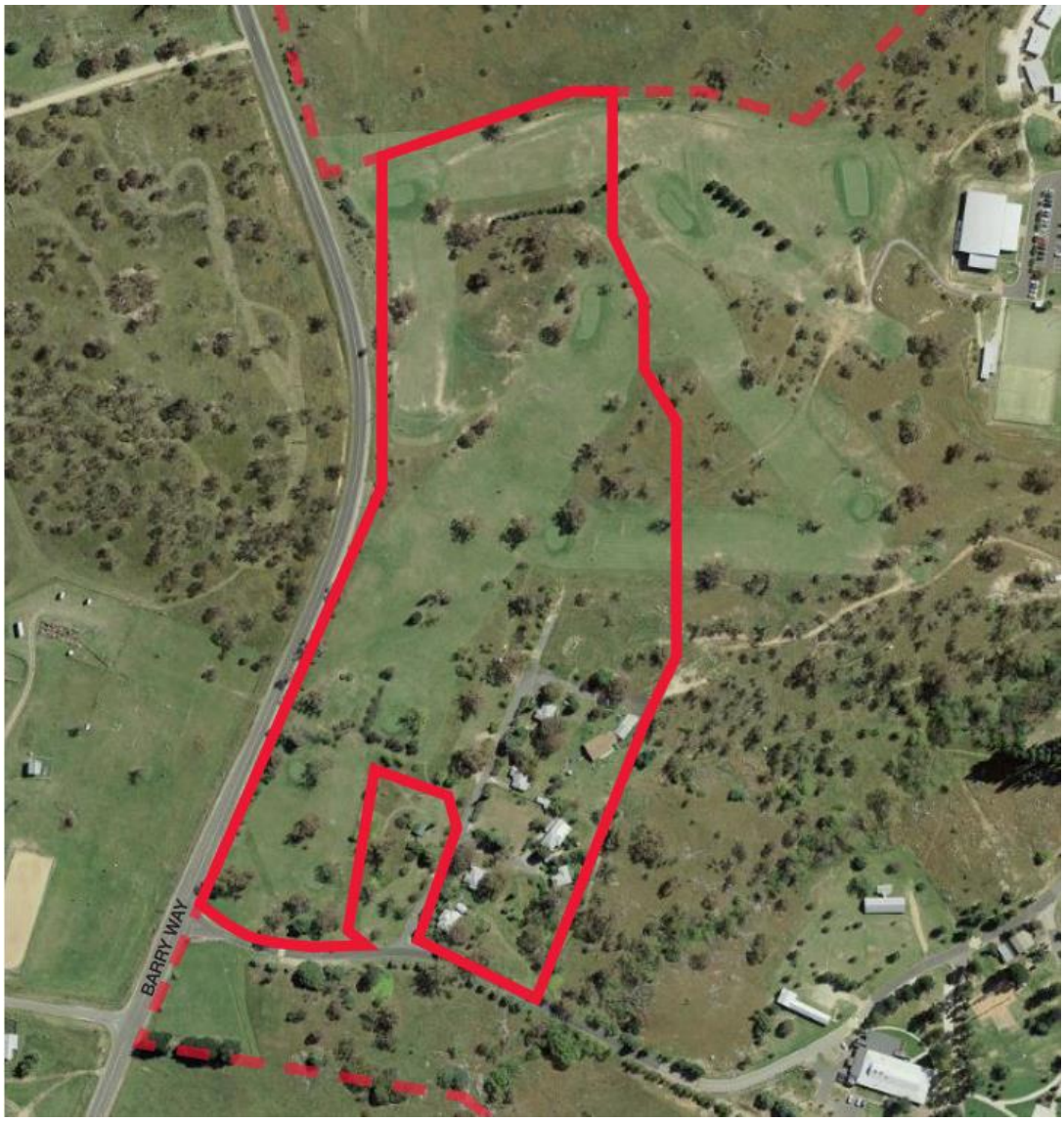


Figure 1: Site aerial - new education campus within the Jindabyne Sport and Recreation Centre.
Source: DJRD

3.1 Updated Site Walkover Observations

Between the time of the geotechnical desktop assessment and intrusive geotechnical investigation, the site boundary had been extended further north and further east. The following observations were made for the extended parts of the site:

- The extended eastern portion of the site comprised an undulating area that had an overall slope from the west, down towards the east. Several existing residential properties were noted across the area. Underground services were also present in this area;
- The extended northern portion of the site comprised of several tees and greens and were considered to be areas of uncontrolled fill;
- A rocky knob was located within the central northern portion of the site and numerous amounts of large mature trees were present across this area of the site; and
- Part of a ski-jump construction site is located within the central northern portion of the site. The construction site comprised a number of large spoil stockpiles from excavations north-east of the site. The spoil comprises of residual clay and rock of varying degrees of weathering. The spoil was in the process of being sorted for the filling of the ski-jump.

4. Regional Soils and Geology

4.1 Geology

GS NSW (1976) indicates that the site is underlain by the Kosciusko Batholith which comprises granodiorite. Two types of intrusive igneous rock are mapped within the site. The south-western corner of the site is mapped as Leesville Granodiorite and the remaining portion of the site is mapped as Jindabyne Tonalite.

An extract of the GS NSW map showing the indicated geological units is shown below in Figure 1.

The field investigation has confirmed the presence of granodiorite and tonalite underlying the site.

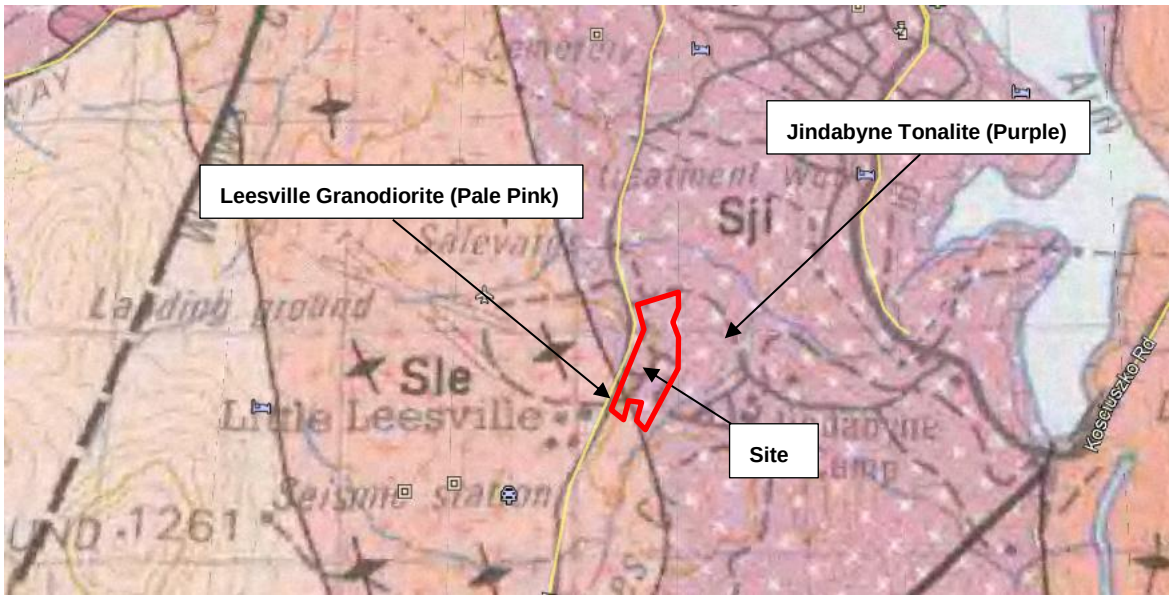


Figure 1: Extract from Geology Map

4.2 Acid Sulfate Soils

Reference to the CSIRO's Atlas of Australian Acid Sulfate Soils online mapping portal, (A S R I S - Atlas of Australian Acid Sulfate Soils (csiro.au)) indicates that the site has an extremely low probability of acid sulfate soils to be present.

4.3 Salinity

Reference to NSW Department of Planning Industry and Environment eSPADE website (https://www.environment.nsw.gov.au/eSpade2Webapp, accessed 20 May 2021), indicated that the site is unlikely to be affected by soil salinity issues.

5. Field Work

5.1 Field Work Methods

The field work comprised the excavation of twenty-eight test pits (Pits 1 – 27 and 16A) using a Komatsu PC 138 US excavator (~15 tonne) fitted with 600 mm wide toothed bucket to depths of 0.6 – 3.6 m. The pits were logged onsite by an experienced geo-environmental scientist. Disturbed and U_{50} samples were collected to assist in strata identification and for laboratory testing. Dynamic cone penetrometer tests (AS 1289 6.3.2:1997) were also undertaken from the surface adjacent to each test location to provide an indication of the in-situ strength of the site soils to 1.2 m depth or prior refusal.

The approximate test location coordinates provided on each test pit log were determined on site using a hand-held GPS which is accurate only to about 3 – 5 m. Surface levels have been broadly estimated

from the partial site plan provided by the client and from Google Earth and must not be relied on. The approximate test locations and site boundary are shown on Drawing 1 in Appendix B.

5.2 Field Work Results

Subsurface conditions encountered are given in the test pit logs in Appendix C, which should be read in conjunction with the notes defining classification methods and descriptive terms.

The soils at the site include uncontrolled fill/topsoil fill and natural topsoil underlain by natural residual and extremely weathered granodiorite / tonalite (sandy clay) soils and then granodiorite / tonalite rock with various degrees of weathering and varied strength. The succession of strata is broadly summarised below:

- **TOPSOIL / TOPSOIL FILL:** generally stiff to hard, low plasticity sandy clay and medium dense to dense clayey sand, with various amount of gravel and rootlets to depths of 0.15 m – 0.3 m in all test pits, except Pits 2, 12, 16, 24 and 27. Remnant topsoil (very stiff low plasticity sandy clay) was encountered in Pit 23 between depths of 0.15 m – 0.3 m;

- **FILL:** generally low plasticity to low – medium plasticity, stiff – very stiff to very stiff-hard sandy clay and/or loose to medium dense sandy soils, with various mixture of silt, sand, gravel, rootlets and cobbles, trace building debris, from the ground surface to depths of 0.15 – 1.5 m in Pits 2, 5, 12, 16, 20, 23, 24, 26 and 27; Pit 24 refused in this stratum at a depth of 1.5 m;

- **NATURAL SOILS:** generally low plasticity to medium – high plasticity, very stiff to hard sandy clay and/or medium dense to dense sandy soils with various mixtures of sand, gravel, trace cobbles and boulders from depths of 0.15 m – 1.5 m in Pits 1, 4, 7, 8, 10 – 13, 15, 16, 18, 19, 21 – 23, 25 and 16A; Pit 16 terminated in this stratum at the limit of investigation depth of 1.5 m.

- **INTRUSIVE VOLCANICS:** variably very low strength to high - very high strength, highly weathered to slightly weathered granodiorite / tonalite from depths of 0.2 m – 1.5 m to the termination depths of 0.6 m – 3.6 m in all the test pits except Pits 16 and 24.

Perched groundwater was observed in Pit 20 at 2.2 m depth. No free groundwater was observed during the site investigation in all other test pits. It is noted that the test pits were immediately backfilled following excavation which precluded longer term monitoring of groundwater level. Groundwater conditions rarely remain constant and can change seasonally due to variations in rainfall, temperature and soil permeability. For these reasons, it is noted that the moisture condition of the site soils may vary considerably from the time of the investigation compared to at the time of construction. It must be noted that due to the topography and fractured weathered rock, groundwater seepages must be expected following periods of rainfall.

It should be noted that undisturbed acid sulfate soils look quite distinctive. They are usually wet, usually entirely saturated and tend to have a steely blue-grey colour, which can range from pale to dark shades. They can even be greenish in some cases. These conditions were not noted during the investigation. It should be also be noted that there were no signs of mineral staining within the soils or a strong smell of hydrogen sulfide (rotten eggs) during the investigation.

6. Laboratory Testing

Laboratory testing was performed on selected samples, and comprised the following:

- 3 Atterberg limits and linear shrinkage tests;
- 1 shrink-swell test;
- 4 California bearing ratio (CBR) tests;
- 2 particle size distribution tests;
- 5 pH, Chloride and Sulphate content (aggressivity) tests; and
- 5 salinity tests

The results of the laboratory testing are provided in detail in the test report sheets in Appendix D and are summarised in Tables 1 – 5 below. Chemical testing (pH, chloride and sulfate) was carried out by Envirolab Services Pty Ltd.

Table 1: Results of Atterberg Limits and linear shrinkage tests

Pit No.	Depth (m)	W_F (%)	W_L (%)	W_P (%)	PI (%)	LS (%)	Field Description
4	0.5	13.2	41	19	22	11.0	Sandy Clay
15	0.5	11.9	42	18	24	11.0	Sandy Clay
22	0.4	14.9	46	19	27	12.5	Sandy Clay

Where W_F = Moisture content W_L = Liquid limit W_P = plastic limit
PI = Plasticity Index LS = Linear shrinkage

Table 2: Results of Shrink-Swell test

Pit No.	Depth (m)	Iss (%)	Swell (%)	SMCB (%)	SMCA (%)	Shrinkage Strain – oven dried (%)	Field Description
22	0.5 – 0.9	0.8	0.0	7.5	13.1	1.5	Sandy Clay

Where Iss = Shrink Swell Index SMCB = Swell moisture content before
SMCA = Swell moisture content after

The Atterberg limits test results indicate that the clayey soils tested were of medium and medium to high plasticity. The clayey soils would be expected to be moderately to moderately to highly susceptible to shrinkage and swelling movements with changes in soil moisture content.

The shrink swell test results indicate that the clayey soil tested was of low plasticity.

Table 3: Summary of Compaction & CBR Testing

Pit No.	Depth (m)	FMC (%)	OMC (%)	MDD (t/m^3)	CBR (%)	Swell (%)	Field Description
1	0.5 – 0.7	6.0	13.5	1.89	17.0	0.0	Tonalite
3	0.6 – 0.8	8.7	12.5	1.96	17.0	0.0	Tonalite
11	0.5 – 0.7	9.2	12.5	1.86	10.0	1.0	Sandy Clay
16A	0.4 – 0.6	14.0	15.5	1.82	6.0	0.0	Sandy Clay

Where: FMC = Field moisture content MDD = Maximum dry density (standard)
OMC = Optimum moisture content CBR = California bearing ratio

Table 4: Result of Particle Size Distribution Tests

Pit No.	Sample Depth (m)	FMC (%)	Percent Passing Sieve Size (%)				Field Description
			6.7 mm	2.36 mm	0.425 mm	0.075 mm	
10	0.5	6.1	92	84	46	24	Clayey Sand
21	0.5	5.6	41	36	19	8	Sandy Gravel

Where: FMC = Field moisture content

Table 5: Results of pH, Salinity, Chloride and Sulphate Testing

Pit No.	Depth (m)	pH	Electrical Conductivity (3) (µS/cm)	Chloride (mg/kg)	Sulphate, as SO_4 (mg/kg)	Estimated Salinity (mg/kg)	Resistivity (2) (ohm.cm)	Field Description
3	0.5	7.4	10	<10	<10	-	110,000	Tonalite
4	1.0	7.8	20	<10	<10	-	51,000	Tonalite
10	1.0	7.2	16	<10	<10	-	61,000	Tonalite
12	0.5	6.9	12	<10	<10	-	83,000	Sandy Clay
19	0.5	7.3	16	<10	<10	-	64,000	Sandy Clay
4	0.5	-	-	-	-	51	-	Sandy Clay
7	0.5	-	-	-	-	33	-	Sandy Clay
11	0.1	-	-	-	-	56	-	Topsoil / Sandy Clay
15	0.5	-	-	-	-	83	-	Sandy Clay
22	0.5	-	-	-	-	47	-	Sandy Clay

Pit No.	Depth (m)	pH	Electrical Conductivity (3) (µS/cm)	Chloride (mg/kg)	Sulphate, as SO_4 (mg/kg)	Estimated Salinity (mg/kg)	Resistivity (2) (ohm.cm)	Field Description
Criteria for "Non-aggressive" Soil Conditions (low permeability soils or soils above the groundwater table) (1)		>5.5 (concrete) >5.0 (steel)	-	<5,000 (steel)	<5,000 (concrete)	-	>5,000 (steel)	-

Notes:
(1) AS 2159:2009
(2) Resistivity (ohm.cm) is the inverse of Electrical Conductivity (S/cm)
(3) EC in 1:5 soil:water solution

The results of the aggressivity testing indicate that based on the low permeability soils above the water table the exposure classification for both concrete and steel is *Non-Aggressive.*

Selected samples were also screened for salinity. Figure 3 below presents the variations of salinity with depth, based on salinity (ECe) profiles at selected test pit locations, together with the salinity classifications of Richards (1954) the soil from the selected soil samples is considered to be *Non-Saline*.

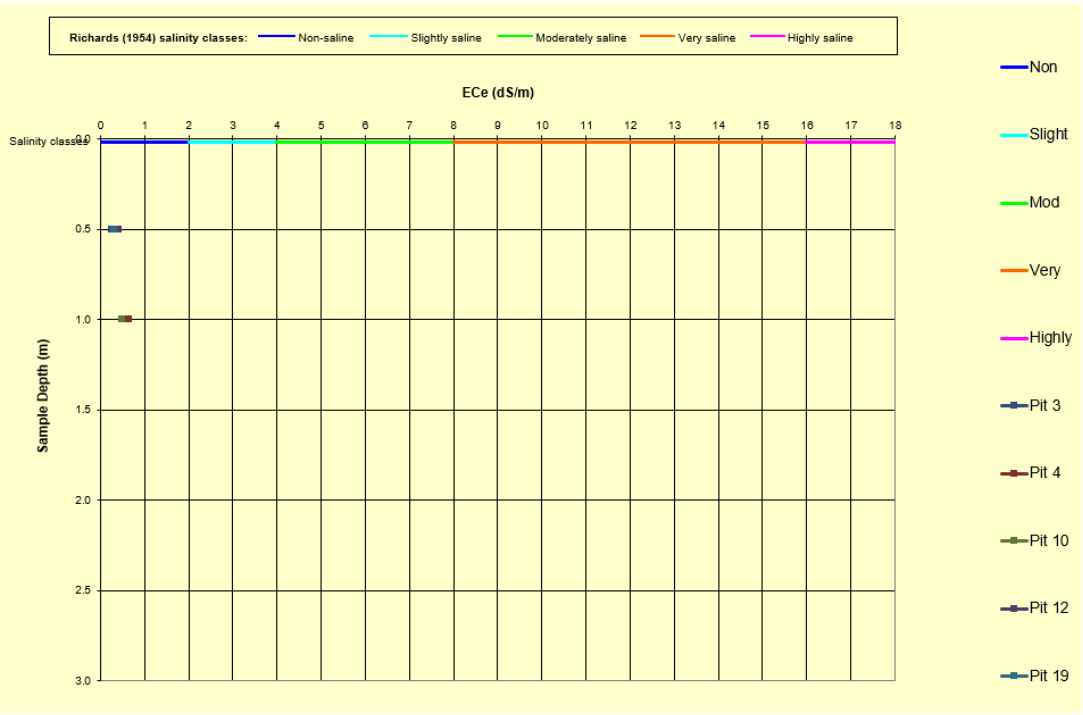


Figure 3: Richards (1954) Salinity Classes

7. Comments

7.1 Site Classification

Site classification in accordance with AS 2870:2011 provides guidance on the patterns and magnitude of moisture related seasonal ground movements that must be considered in design. Due to the presence of uncontrolled fill (fill pads, undocumented fill and in old service trenches) and the adverse moisture conditions arising from existing trees, the site is classified as Class P. Notwithstanding the Class P classification, the site classification based on soil reactivity alone following removal of topsoil and any existing fill, would likely be Class S to Class M conditions depending on the extent of clay, the depth to rock and set back distances to trees. The site classification must be reassessed should the subsurface profile change by either cutting or filling and/or if the presence of service trenches, retaining walls or submerged structures are within the zone of influence of the proposed footings.

It is recommended that the site be reclassified/reassessed after earthworks involving cut and fill work has been completed.

7.2 Earthworks and Site Preparation

7.2.1 Stripping

Site preparation for the construction of pavement areas and structures should include the removal of uncontrolled filling, roots, topsoils, vegetation and other deleterious materials such as organic matter and/or tree affected soils from the proposed construction areas.

Based on the results of the investigation, the depth of topsoil / topsoil fill varied up to 0.3 m. Any filling encountered during stripping works must be considered uncontrolled and fully removed unless Level 1 fill certification (AS3798:2007) is produced.

Whilst not observed at the test locations, any silty sandy soils encountered during stripping works should be fully removed though should be assessed at the time of construction by a geotechnical engineer. The extent of removal of silty soils underlying the site to be stripped would largely be dependent on the weather conditions at the time of stripping and the intended land use.

Deeper excavations could occur should localised thicker topsoils or unsuitable materials, including undocumented filling, be encountered, if inclement weather precedes construction or if the contractor adopts inappropriate stripping methods.

7.2.2 Site Trafficability

Following periods of wet weather, the natural surface across the site will be boggy and effectively untrafficable to all but tracked construction vehicles.

Some measures that can be undertaken to reduce the impact of wet weather on the earthworks construction include:

- retain grass cover wherever possible;
- provide cut surfaces with a slight but even cross-gradient to assist surface drainage;

- "seal" exposed fill surfaces at the end of each work day by running over with a smooth-wheeled roller;
- armour temporary access roads with rockfill; and
- form swale drains at upslope locations to help intercept surface and near-surface seepage water and to redirect it into existing drainage gullies or dams, or to sediment retention ponds.

7.2.3 Excavation Conditions

Removal of the topsoil, natural soils and up to low strength rock should be readily achievable using conventional earthmoving plant.

Large excavators (45t+) with rock hammers, and single tyne ripper will be needed to remove medium or higher strength weathered rock in trenches, and ripping with a large dozer (D9+) for bulk excavations. The excavatability of the rock will be largely dependent on the strength of the rock and the degree of fracturing within the rock mass. Low production rates will be experienced particularly where shallow rock was encountered and where possible high strength or greater granodiorite and tonalite core stones are encountered. It is possible that blasting techniques may need to be applied to loosen areas of very high and extremely high strength rock to assist the excavation. Blasting of services lines in the deep bulk cut areas may be required in order to expedite trenching works or deep cuts. It must be noted that "blow-out" of trench excavations as a result of over-break of the rock mass will occur and as such contingency planning of additional work/backfilling to enable construction should be employed. It should be noted that anecdotal information obtained from the ski-jump construction workers (the ski-jump construction site is located approximately 100 m north-east of the site) indicated that blasting was required for their deep excavations. It is possible that the proposed JCS site may encounter similar conditions within areas of the site.

Groundwater seepages into excavations must be expected to occur from sandy layers, and/or from fractures in the bedrock after periods or rain. Flows are likely to be continuous but readily controllable by gravity draining to a collection sump or pond.

7.2.4 Excavation Support

Vertical excavations within the soil and weathered rock will not be stable. For excavations up to 3 m in depth, maximum temporary batter slopes of 1H:1V (horizontal : vertical) are recommended. Permanent batter slopes should not be steeper than 2.5H:1V and should generally be flatter where vegetation maintenance is required. Erosion protection must be provided for all permanent batters. Further advice should be sought if deeper excavations are proposed.

Surcharge loads should not be placed closer to the crest of the batter than a distance equal to the vertical height of the batter, unless specific geotechnical stability analysis shows that the loads can be placed closer.

Retaining structures, if required, may be preliminarily designed using the parameters in Table 6. It is suggested that preliminary design for cantilevered or walls anchored with a single row of anchors be based on a triangular distribution with the lateral earth pressure being determined as a proportion of the vertical stress as given in the following formula:

$$\sigma_z = K\ z\ \gamma,$$

where σ_z = Horizontal pressure at depth z (kPa)
K = Earth pressure coefficient
z = Depth (m)
γ = Unit weight of soil or rock (kN/m^3)

Table 6: Retaining Wall Design Parameters

Material	Unit Weight (kN/m^3)	Earth Pressure Coefficient		Ultimate Passive Earth Pressure (kPa)[1]
		Active (K_a)	At Rest (K_0)	
Controlled Fill	20	0.3	0.5	150
Very Stiff to Hard/ Medium Dense to Dense Natural Soil	20	0.3	0.5	150
Weathered Rock (very low strength and stronger)	22	0.25[2]	0.4[2]	400[2]

Notes: [1]Below a minimum of 0.5 m embedment below the base of the excavation;
[2]Provided that adverse jointing is not encountered in the rock.

The 'At Rest' coefficient (K_0) should be used where retaining walls are close to existing structures or movement intolerant services, to minimise ground (and wall) movements. Sections of the wall where small movements of the wall are acceptable can be designed for the 'active' (K_a) condition.

Embedment of the wall can be used to achieve passive support. A triangular passive earth pressure distribution (increasing linearly with depth) may be assumed, starting from 0.5 m below excavation toe/base level.

Lateral pressures due to surcharge loads from adjacent buildings, sloping ground surfaces, pavements and construction machinery should be included where relevant. Hydrostatic pressure acting on retaining walls should also be included in the design where adequate drainage is not provided behind the full height of the walls.

7.2.5 Excavated Material Re-Use

The topsoil and any upper silty sandy slopewash/colluvium layer are not considered to be suitable for engineering applications. The silty sand soil can be difficult to handle and compact and is prone to loss of strength upon saturation. Blending of the non-organic silty sand soils in small quantities (less than 20% by volume) with the site clayey soils and weathered rock may produce a material suitable for inclusion in controlled filling. Alternatively, the silty/sandy soil could be placed in non-structural applications.

The natural soils underlying the topsoil and silty sand soils generally comprise clayey and sandy soils with varying amounts of silt and gravel. This low to medium plasticity and granular soils appear suitable for use as general fill or controlled fill following blending and moisture reconditioning. The high plasticity clays are susceptible to shrink/swell movements with changes in moisture conditions. It is considered

that the reuse of any medium to high plasticity soils for controlled fill applications should be used with caution otherwise site classifications used for dwelling footing systems would be required to be significantly higher than in the natural state. It is advised that if reuse is required and then it should be used at depth (i.e. greater than 1 m from finished surface).

Upon excavation/drilling, the extremely low to very low strength rock will most likely deteriorate to have similar properties as to clayey sand soil with reuse in general fill and controlled fill areas provided rock particles are broken down to less than 75 – 100 mm in size.

Rock greater than low to medium strength would likely excavate as cobble and boulder sized fragments, which would need to be crushed using a mobile crushing plant to achieve a general maximum particle size of 75 mm prior to use within fill areas. It is likely that minimal fines would be created during the rock crushing process and that blending with the overlying soil may be required to create a suitable (well graded) fill material.

If fill is imported to the site, then the engineering properties (e.g. plasticity, reactivity, CBR, etc.) should ideally be equivalent, or superior, to the existing suitable materials on site.

7.2.6 Filling Placement and Compaction

Prior to filling, the stripped surfaces must be inspected and/or test rolled in the presence of a geotechnical engineer. Any areas exhibiting deflections under test rolling must be appropriately treated at the direction of the geotechnical engineer.

All controlled filling should be placed in horizontal layers of maximum 250 mm loose thickness. Moisture content should be within the range ±2% of modified optimum.

All constructed fill batters should be constructed no steeper than 2.5:1 (horizontal:vertical), protected against erosion by vegetating the exposed surface and construction of toe and spoon drains as a means of controlling surface water flows on the batters. Flatter batters would be required should they need to be maintained regularly for safety reasons.

All controlled filling should be compacted to a minimum 95% modified maximum dry density.

To validate the filling quality, field inspections and in-situ testing of future earthworks must be undertaken in order to satisfy the requirements for Level 1 controlled filling AS 3798:2007.

7.3 Groundwater

Perched water was observed in Pit 20 at 2.2 m depth. No groundwater seepages were noted in any other test pit during excavation. During times of high or prolonged rainfall, seepages are likely to occur through fractures within the rock and/or within the extremely weathered permeable layers (i.e. gravelly sand / clayey sand).

Surface drainage measures are recommended to divert overland stormwater flows around future structures and pavements to minimise the risk of adverse impacts of moisture ingress.

Drainage measures will also need to be provided for any subsurface structures or behind any retaining walls to allow any seepage to flow around the structures rather than exert hydrostatic pressures against them.

Groundwater conditions rarely remain constant and can change seasonally due to variations in rainfall, temperature and soil permeability. For these reasons, it is noted that the moisture condition of the site soils may vary considerably from the time of the assessment compared to at the time of construction.

7.4 Foundations

All footings must found within a uniform bearing stratum of suitable strength/material, below the zone of influence of any uncontrolled fill (if left in place), service trenches, backfill zones, retaining walls or underground structures. Masonry walls should be articulated in accordance with current best practice. Structure design will need to ensure suitable drainage and uniform moisture conditions are maintained in the vicinity of the footings otherwise footing performance would be compromised. Footing systems must be confirmed by a structural engineer taking into consideration any onsite or offsite constraints.

For building structures, suitable footing systems could include pad and strip footings or bored cast-in situ reinforced concrete piers. Suggested allowable base bearing pressures are as follows:

- Controlled fill 150 kPa
- Stiff / medium dense natural soils 100 kPa
- Very stiff to hard / dense natural soils 150 kPa
- Extremely low to very low strength bedrock 500 kPa
- Low strength bedrock 1000 kPa
- Medium to high strength bedrock 2500 kPa
- Very high strength bedrock 3500 kPa

Settlements of footings will be dependent on the applied load and the sizing of the footing and at this stage cannot be determined. Confirmation of suitable footing systems and expected settlements can be undertaken once building design is suitably advanced.

7.5 Drainage

The performance of footing systems will be dependent on the installation of temporary and long term subsoil and surface drainage. Should soils in the vicinity of foundations be allowed to be impacted by adverse moisture conditions, foundation performance would be adversely compromised. Similarly, the performance of cut materials in bulk filling operations and compacted fills will be impacted by groundwater inundation. Suitable drainage measures will need to be implemented in areas of bulk filling to reduce the risk of inundation and softening.

7.6 Pavement Design Considerations

A design California bearing ratio (CBR) of 3% is suggested as a preliminary value for sandy clay natural and fill soils at the site. However, should high plasticity clay soils be encountered either at the surface or at shallow (less than 0.5 m) depth a lower CBR value of 1.5 – 2.0% should be adopted with the possible need for subgrade replacement. This should be confirmed by undertaking CBR tests. Areas with weathered rock exposed at subgrade level, a design CBR of 7% to 10% could be adopted, pending weathering and strength of the rock.

The CBR of any imported fill should also be assessed to confirm the suggested design value is appropriate.

All pavement preparation works should be undertaken under close supervision and consultation with the geotechnical consultant to avoid any unnecessary earthworks. The standard of construction, the selection of materials and quality of workmanship for the roads should satisfy the latest Council requirements.

Surface and subsoil drainage must be installed and maintained to protect the pavement and subgrade. Subsoil drains should be located at a minimum of 0.5 m depth below the subgrade level and be included adjacent to any traffic islands.

7.7 Geotechnical Seismicity Parameters

In accordance with AS1170:2007 “Structural Design Actions, Part 4: Earthquake Actions in Australia”, a hazard factor (Z) of 0.09 and a site subsoil Class B_e are considered appropriate for the site on the expectation rock depths are less than 3 m from design finished ground surface.

8. References

AS 1289.6.3.2:1997 Rec 2013, *Soil strength and consolidation tests—Determination of the penetration resistance of a soil—9 kg dynamic cone penetrometer test*, Standards Australia.

AS 2870:2011, *Residential Slabs and Footings*, Standards Australia.

AS 3798:2007, *Guidelines on Earthworks for Commercial and Residential Developments*, Standards Australia.

DP (2021), *'Report on Desktop Geotechnical Assessment, SINSW01290/20, Jindabyne Central School, Lot 101, DP1019527, Jindabyne'*, Douglas Partners Pty Ltd

GS NSW (1976), *Geology of Berridale 1:100 000 Geological Series Sheet 8625*, Geological Survey of NSW.

NSW EPA (2014), *Waste Classification Guidelines*, NSW Environment Protection Authority.

9. Limitations

Douglas Partners (DP) has prepared this report for this project at Part of Lot 101 DP 1019725, Jindabyne in accordance with DP's proposal dated 9 October 2020, subsequent variation dated 23 March 2021 and acceptance received from Christine Yorkston dated 06 November 2020 and Neil Hogan 30 March 2021. The work was carried out under contract ID SINSW01290/20, dated 6 November 2020 This report is provided for the exclusive use of SINSW for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the sub-surface conditions on the site only at the specific sampling and/or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after DP's field testing has been completed.

DP's advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by DP in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and/or testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

The assessment of atypical safety hazards arising from this advice is restricted to the geotechnical components set out in this report and based on known project conditions and stated design advice and assumptions. While some recommendations for safe controls may be provided, detailed 'safety in design' assessment is outside the current scope of this report and requires additional project data and assessment.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

The scope for work for this investigation/report did not include the assessment of surface or sub-surface materials or groundwater for contaminants, within or adjacent to the site. Should evidence of filling of unknown origin be noted in the report, and in particular the presence of building demolition materials, it should be recognised that there may be some risk that such filling may contain contaminants and hazardous building materials.

Douglas Partners Pty Ltd

Appendix A

About This Report

About this Report

Douglas Partners

Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

Copyright

Borehole and Test Pit Logs

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable or possible to justify on economic grounds. In any case the boreholes and test pits represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Groundwater

Where groundwater levels are measured in boreholes there are several potential problems, namely:

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;
- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

About this Report

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

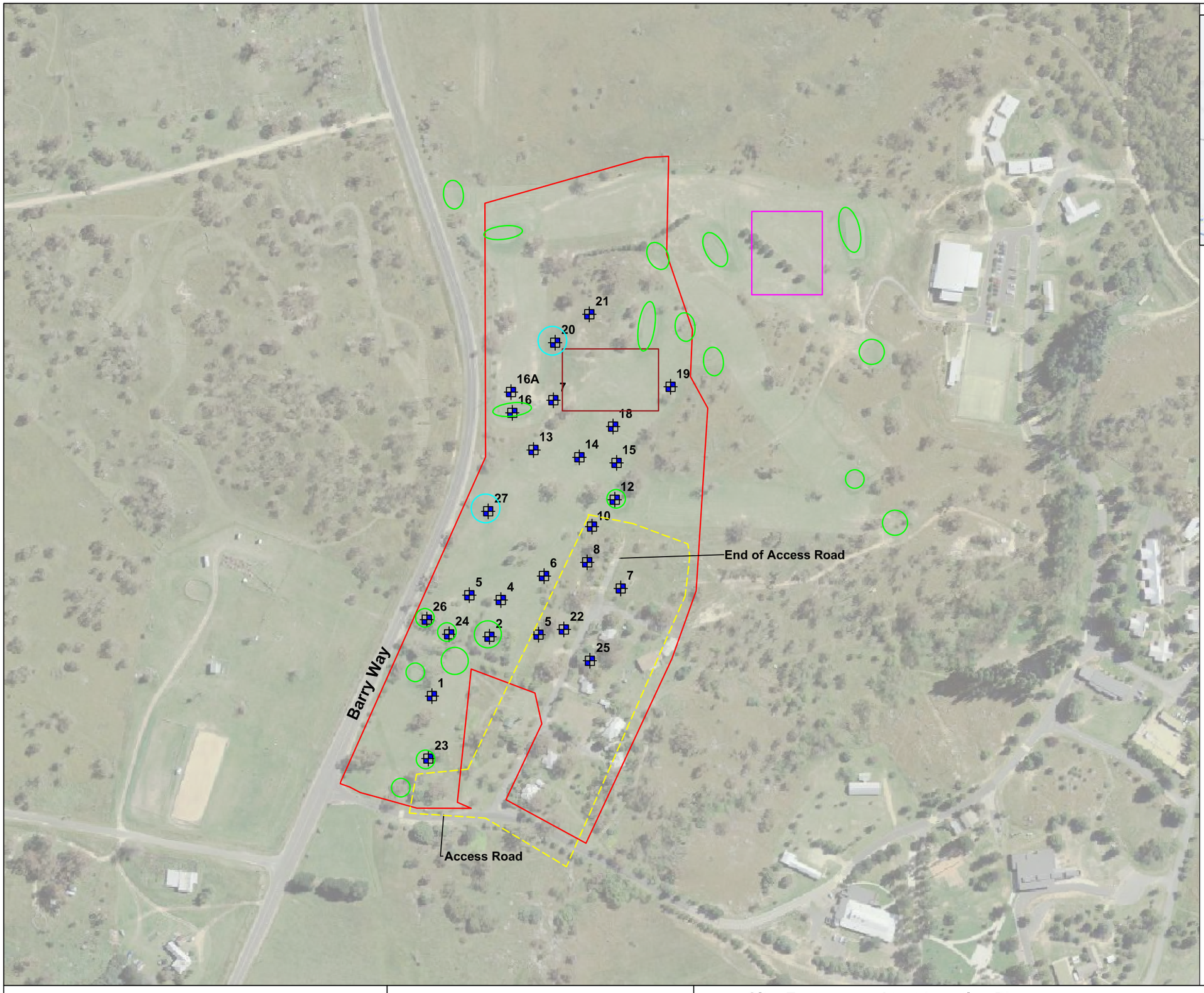
Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

Appendix B

Drawing 1



Locality Plan

LEGEND

- Approximate Site Boundary
- Approximate Area of Previous and Current Residential Dwellings (also known as south-east portion of the site). Observed Topsoil Fill and Surface Fill
- Approximate Area of Tee-Off Points and Greens
- Observed Fill (Appeared to not be Associated with Tees and Greens)
- Approximate Excavation Area for the Ski-Jump
- Approximate Area of Ski-Jump Construction Site (Residual Soils and Weathered Rock Spoil) Location
- Approximate Test Pit Location

0 30 60 90 120 150

1:3000 @ A3

NOTE:
- Base drawing from maps.six.nsw.gov.au image extracted 22.06.2021.

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT: School Infrastructure New South Wales		TITLE: Site Features and test Location Plan Proposed Jindabyne Central School Part Lot 101 DP1019527, Jindabyne	PROJECT No: 103109.02
OFFICE: Canberra	DRAWN BY: SDG		DRAWING No: 1
SCALE: As Shown	DATE: 10.12.2021		REVISION: 1

Appendix C

Explanatory Notes
Test Pit Logs

Sampling Methods

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Sampling

Sampling is carried out during drilling or test pitting to allow engineering examination (and laboratory testing where required) of the 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 taken by pushing a thin-walled sample tube into the soil and withdrawing it to obtain a sample of the soil in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Test Pits

Test pits are usually excavated with a backhoe or an excavator, allowing close examination of the in-situ soil if it is safe to enter into the pit. The depth of excavation is limited to about 3 m for a backhoe and up to 6 m for a large excavator. A potential disadvantage of this investigation method is the larger area of disturbance to the site.

Large Diameter Augers

Boreholes can be drilled using a rotating plate or short spiral auger, generally 300 mm or larger in diameter commonly mounted on a standard piling rig. The cuttings are returned to the surface at intervals (generally not more than 0.5 m) and are disturbed but usually unchanged in moisture content. Identification of soil strata is generally much more reliable than with continuous spiral flight augers, and is usually supplemented by occasional undisturbed tube samples.

Continuous Spiral Flight Augers

The borehole is advanced using 90-115 mm diameter continuous spiral flight augers which are withdrawn at intervals to allow sampling or in-situ testing. This is a relatively economical means of drilling in clays and sands above the water table. Samples are returned to the surface, or may be collected after withdrawal of the auger flights, but they are disturbed and may be mixed with soils from the sides of the hole. Information from the drilling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively low reliability, due to the remoulding, possible mixing or softening of samples by groundwater.

Non-core Rotary Drilling

The borehole is advanced using a rotary bit, with water or drilling mud being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from the rate of penetration. Where drilling mud is used this can mask the cuttings and reliable identification is only possible from separate sampling such as SPTs.

Continuous Core Drilling

A continuous core sample can be obtained using a diamond tipped core barrel, usually with a 50 mm internal diameter. Provided full core recovery is achieved (which is not always possible in weak rocks and granular soils), this technique provides a very reliable method of investigation.

Standard Penetration Tests

Standard penetration tests (SPT) are used as a means of estimating the density or strength of soils and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289, Methods of Testing Soils for Engineering Purposes - Test 6.3.1.

The test is carried out in a borehole by driving a 50 mm diameter split sample tube under the impact of a 63 kg hammer with a free fall of 760 mm. It is normal for the tube to be driven in three successive 150 mm increments and the 'N' value is taken as the number of blows for the last 300 mm. In dense sands, very hard clays or weak rock, the full 450 mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form.

- In the case where full penetration is obtained with successive blow counts for each 150 mm of, say, 4, 6 and 7 as:

  4,6,7
  N=13

- In the case where the test is discontinued before the full penetration depth, say after 15 blows for the first 150 mm and 30 blows for the next 40 mm as:

  15, 30/40 mm

The results of the SPT tests can be related empirically to the engineering properties of the soils.

Dynamic Cone Penetrometer Tests / Perth Sand Penetrometer Tests

Dynamic penetrometer tests (DCP or PSP) are carried out by driving a steel rod into the ground using a standard weight of hammer falling a specified distance. As the rod penetrates the soil the number of blows required to penetrate each successive 150 mm depth are recorded. Normally there is a depth limitation of 1.2 m, but this may be extended in certain conditions by the use of extension rods. Two types of penetrometer are commonly used.

- Perth sand penetrometer - a 16 mm diameter flat ended rod is driven using a 9 kg hammer dropping 600 mm (AS 1289, Test 6.3.3). This test was developed for testing the density of sands and is mainly used in granular soils and filling.
- Cone penetrometer - a 16 mm diameter rod with a 20 mm diameter cone end is driven using a 9 kg hammer dropping 510 mm (AS 1289, Test 6.3.2). This test was developed initially for pavement subgrade investigations, and correlations of the test results with California Bearing Ratio have been published by various road authorities.

Description and Classification Methods

The methods of description and classification of soils and rocks used in this report are generally based on Australian Standard AS1726:2017, Geotechnical Site Investigations. In general, the descriptions include strength or density, colour, structure, soil or rock type and inclusions.

Soil Types

Soil types are described according to the predominant particle size, qualified by the grading of other particles present:

Type	Particle size (mm)
Boulder	>200
Cobble	63 - 200
Gravel	2.36 - 63
Sand	0.075 - 2.36
Silt	0.002 - 0.075
Clay	<0.002

The sand and gravel sizes can be further subdivided as follows:

Type	Particle size (mm)
Coarse gravel	19 - 63
Medium gravel	6.7 - 19
Fine gravel	2.36 – 6.7
Coarse sand	0.6 - 2.36
Medium sand	0.21 - 0.6
Fine sand	0.075 - 0.21

Definitions of grading terms used are:

- Well graded - a good representation of all particle sizes
- Poorly graded - an excess or deficiency of particular sizes within the specified range
- Uniformly graded - an excess of a particular particle size
- Gap graded - a deficiency of a particular particle size with the range

The proportions of secondary constituents of soils are described as follows:

In fine grained soils (>35% fines)

Term	Proportion of sand or gravel	Example
And	Specify	Clay (60%) and Sand (40%)
Adjective	>30%	Sandy Clay
With	15 – 30%	Clay with sand
Trace	0 - 15%	Clay with trace sand

In coarse grained soils (>65% coarse)
- with clays or silts

Term	Proportion of fines	Example
And	Specify	Sand (70%) and Clay (30%)
Adjective	>12%	Clayey Sand
With	5 - 12%	Sand with clay
Trace	0 - 5%	Sand with trace clay

In coarse grained soils (>65% coarse)
- with coarser fraction

Term	Proportion of coarser fraction	Example
And	Specify	Sand (60%) and Gravel (40%)
Adjective	>30%	Gravelly Sand
With	15 - 30%	Sand with gravel
Trace	0 - 15%	Sand with trace gravel

The presence of cobbles and boulders shall be specifically noted by beginning the description with ‘Mix of Soil and Cobbles/Boulders’ with the word order indicating the dominant first and the proportion of cobbles and boulders described together.

Soil Descriptions

Cohesive Soils

Cohesive soils, such as clays, are classified on the basis of undrained shear strength. The strength may be measured by laboratory testing, or estimated by field tests or engineering examination. The strength terms are defined as follows:

Description	Abbreviation	Undrained shear strength (kPa)
Very soft	VS	<12
Soft	S	12 - 25
Firm	F	25 - 50
Stiff	St	50 - 100
Very stiff	VSt	100 - 200
Hard	H	>200
Friable	Fr	-

Cohesionless Soils

Cohesionless soils, such as clean sands, are classified on the basis of relative density, generally from the results of standard penetration tests (SPT), cone penetration tests (CPT) or dynamic penetrometers (PSP). The relative density terms are given below:

Relative Density	Abbreviation	Density Index (%)
Very loose	VL	<15
Loose	L	15-35
Medium dense	MD	35-65
Dense	D	65-85
Very dense	VD	>85

Soil Origin

It is often difficult to accurately determine the origin of a soil. Soils can generally be classified as:

- Residual soil - derived from in-situ weathering of the underlying rock;
- Extremely weathered material – formed from in-situ weathering of geological formations. Has soil strength but retains the structure or fabric of the parent rock;
- Alluvial soil – deposited by streams and rivers;
- Estuarine soil – deposited in coastal estuaries;
- Marine soil – deposited in a marine environment;
- Lacustrine soil – deposited in freshwater lakes;
- Aeolian soil – carried and deposited by wind;
- Colluvial soil – soil and rock debris transported down slopes by gravity;
- Topsoil – mantle of surface soil, often with high levels of organic material.
- Fill – any material which has been moved by man.

Moisture Condition – Coarse Grained Soils

For coarse grained soils the moisture condition should be described by appearance and feel using the following terms:

- Dry (D) Non-cohesive and free-running.
- Moist (M) Soil feels cool, darkened in colour.
  Soil tends to stick together.
  Sand forms weak ball but breaks easily.
- Wet (W) Soil feels cool, darkened in colour.
  Soil tends to stick together, free water forms when handling.

Moisture Condition – Fine Grained Soils

For fine grained soils the assessment of moisture content is relative to their plastic limit or liquid limit, as follows:

- ‘Moist, dry of plastic limit’ or ‘w <PL’ (i.e. hard and friable or powdery).
- ‘Moist, near plastic limit’ or ‘w ≈ PL (i.e. soil can be moulded at moisture content approximately equal to the plastic limit).
- ‘Moist, wet of plastic limit’ or ‘w >PL’ (i.e. soils usually weakened and free water forms on the hands when handling).
- ‘Wet’ or ‘w ≈LL’ (i.e. near the liquid limit).
- ‘Wet’ or ‘w >LL’ (i.e. wet of the liquid limit).

Rock Strength

Rock strength is defined by the Unconfined Compressive Strength and it refers to the strength of the rock substance and not the strength of the overall rock mass, which may be considerably weaker due to defects.

The Point Load Strength Index $Is_{(50)}$ is commonly used to provide an estimate of the rock strength and site specific correlations should be developed to allow UCS values to be determined. The point load strength test procedure is described by Australian Standard AS4133.4.1-2007. The terms used to describe rock strength are as follows:

Strength Term	Abbreviation	Unconfined Compressive Strength MPa	Point Load Index * $Is_{(50)}$ MPa
Very low	VL	0.6 - 2	0.03 - 0.1
Low	L	2 - 6	0.1 - 0.3
Medium	M	6 - 20	0.3 - 1.0
High	H	20 - 60	1 - 3
Very high	VH	60 - 200	3 - 10
Extremely high	EH	>200	>10

* Assumes a ratio of 20:1 for UCS to $Is_{(50)}$. It should be noted that the UCS to $Is_{(50)}$ ratio varies significantly for different rock types and specific ratios should be determined for each site.

Degree of Weathering

The degree of weathering of rock is classified as follows:

Term	Abbreviation	Description
Residual Soil	RS	Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are no longer visible, but the soil has not been significantly transported.
Extremely weathered	XW	Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are still visible
Highly weathered	HW	The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable. Rock strength is significantly changed by weathering. Some primary minerals have weathered to clay minerals. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores.
Moderately weathered	MW	The whole of the rock material is discoloured , usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable, but shows little or no change of strength from fresh rock.
Slightly weathered	SW	Rock is partially discoloured with staining or bleaching along joints but shows little or no change of strength from fresh rock.
Fresh	FR	No signs of decomposition or staining.
Note: If HW and MW cannot be differentiated use DW (see below)		
Distinctly weathered	DW	Rock strength usually changed by weathering. The rock may be highly discoloured, usually by iron staining. Porosity may be increased by leaching or may be decreased due to deposition of weathered products in pores.

Rock Descriptions

Degree of Fracturing

The following classification applies to the spacing of natural fractures in diamond drill cores. It includes bedding plane partings, joints and other defects, but excludes drilling breaks.

Term	Description
Fragmented	Fragments of <20 mm
Highly Fractured	Core lengths of 20-40 mm with occasional fragments
Fractured	Core lengths of 30-100 mm with occasional shorter and longer sections
Slightly Fractured	Core lengths of 300 mm or longer with occasional sections of 100-300 mm
Unbroken	Core contains very few fractures

Rock Quality Designation

The quality of the cored rock can be measured using the Rock Quality Designation (RQD) index, defined as:

$$\text{RQD \%} = \frac{\text{cumulative length of 'sound' core sections > 100 mm long}}{\text{total drilled length of section being assessed}}$$

where 'sound' rock is assessed to be rock of low strength or stronger. The RQD applies only to natural fractures. If the core is broken by drilling or handling (i.e. drilling breaks) then the broken pieces are fitted back together and are not included in the calculation of RQD.

Stratification Spacing

For sedimentary rocks the following terms may be used to describe the spacing of bedding partings:

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

Symbols & Abbreviations

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Introduction

These notes summarise abbreviations commonly used on borehole logs and test pit reports.

Drilling or Excavation Methods

C	Core drilling
R	Rotary drilling
SFA	Spiral flight augers
NMLC	Diamond core - 52 mm dia
NQ	Diamond core - 47 mm dia
HQ	Diamond core - 63 mm dia
PQ	Diamond core - 81 mm dia

Water

▷	Water seep
▽	Water level

Sampling and Testing

A	Auger sample
B	Bulk sample
D	Disturbed sample
E	Environmental sample
U_{50}	Undisturbed tube sample (50mm)
W	Water sample
pp	Pocket penetrometer (kPa)
PID	Photo ionisation detector
PL	Point load strength Is(50) MPa
S	Standard Penetration Test
V	Shear vane (kPa)

Description of Defects in Rock

The abbreviated descriptions of the defects should be in the following order: Depth, Type, Orientation, Coating, Shape, Roughness and Other. Drilling and handling breaks are not usually included on the logs.

Defect Type

B	Bedding plane
Cs	Clay seam
Cv	Cleavage
Cz	Crushed zone
Ds	Decomposed seam
F	Fault
J	Joint
Lam	Lamination
Pt	Parting
Sz	Sheared Zone
V	Vein

Orientation

The inclination of defects is always measured from the perpendicular to the core axis.

h	horizontal
v	vertical
sh	sub-horizontal
sv	sub-vertical

Coating or Infilling Term

cln	clean
co	coating
he	healed
inf	infilled
stn	stained
ti	tight
vn	veneer

Coating Descriptor

ca	calcite
cbs	carbonaceous
cly	clay
fe	iron oxide
mn	manganese
slt	silty

Shape

cu	curved
ir	irregular
pl	planar
st	stepped
un	undulating

Roughness

po	polished
ro	rough
sl	slickensided
sm	smooth
vr	very rough

Other

fg	fragmented
bnd	band
qtz	quartz

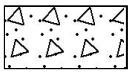
Symbols & Abbreviations

Graphic Symbols for Soil and Rock

General


Asphalt


Road base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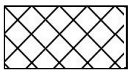
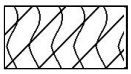
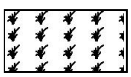

Filling

Soils


Topsoil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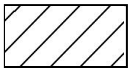
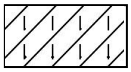
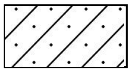
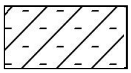
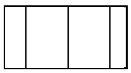

Clay


Silty clay


Sandy clay


Gravelly clay


Shaly clay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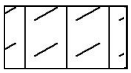
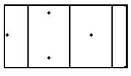
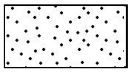
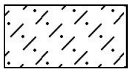
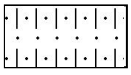

Clayey silt


Sandy silt

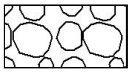

Sand

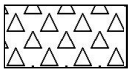

Clayey sand


Silty sand


Gravel

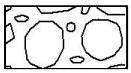

Sandy gravel


Cobbles, boulders

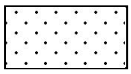

Talus

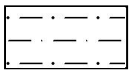
Sedimentary Rocks

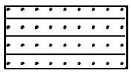

Boulder conglomerate

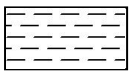

Conglomerate


Conglomeratic sandstone

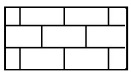

Sandstone


Siltstone

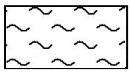

Laminite

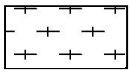

Mudstone, claystone, shale

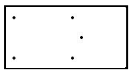

Coal


Limestone

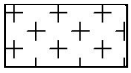
Metamorphic Rocks

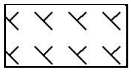

Slate, phyllite, schist

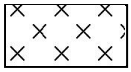

Gneiss

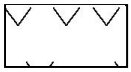

Quartzite

Igneous Rocks


Granite


Dolerite, basalt, andesite


Dacite, epidote


Tuff, breccia


Porphyry

TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Jindabyne Central School
LOCATION: Lot 101 DP1019527, Jindabyne

SURFACE LEVEL: 1003 AHD
EASTING: 644301
NORTHING: 5966954

PIT No: 1
PROJECT No: 103109.02
DATE: 20/4/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
1003	0.15	TOPSOIL/Sandy CLAY (CL): low plasticity, pale brown, fine to coarse grained sand, with rootlets, moist to dry, w<PL, very stiff, TOPSOIL		E	0.1		PID < 1		
	0.4	Sandy CLAY (CL): low plasticity, dark brown, fine to coarse grained sand, with rootlets, trace gravel up to 20mm in size, moist to dry, w<PL, very stiff to hard, residual		E	0.5		PID < 1		
		GRANODIORITE: medium to coarse grained, pale brown, dry, very low to low strength, highly weathered		B	0.7				
1002	1	-from 1.2m, pockets/seams of medium to high strength, moderately to slightly weathered		E	1.0		PID < 1		1
				D	1.4				
	1.5	Pit discontinued at 1.5m -limit of investigation							
1001	2								2
1000	3								3

RIG: Komatsu PC 138 US fitted with 600mm wide toothed bucket

LOGGED: SDG

SURVEY DATUM: MGA94 Zone 55

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Survey drawings for the whole site have not been provided to DP yet. Therefore, RLs and coordinates are approximate only and must not be relied upon.

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Jindabyne Central School
LOCATION: Lot 101 DP1019527, Jindabyne

SURFACE LEVEL: 1002 AHD
EASTING: 644336
NORTHING: 5966995

PIT No: 2
PROJECT No: 103109.02
DATE: 20/4/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
1002	0.15	FILL/SAND (SP): poorly graded, fine to medium grained, grey, with rootlets, dry, loose to medium dense, FILL		E	0.1		PID < 1		
		FILL/Sandy CLAY (CL): low plasticity, brown, fine to coarse grained sand, trace concrete with steel reinforcement block and terracotta pipe fragments, moist to dry, w~PL, stiff to very stiff, FILL		E	0.5		PID < 1		
	0.6	TONALITE: medium to coarse grained, blue-grey, dry, high to very high strength. slightly weathered, fractured -bucket refusal at 0.65m							
1001	1								1
	1.9	Pit discontinued at 1.9m -ripper refusal							
1000	2								2
999	3								3

RIG: Komatsu PC 138 US fitted with 600mm wide toothed bucket

LOGGED: SDG

SURVEY DATUM: MGA94 Zone 55

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Survey drawings for the whole site have not been provided to DP yet. Therefore, RLs and coordinates are approximate only and must not be relied upon.

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Jindabyne Central School
LOCATION: Lot 101 DP1019527, Jindabyne

SURFACE LEVEL: 1004 AHD
EASTING: 644322
NORTHING: 5967031

PIT No: 3
PROJECT No: 103109.02
DATE: 20/4/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
1004		TOPSOIL/Sandy CLAY (CL): low plasticity, brown, fine to coarse grained sand, with rootlets, moist to dry, w<PL, very stiff, TOPSOIL		E	0.1		PID < 1		
	0.3	TONALITE: medium to coarse grained, dark yellow-brown, dry, very low to low strength, highly weathered, fractured, with occasional clay seams and occasional low to medium strength, highly to moderately weathered seams		E	0.5		PID < 1		
					0.6				
				B					
					0.8				
1003	1			D	1.0				1
	1.7	Pit discontinued at 1.7m -limit of investigation							
1002	2								2
1001	3								3

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: Komatsu PC 138 US fitted with 600mm wide toothed bucket

LOGGED: SDG

SURVEY DATUM: MGA94 Zone 55

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Survey drawings for the whole site have not been provided to DP yet. Therefore, RLs and coordinates are approximate only and must not be relied upon.

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Jindabyne Central School
LOCATION: Lot 101 DP1019527, Jindabyne

SURFACE LEVEL: 1002 AHD
EASTING: 644348
NORTHING: 5967025

PIT No: 4
PROJECT No: 103109.02
DATE: 20/4/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
1002	0.0	TOPSOIL/Sandy CLAY (CL): low plasticity, dark brown, fine to coarse grained sand, with rootlets, trace silt, moist to dry, w<PL, very stiff, TOPSOIL		E	0.1		PID < 1		
	0.3	Sandy CLAY (CI): medium plasticity, dark yellow-brown, fine to coarse grained sand, dry to most, w<PL, very stiff to hard, residual		D E	0.5		PID < 1		
	0.6	TONALITE: medium to coarse grained, yellow-grey, dry, very low to low strength, highly weathered, slightly fracture to fractured with iron staining along joints							
1001	1			E	1.0		PID < 1		1
		-from 1.2m, low strength							
				D	1.7				
1000	2	-from 2.0m, low to medium strength, highly to moderately weathered, fractured							2
		-from 2.4m, ripper used							
		-from 2.5m, medium to high strength, moderately weathered		D	2.6				
999	3	-from 3.0m, blue-grey, moderately to slightly weathered							3
	3.5	Pit discontinued at 3.5m -ripper refusal		D	3.5				

RIG: Komatsu PC 138 US fitted with 600mm wide toothed bucket

LOGGED: SDG

SURVEY DATUM: MGA94 Zone 55

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Survey drawings for the whole site have not been provided to DP yet. Therefore, RLs and coordinates are approximate only and must not be relied upon.

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Jindabyne Central School
LOCATION: Lot 101 DP1019527, Jindabyne

SURFACE LEVEL: 1000 AHD
EASTING: 644372
NORTHING: 5967003

PIT No: 5
PROJECT No: 103109.02
DATE: 20/4/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
1000		TOPSOIL FILL/Sandy CLAY (CL): low plasticity, dark brown, fine to coarse grained sand, with rootlets, trace silt, moist to dry, w<PL, very stiff, TOPSOIL FILL		E	0.1		PID < 1		
	0.3	FILL/Sandy CLAY (CL/CI): low to medium plasticity, dark yellow-brown, fine to coarse grained sand, with quartz rounded gravel up to 30mm in size, dry to moist, w<PL, very stiff to hard, FILL		D E	0.5		PID < 1		
		-at 0.7m, terracotta pipeline							
	0.8	TONALITE: medium to coarse grained, yellow-grey, dry, very low to low strength, highly weathered, fractured, with iron staining in between joints							
999	1			E	1.0		PID < 1		1
998	2	-from 2.0m, low to medium strength, highly to moderately weathered -from 2.1m, grey		D	2.0				2
		-from 2.5m, ripper required							
997	3 3.0	Pit discontinued at 3.0m -ripper refusal		D	3.0				3

RIG: Komatsu PC 138 US fitted with 600mm wide toothed bucket

LOGGED: SDG

SURVEY DATUM: MGA94 Zone 55

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Survey drawings for the whole site have not been provided to DP yet. Therefore, RLs and coordinates are approximate only and must not be relied upon.

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Jindabyne Central School
LOCATION: Lot 101 DP1019527, Jindabyne

SURFACE LEVEL: 999 AHD
EASTING: 644383
NORTHING: 5967044

PIT No: 6
PROJECT No: 103109.02
DATE: 21/4/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
999		TOPSOIL FILL/Sandy CLAY (CL): low plasticity, brown, fine to coarse grained sand, moist to dry, w<PL, very stiff, TOPSOIL FILL		E	0.1		PID < 1		
	0.3	TONALITE: medium to coarse grained, pale orange-brown, dry, very low strength, highly weathered, fractured, with iron staining		D E	0.5		PID < 1		
998	1	-from 1.0m, low strength		E	1.0		PID < 1		
		-from 1.4m, part of the test pit has medium strength, moderately weathered tonalite present							
		-from 1.8m, ripper required							
997	2	-from 2.0m, blue-grey/brown-grey, medium strength, moderately weathered, with some high strength seams							
	2.2	Pit discontinued at 2.2m -ripper refusal							
996	3								

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: Komatsu PC 138 US fitted with 600mm wide toothed bucket

LOGGED: SDG

SURVEY DATUM: MGA94 Zone 55

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Survey drawings for the whole site have not been provided to DP yet. Therefore, RLs and coordinates are approximate only and must not be relied upon.

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Jindabyne Central School
LOCATION: Lot 101 DP1019527, Jindabyne

SURFACE LEVEL: 995 AHD
EASTING: 644436
NORTHING: 5967029

PIT No: 7
PROJECT No: 103109.02
DATE: 20/4/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
995	0.25	TOPSOIL FILL/Sandy CLAY (CL): low plasticity, dark brown, fine to coarse grained sand, with rootlets, quartz gravel up to 20mm in size, glass, porcelain and terracotta pipe fragments, trace silt, moist to dry, w<PL, very stiff, TOPSOIL FILL		E	0.1		PID < 1		
		Sandy CLAY (CI): medium plasticity, orange-brown, fine to coarse grained sand, moist to dry, w<PL, very stiff to hard, extremely weathered granodiorite		D	0.4				
				E	0.5		PID < 1		
994	0.6	TONALITE: medium to coarse grained, orange-brown, dry to moist, very low strength, highly weathered							
	1.5	Pit discontinued at 1.5m -limit of investigation							
993									
992									

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20; 1, 2, 3

RIG: Komatsu PC 138 US fitted with 600mm wide toothed bucket

LOGGED: SDG

SURVEY DATUM: MGA94 Zone 55

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Survey drawings for the whole site have not been provided to DP yet. Therefore, RLs and coordinates are approximate only and must not be relied upon.

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Jindabyne Central School
LOCATION: Lot 101 DP1019527, Jindabyne

SURFACE LEVEL: 997 AHD
EASTING: 644419
NORTHING: 5967059

PIT No: 8
PROJECT No: 103109.02
DATE: 20/4/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
997	0.3	TOPSOIL FILL/Gravelly SAND (SW): well graded, fine to coarse grained, brown, gravel rounded up to 60mm in size, with cobbles up to 100mm in size, rootlets, dry to moist, medium dense to dense, TOPSOIL FILL		D E	0.1		PID < 1		
	0.7	Sandy CLAY (CI): medium plasticity, orange-brown, fine to coarse grained sand, moist to dry, w<PL, hard, extremely weathered granodiorite, with some very low strength, highly weathered seams		D E	0.5		PID < 1		
996	1	TONALITE: medium to coarse grained, pale orange-grey, dry, very low strength, highly weathered -from 1.4m, low strength		E	1.0		PID < 1		1
995	2			D	2.2				2
994	3								3
	3.5	Pit discontinued at 3.5m -limit of investigation							

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: Komatsu PC 138 US fitted with 600mm wide toothed bucket

LOGGED: SDG

SURVEY DATUM: MGA94 Zone 55

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Survey drawings for the whole site have not been provided to DP yet. Therefore, RLs and coordinates are approximate only and must not be relied upon.

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Jindabyne Central School
LOCATION: Lot 101 DP1019527, Jindabyne

SURFACE LEVEL: 1001 AHD
EASTING: 644362
NORTHING: 5967084

PIT No: 9
PROJECT No: 103109.02
DATE: 21/4/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
1001	0.2	TOPSOIL/Gravelly Clayey SAND (SC): fine to coarse grained, pale brown, low plasticity clay, gravel up to 20mm in size, with rootlets, dry to moist, dense, TOPSOIL		E	0.1		PID < 1		
		TONALITE: medium to coarse grained, pale grey, dry, medium to high strength, moderately to slightly weathered, slightly fractured, with iron staining -from 0.25m, ripper required							
	0.6	Pit discontinued at 0.6m -ripper refusal		D	0.6				
1000	1								1
999	2								2
998	3								3

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: Komatsu PC 138 US fitted with 600mm wide toothed bucket

LOGGED: SDG

SURVEY DATUM: MGA94 Zone 55

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Survey drawings for the whole site have not been provided to DP yet. Therefore, RLs and coordinates are approximate only and must not be relied upon.

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Jindabyne Central School
LOCATION: Lot 101 DP1019527, Jindabyne

SURFACE LEVEL: 997 AHD
EASTING: 644413
NORTHING: 5967083

PIT No: 10
PROJECT No: 103109.02
DATE: 21/4/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
997		TOPSOIL FILL/Sandy CLAY (CL): low plasticity, pale brown, fine to coarse grained sand, with rootlets, trace gravel up to 60mm in size, moist to dry, w<PL, very stiff, TOPSOIL FILL		E	0.1		PID < 1		
	0.3	Clayey SAND (SC): fine to coarse grained, pale brown, low plasticity clay, trace gravel up to 20mm in size, dry to moist, medium dense to dense, possible colluvial		D E	0.5		PID < 1		
	0.8	TONALITE: medium to coarse grained, pale yellow-brown, dry, very low to low strength, highly weathered							
996	1			E	1.0		PID < 1		1
				D	1.7				
995	2								2
				D	3.2				
994	3	-from 3.2m, ripper required							3
				D	3.5				
	3.6	-from 3.5m, grey/white, high strength, moderately to slightly weathered							
		Pit discontinued at 3.6m -ripper refusal							

RIG: Komatsu PC 138 US fitted with 600mm wide toothed bucket

LOGGED: SDG

SURVEY DATUM: MGA94 Zone 55

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Survey drawings for the whole site have not been provided to DP yet. Therefore, RLs and coordinates are approximate only and must not be relied upon.

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Jindabyne Central School
LOCATION: Lot 101 DP1019527, Jindabyne

SURFACE LEVEL: 1001 AHD
EASTING: 644351
NORTHING: 5967117

PIT No: 11
PROJECT No: 103109.02
DATE: 21/4/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
1001	0.25	TOPSOIL/Sandy CLAY (CL): low plasticity, dark brown, fine to coarse grained, moist to dry, w<PL, very stiff, TOPSOIL		E	0.1		PID < 1		
		Sandy CLAY (CL/CI): low to medium plasticity, brown, fine to coarse grained, dry to moist, w<PL, very stiff to hard, extremely weathered tonalite		D E B	0.5		PID < 1		
	0.7	TONALITE: medium to coarse grained, orange brown, dry to moist, low strength, highly weathered, fracture, with iron staining		D	0.7 1.0				
1000	1								1
999	2	-from 2.0m, green-grey, highly to moderately weathered		D	2.0				2
		-from 2.4m, ripper required, low to medium strength							
		-from 2.7m, green, high strength, slightly weathered		D	2.7				
998	2.8	Pit discontinued at 2.8m -ripper refusal							3
	3								

RIG: Komatsu PC 138 US fitted with 600mm wide toothed bucket

LOGGED: SDG

SURVEY DATUM: MGA94 Zone 55

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Survey drawings for the whole site have not been provided to DP yet. Therefore, RLs and coordinates are approximate only and must not be relied upon.

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Jindabyne Central School
LOCATION: Lot 101 DP1019527, Jindabyne

SURFACE LEVEL: 996 AHD
EASTING: 644427
NORTHING: 5967109

PIT No: 12
PROJECT No: 103109.02
DATE: 21/4/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
996		FILL/SAND (SP): poorly graded, medium grained, grey-brown, with rootlets, trace low plasticity silt and clay, moist, medium dense, FILL		E	0.1		PID < 1		
	0.3	Sandy CLAY (CI): medium plasticity, orange-brown/red-brown, fine to coarse grained sand, with silt, moist to dry, very stiff to hard, extremely weathered tonalite		D	0.4				
				E	0.5		PID < 1		
	0.6	TONALITE: medium to coarse grained, dark orange-brown, moist to dry, very low strength, highly weathered, fractured							
995	1	-from 1.0m, low to medium strength, highly to moderately weathered		D E	1.0		PID < 1		1
994	2	-from 1.6m , ripper required, grey brown, high strength, moderately to slightly weathered							2
	2.1	Pit discontinued at 2.1m -slow ripper progress							
993	3								3

RIG: Komatsu PC 138 US fitted with 600mm wide toothed bucket

LOGGED: SDG

SURVEY DATUM: MGA94 Zone 55

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Survey drawings for the whole site have not been provided to DP yet. Therefore, RLs and coordinates are approximate only and must not be relied upon.

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Jindabyne Central School
LOCATION: Lot 101 DP1019527, Jindabyne

SURFACE LEVEL: 999 AHD
EASTING: 644373
NORTHING: 5967145

PIT No: 13
PROJECT No: 103109.02
DATE: 21/4/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
999		TOPSOIL/Clayey SAND (SC): fine to coarse grained, brown, low plasticity clay, with rootlets, moist to dry, medium dense, TOPSOIL		E	0.1		PID < 1		
	0.25	Sandy CLAY (CL): low plasticity, orange-brown, fine to coarse grained sand, dry to moist, w<PL, very stiff to hard, residual/extremely weathered tonalite		D E	0.5		PID < 1		
	0.6	TONALITE: medium to coarse grained, orange-brown/red-brown, dry to moist, very low strength, highly weathered, fractured		D E	1.0		PID < 1		
998	1								1
				D	1.8				
997	2								2
				D	2.2				
	2.4	Pit discontinued at 2.4m -slow progress							
996	3								3

RIG: Komatsu PC 138 US fitted with 600mm wide toothed bucket

LOGGED: SDG

SURVEY DATUM: MGA94 Zone 55

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Survey drawings for the whole site have not been provided to DP yet. Therefore, RLs and coordinates are approximate only and must not be relied upon.

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Jindabyne Central School
LOCATION: Lot 101 DP1019527, Jindabyne

SURFACE LEVEL: 997 AHD
EASTING: 644408
NORTHING: 5967141

PIT No: 14
PROJECT No: 103109.02
DATE: 21/4/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
997		TOPSOIL/Sandy CLAY (CL): low plasticity, dark brown, fine to coarse grained, with silt and rootlets, trace gravel up to 10mm in size, moist to dry, w<PL, stiff, TOPSOIL		E	0.1		PID < 1		
	0.3	TONALITE: medium to coarse grained, orange brown, with rootlets, dry to moist, very low to low strength, highly weathered, fragmented to fractured							
		-from 0.5m, fractured		E	0.5		PID < 1		
996	1	-from 1.0m, ripper required, brown, medium strength, moderately weathered		E	1.0		PID < 1		1
		-from 1.5m, medium to high strength, moderately weathered		D	1.5				
995	2	-from 2.2m, low to medium strength, highly to moderately weathered							2
		-from 2.9m, blue grey, medium to high strength, moderately to slightly weathered		D	2.9				
994	3	3.0 Pit discontinued at 3.0m							3
		-slow ripper progress							

RIG: Komatsu PC 138 US fitted with 600mm wide toothed bucket

LOGGED: SDG

SURVEY DATUM: MGA94 Zone 55

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Survey drawings for the whole site have not been provided to DP yet. Therefore, RLs and coordinates are approximate only and must not be relied upon.

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Jindabyne Central School
LOCATION: Lot 101 DP1019527, Jindabyne

SURFACE LEVEL: 995 AHD
EASTING: 644439
NORTHING: 5967139

PIT No: 15
PROJECT No: 103109.02
DATE: 21/4/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
995		TOPSOIL/Sandy CLAY (CL): low plasticity, dark brown, fine to coarse grained, with rootlets, moist to dry, w<PL, stiff, TOPSOIL		E	0.1		PID < 1		
	0.3	Sandy CLAY (CI): medium plasticity, brown, mottled orange, fine to coarse grained sand, moist to dry, w<PL, very stiff to hard, extremely weathered tonalite		D E	0.5		PID < 1		
	0.6	TONALITE: medium to coarse grained, orange brown, dry to moist, low strength, highly weathered, fractured, trace rootlets, iron staining							
994	1	-from 1.0m, ripper required, grey brown, medium to high strength, moderately to slightly weathered		E	1.0		PID < 1		1
				D	1.5				
	1.7	Pit discontinued at 1.7m -ripper refusal							
993	2								2
992	3								3

RIG: Komatsu PC 138 US fitted with 600mm wide toothed bucket

LOGGED: SDG

SURVEY DATUM: MGA94 Zone 55

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Survey drawings for the whole site have not been provided to DP yet. Therefore, RLs and coordinates are approximate only and must not be relied upon.

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Jindabyne Central School
LOCATION: Lot 101 DP1019527, Jindabyne

SURFACE LEVEL: 999 AHD
EASTING: 644356
NORTHING: 5967187

PIT No: 16
PROJECT No: 103109.02
DATE: 21/4/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
999		FILL/Sandy CLAY (CL): low plasticity, brown, fine to coarse grained sand, with rootlets, rounded to angular gravel up to 60mm in size, trace glass fragments, dry to moist, w<PL, very stiff, FILL		E	0.1		PID < 1		
				E	0.5		PID < 1		
998	1			E	1.0		PID < 1		1
	1.4	Sandy CLAY (CL): low plasticity, pale orange-brown, fine to coarse grained sand, dry to moist, w<PL, hard, possible colluvial							
	1.5	Pit discontinued at 1.5m -limit of investigation		E	1.5		PID < 1		
997	2								2
996	3								3

RIG: Komatsu PC 138 US fitted with 600mm wide toothed bucket

LOGGED: SDG

SURVEY DATUM: MGA94 Zone 55

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Survey drawings for the whole site have not been provided to DP yet. Therefore, RLs and coordinates are approximate only and must not be relied upon.

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Jindabyne Central School
LOCATION: Lot 101 DP1019527, Jindabyne

SURFACE LEVEL: 996 AHD
EASTING: 644384
NORTHING: 5967187

PIT No: 17
PROJECT No: 103109.02
DATE: 21/4/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
996		TOPSOIL FILL/Sandy CLAY (CL): low plasticity, dark brown, fine to coarse grained, with rootlets and gravel up to 10mm in size, trace polypipe, dry to moist, w<PL, hard, TOPSOIL FILL		E	0.1		PID < 1		
	0.2	TONALITE: medium to coarse grained, grey, dry, high strength, slightly weathered, iron staining		E	0.5		PID < 1		
995	1	-from 0.8m, ripper required, some high to very high strength, slightly weathered seams		D	0.8				1
	1.2	Pit discontinued at 1.2m -ripper refusal							
994	2								2
993	3								3

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: Komatsu PC 138 US fitted with 600mm wide toothed bucket

LOGGED: SDG

SURVEY DATUM: MGA94 Zone 55

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Survey drawings for the whole site have not been provided to DP yet. Therefore, RLs and coordinates are approximate only and must not be relied upon.

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Jindabyne Central School
LOCATION: Lot 101 DP1019527, Jindabyne

SURFACE LEVEL: 994 AHD
EASTING: 644438
NORTHING: 5967177

PIT No: 18
PROJECT No: 103109.02
DATE: 22/4/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
994		TOPSOIL/Sandy CLAY (CL): low plasticity, brown, fine to coarse grained sand, with rootlets, dry to moist, w<PL, very stiff to hard, TOPSOIL		E	0.1		PID < 1		
	0.25	Sandy CLAY (CL): low plasticity, pale brown, fine to coarse grained sand, dry to moist, w<PL, very stiff to hard, extremely weathered tonalite		D E	0.5		PID < 1		
	0.6	TONALITE: medium to coarse grained, orange-brown, very low to low strength, highly weathered, fractured		E	1.0		PID < 1		
993	1			D	1.2				1
		-from 1.5m, low strength							
		-from 1.7m, ripper required, brown-grey, mottled blue, high to very high strength, slightly weathered							
	1.9	Pit discontinued at 1.9m		D	1.9				
992	2	-ripper refusal							2
991	3								3

RIG: Komatsu PC 138 US fitted with 600mm wide toothed bucket

LOGGED: SDG

SURVEY DATUM: MGA94 Zone 55

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Survey drawings for the whole site have not been provided to DP yet. Therefore, RLs and coordinates are approximate only and must not be relied upon.

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Jindabyne Central School
LOCATION: Lot 101 DP1019527, Jindabyne

SURFACE LEVEL: 992 AHD
EASTING: 644440
NORTHING: 5967214

PIT No: 19
PROJECT No: 103109.02
DATE: 22/4/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
992	0.2	TOPSOIL/Sandy CLAY (CL): low plasticity, dark brown, fine to coarse grained sand, with rootlets, dry to moist, w<PL, stiff to very stiff, TOPSOIL		E	0.1		PID < 1		
	0.5	Sandy CLAY (CL): low plasticity, pale brown, fine to coarse grained sand, dry to moist, w<PL, very stiff to hard, residual		E	0.5		PID < 1		
	0.7	Sandy CLAY (CL/CI): low to medium plasticity, pale orange-brown, fine to coarse grained sand, dry to moist, w<PL, hard, extremely weathered tonalite							
991	1	TONALITE: medium to coarse grained, orange-brown, dry to moist, very low to low strength, highly weathered, fractured to slightly fractured		E	1.0		PID < 1		1
990	2			D	2.1				2
		-from 2.6m, low strength							
		-from 2.7m, ripper required		D	2.7				
989	3								3
	3.5	Pit discontinued at 3.5m -slow ripper progress							

RIG: Komatsu PC 138 US fitted with 600mm wide toothed bucket

LOGGED: SDG

SURVEY DATUM: MGA94 Zone 55

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Survey drawings for the whole site have not been provided to DP yet. Therefore, RLs and coordinates are approximate only and must not be relied upon.

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Jindabyne Central School
LOCATION: Lot 101 DP1019527, Jindabyne

SURFACE LEVEL: 995 AHD
EASTING: 644386
NORTHING: 5967218

PIT No: 20
PROJECT No: 103109.02
DATE: 21/4/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
995	0.2	TOPSOIL FILL/Sandy CLAY (CL): low plasticity, brown, fine to coarse grained sand, with gravel up to 50mm and rootlets, dry to moist, w<PL, poorly compacted stiff, TOPSOIL FILL		E	0.1		PID < 1		
		FILL/Clayey SAND (SC): fine to coarse grained, brown, low plasticity clay, with gravel up to 60mm in size, trace asphalt and glass, dry to moist, loose to medium dense, FILL		D E	0.5		PID < 1		
994	1			E	1.0		PID < 1		1
	1.5	TONALITE: medium to coarse grained, green-grey, dry, medium to high strength, moderately to slightly weathered, fractured to highly fractured, with some low strength, highly weathered seams							
993	2			D	2.3			▽	2
992	3	3.0 Pit discontinued at 3.0m -limit of investigation							3

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: Komatsu PC 138 US fitted with 600mm wide toothed bucket

LOGGED: SDG

SURVEY DATUM: MGA94 Zone 55

WATER OBSERVATIONS: Perched groundwater at 2.2m

REMARKS: Survey drawings for the whole site have not been provided to DP yet. Therefore, RLs and coordinates are approximate only and must not be relied upon.

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Jindabyne Central School
LOCATION: Lot 101 DP1019527, Jindabyne

SURFACE LEVEL: 992 AHD
EASTING: 644411
NORTHING: 5967245

PIT No: 21
PROJECT No: 103109.02
DATE: 21/4/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
992		TOPSOIL/Sandy CLAY (CL): low plasticity, dark brown, fine to coarse grained sand, trace gravel up to 20mm in size, dry to moist, w<PL, stiff, TOPSOIL		E	0.1		PID < 1		
	0.3	Sandy GRAVEL (GW): well graded, gravel up to 60mm in size, pale orange-brown, fine to coarse grained sand with cobbles up to 100mm in size, trace boulders up to 300mm in size, dry to moist, medium dense to dense, possible colluvial		D E	0.5		PID < 1		
	0.9	TONALITE: medium to coarse grained, grey, dry, medium to high strength, moderately to slightly weathered, highly fractured to fractured		E	1.0		PID < 1		
991	1	-from 1.0m, large high to very high corestone, cannot be ripped -from 1.2m, ripper required							1
		-from 1.5m, fractured		D	1.5				
990	2								2
	2.4	Pit discontinued at 2.4m -slow ripper progress							
989	3								3

RIG: Komatsu PC 138 US fitted with 600mm wide toothed bucket

LOGGED: SDG

SURVEY DATUM: MGA94 Zone 55

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Survey drawings for the whole site have not been provided to DP yet. Therefore, RLs and coordinates are approximate only and must not be relied upon.

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Jindabyne Central School
LOCATION: Lot 101 DP1019527, Jindabyne

SURFACE LEVEL: 998 AHD
EASTING: 644399
NORTHING: 5967006

PIT No: 22
PROJECT No: 103109.02
DATE: 20/4/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
998	0.25	TOPSOIL FILL/Sandy CLAY (CL): low plasticity, dark brown, fine to coarse grained sand, with rootlets and quartz gravel up to 20mm in size, trace silt, moist, w>PL, stiff, TOPSOIL FILL		E	0.1		PID < 1		
		Sandy CLAY (CI/CH): medium to high plasticity, orange-brown/red-brown, fine to coarse grained sand, moist to dry, w<PL, very stiff, residual/extremely weathered tonalite		D E	0.4		PID < 1		
					0.5				
				U_{50}					
	0.8	TONALITE: fine to coarse grained, pale grey-green, dry to moist, very low to low strength, highly weathered			0.9				
997	1			D	1.0				
	1.5	Pit discontinued at 1.5m -limit of investigation							
996	2								
995	3								

RIG: Komatsu PC 138 US fitted with 600mm wide toothed bucket

LOGGED: SDG

SURVEY DATUM: MGA94 Zone 55

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Survey drawings for the whole site have not been provided to DP yet. Therefore, RLs and coordinates are approximate only and must not be relied upon.

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Jindabyne Central School
LOCATION: Lot 101 DP1019527, Jindabyne

SURFACE LEVEL: 1002 AHD
EASTING: 644321
NORTHING: 5966931

PIT No: 23
PROJECT No: 103109.02
DATE: 20/4/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
1002	0.15	FILL/SAND (SP): poorly graded, fine to medium grained, grey, with rootlets, dry, medium dense, FILL		E	0.1		PID < 1		
	0.3	TOPSOIL/Sandy CLAY (CL): low plasticity, brown, with rootlets, silt and fine to coarse grained sand, dry to moist, w<PL, very stiff, remnant topsoil							
	0.4	Sandy CLAY (CL): low plasticity, grey, fine to coarse grained sand, trace gravel up to 20mm in size, moist to dry, w<PL, very stiff to hard, residual/extremely weathered granodiorite		E	0.5		PID < 1		
1001	1	GRANODIORITE: medium to coarse grained, yellow-brown/grey-brown, dry, very low to low strength, highly weathered		E	1.0		PID < 1		
	1.5	Pit discontinued at 1.5m -limit of investigation		D	1.5				
1000	2								
999	3								

RIG: Komatsu PC 138 US fitted with 600mm wide toothed bucket

LOGGED: SDG

SURVEY DATUM: MGA94 Zone 55

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Survey drawings for the whole site have not been provided to DP yet. Therefore, RLs and coordinates are approximate only and must not be relied upon.

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Jindabyne Central School
LOCATION: Lot 101 DP1019527, Jindabyne

SURFACE LEVEL: 1005 AHD
EASTING: 644309
NORTHING: 5967005

PIT No: 24
PROJECT No: 103109.02
DATE: 20/4/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
1005		FILL/Clayey SAND (SC): well graded, fine to coarse grained, pale brown.dark brown, low plasticity clay, with gravel up to 30mm in size, trace cobbles up to 100mm in size, asphalt, dry to moist, medium dense FILL		E	0.1		PID < 1		
				E	0.5		PID < 1		
1004	1	-from 0.9m, trace boulders up to 500mm in size		D E	1.0		PID < 1		1
		-from 1.3m, boulders larger in size, could be possible surface rock							
	1.5	Pit discontinued at 1.5m -refusal on boulders		E	1.5		PID < 1		
1003	2								2
1002	3								3

Dynamic Penetrometer Test (blows per 150mm): 5 10 15 20

RIG: Komatsu PC 138 US fitted with 600mm wide toothed bucket

LOGGED: SDG

SURVEY DATUM: MGA94 Zone 55

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Survey drawings for the whole site have not been provided to DP yet. Therefore, RLs and coordinates are approximate only and must not be relied upon.

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Jindabyne Central School
LOCATION: Lot 101 DP1019527, Jindabyne

SURFACE LEVEL: 995 AHD
EASTING: 644421
NORTHING: 5966982

PIT No: 25
PROJECT No: 103109.02
DATE: 20/4/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
995	0.15	TOPSOIL FILL/clayey SAND (SC): fine to coarse grained, dark brown, low plasticity clay, with glass, brick, timber and concrete fragments, rootlets, moist to dry, medium dense, TOPSOIL FILL		E	0.1		PID < 1		
	0.4	Clayey SAND (SC): fine to coarse grained sand, dark brown, low plasticity clay, with rootlets, dry to moist, medium dense, residual							
	0.6	Sandy CLAY (CL): low plasticity, dark yellow-brown, fine to coarse grained sand, with quartz gravel up to 20mm in size, dry to moist, w<PL, hard, residual		D E	0.5		PID < 1		
994	1	TONALITE: medium to coarse grained, pale orange-grey, dry, low strength, highly weathered, fractured		E	1.0		PID < 1		1
	1.5	Pit discontinued at 1.5m -limit of investigation		D	1.5				
993	2								2
992	3								3

RIG: Komatsu PC 138 US fitted with 600mm wide toothed bucket

LOGGED: SDG

SURVEY DATUM: MGA94 Zone 55

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Survey drawings for the whole site have not been provided to DP yet. Therefore, RLs and coordinates are approximate only and must not be relied upon.

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Jindabyne Central School
LOCATION: Lot 101 DP1019527, Jindabyne

SURFACE LEVEL: 1005 AHD
EASTING: 644286
NORTHING: 5967015

PIT No: 26
PROJECT No: 103109.02
DATE: 22/4/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
1005	0.2	TOPSOIL FILL/Sandy CLAY (CL): low plasticity, dark brown, fine to coarse grained sand, trace gravel up to 10mm in size, dry to moist, w<PL, very stiff, TOPSOIL FILL		E	0.1		PID < 1		
		FILL/Clayey SAND (SC): fine to coarse grained, dark brown, low plasticity clay, with gravel up to 60mm in size, cobbles up to 200mm in size, trace boulders up to 400mm in size and terracotta pot, dry to moist, medium dense, FILL		E	0.5		PID < 1		
1004	0.9	FILL/Clayey SAND (SC): fine to coarse grained, pale brown, low plasticity clay, with quartz gravel up to 60mm in size, dry to moist, medium dense, FILL		E	1.0		PID < 1		
	1.4	TONALITE: medium to coarse grained, pale orange-brown, dry to moist, low strength, highly weathered							
	1.5	Pit discontinued at 1.5m -limit of investigation							
1003	2								
1002	3								

RIG: Komatsu PC 138 US fitted with 600mm wide toothed bucket

LOGGED: SDG

SURVEY DATUM: MGA94 Zone 55

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Survey drawings for the whole site have not been provided to DP yet. Therefore, RLs and coordinates are approximate only and must not be relied upon.

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Jindabyne Central School
LOCATION: Lot 101 DP1019527, Jindabyne

SURFACE LEVEL: 1004 AHD
EASTING: 644329
NORTHING: 5967092

PIT No: 27
PROJECT No: 103109.02
DATE: 22/4/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm) 5 10 15 20
1004		FILL/Clayey SAND (SC): fine to coarse grained, brown, low plasticity clay, with rootlets and gravel up to 60mm in size, dry to moist, medium dense, FILL		E	0.1		PID < 1		
		-from 0.3m, dark brown		E	0.5		PID < 1		
1003	1	TONALITE: medium to coarse grained, pale orange-brown, dry, low strength, highly weathered, fractured		E	1.0		PID < 1		1
	0.9								
	1.2	Pit discontinued at 1.2m -limit of investigation							
1002	2								2
1001	3								3

RIG: Komatsu PC 138 US fitted with 600mm wide toothed bucket

LOGGED: SDG

SURVEY DATUM: MGA94 Zone 55

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Survey drawings for the whole site have not been provided to DP yet. Therefore, RLs and coordinates are approximate only and must not be relied upon.

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Jindabyne Central School
LOCATION: Lot 101 DP1019527, Jindabyne

SURFACE LEVEL: 997 AHD
EASTING: 644356
NORTHING: 5967187

PIT No: 16A
PROJECT No: 103109.02
DATE: 21/4/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
997	0.2	TOPSOIL/Sandy CLAY (CL): low plasticity, pale brown, fine to coarse grained sand, with rootlets, moist to dry, w<PL, very stiff, TOPSOIL							
	0.4	Sandy CLAY (CL): low plasticity, pale orange-brown, fine to coarse grained sand, dry to moist, w<PL, hard, possible colluvial							
		Sandy CLAY (CI): medium plasticity, dark orange-brown/red-brown, fine to coarse grained sand, dry to moist, w<PL, hard, extremely weathered tonalite		B	0.4				
	0.6	TONALITE: medium to coarse grained, red-brown, dry to moist, very low to low strength, highly weathered, fractured			0.6				
996	1								1
	1.6	Pit discontinued at 1.6m -limit of investigation							
995	2								2
994	3								3

RIG: Komatsu PC 138 US fitted with 600mm wide toothed bucket

LOGGED: SDG

SURVEY DATUM: MGA94 Zone 55

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Survey drawings for the whole site have not been provided to DP yet. Therefore, RLs and coordinates are approximate only and must not be relied upon.

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

Appendix D

Results of Laboratory Tests

Material Test Report

Douglas Partners
Geotechnics / Environment / Groundwater
Douglas Partners Pty Ltd
Unanderra Laboratory
Unit 1/1 Luso Drive Unanderra NSW 2526
Phone: (02) 4271 1836
Fax: (02) 4271 1897
Email: david.evans@douglaspartners.com.au

Report Number: **103109.02-1**
Issue Number: 1
Date Issued: 17/05/2021
Client: NSW Department of Education - School Infrastructure NSW
Level 8, 259 George Street, Sydney NSW 2000
Contact: Neil Hogan
Project Number: 103109.02
Project Name: Jindabyne Central School
Project Location: Part Lot 101 DP1019527, Jindabyne NSW
Work Request: 7067
Sample Number: WO-7067A
Date Sampled: 10/05/2021
Dates Tested: 10/05/2021 - 11/05/2021
Sampling Method: Sampled by Engineering Department
The results apply to the sample as received
Site Selection: AS 1289.1.4.1
Sample Location: **Pit 22, Depth: 0.5 - 0.9m**
Material: Sandy Clay

Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: David Evans
Laboratory Quality Manager
Laboratory Accreditation Number: 828

Shrink Swell Index (AS 1289 7.1.1 & 2.1.1)	
Iss (%)	**0.8**
Visual Description	Sandy Clay
* Shrink Swell Index (Iss) reported as the percentage vertical strain per pF change in suction.	

Core Shrinkage Test	
Shrinkage Strain - Oven Dried (%)	**1.5**
Estimated % by volume of significant inert inclusions	3
Cracking	Uncracked
Crumbling	No
Moisture Content (%)	9.8

Swell Test	
Initial Pocket Penetrometer (kPa)	550
Final Pocket Penetrometer (kPa)	415
Initial Moisture Content (%)	7.5
Final Moisture Content (%)	13.1
Swell (%)	**0.0**
* NATA Accreditation does not cover the performance of pocket penetrometer readings.	

Material Test Report

Douglas Partners
Geotechnics / Environment / Groundwater
Douglas Partners Pty Ltd
Goulburn Laboratory
54 Sinclair Street Goulburn NSW 2580
Phone: 02 4822 8395
Email: brachlan.harris@douglaspartners.com.au

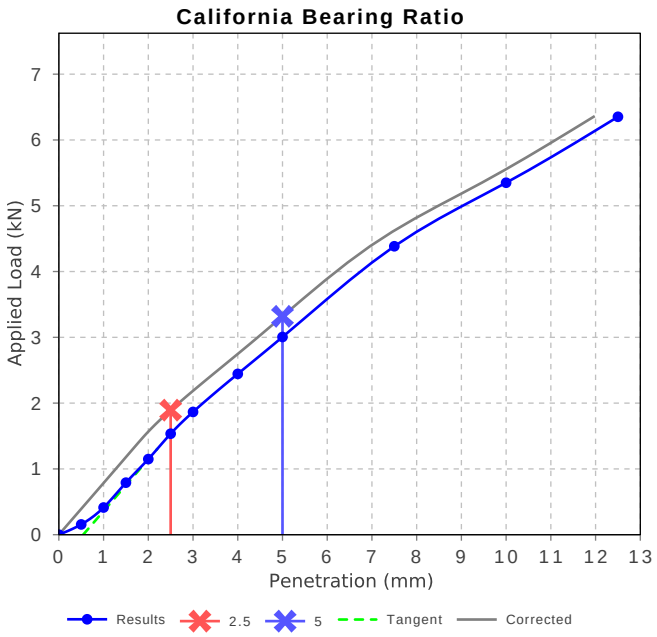
Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Brachlan Harris
Assistant Laboratory Manager
Laboratory Accreditation Number: 828

Report Number: **103109.02-2**
Issue Number: 1
Date Issued: 21/05/2021
Client: NSW Department of Education - School Infrastructure NSW
Level 8, 259 George Street, Sydney NSW 2000
Contact: Neil Hogan
Project Number: 103109.02
Project Name: Jindabyne Central School
Project Location: Part Lot 101 DP1019527, Jindabyne NSW
Work Request: 5892
Sample Number: GU-5892A
Date Sampled: 20/04/2021
Dates Tested: 04/05/2021 - 17/05/2021
Sampling Method: Sampled by Engineering Department
The results apply to the sample as received
Sample Location: **Pit 1 , Depth: 0.5-0.7**
Material: Tonalite

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	5 mm		
CBR %	**17.0**		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity	Visual Assessment		
Maximum Dry Density (t/m^3)	1.89		
Optimum Moisture Content (%)	13.5		
Laboratory Density Ratio (%)	100.0		
Laboratory Moisture Ratio (%)	100.0		
Dry Density after Soaking (t/m^3)	1.89		
Field Moisture Content (%)	6.0		
Moisture Content at Placement (%)	13.7		
Moisture Content Top 30mm (%)	14.7		
Moisture Content Rest of Sample (%)	13.7		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours	48.8		
Swell (%)	0.0		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	7.7		

Moisture Content (AS 1289 2.1.1)	
Moisture Content (%)	6.0



Material Test Report

Douglas Partners
Geotechnics / Environment / Groundwater
Douglas Partners Pty Ltd
Goulburn Laboratory
54 Sinclair Street Goulburn NSW 2580
Phone: 02 4822 8395
Email: brachlan.harris@douglaspartners.com.au

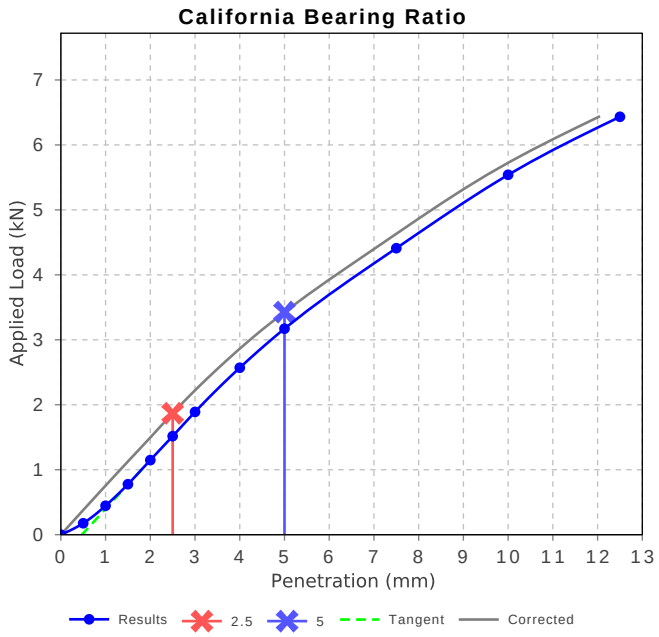
Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Brachlan Harris
Assistant Laboratory Manager
Laboratory Accreditation Number: 828

Report Number: **103109.02-2**
Issue Number: 1
Date Issued: 21/05/2021
Client: NSW Department of Education - School Infrastructure NSW
Level 8, 259 George Street, Sydney NSW 2000
Contact: Neil Hogan
Project Number: 103109.02
Project Name: Jindabyne Central School
Project Location: Part Lot 101 DP1019527, Jindabyne NSW
Work Request: 5892
Sample Number: GU-5892B
Date Sampled: 20/04/2021
Dates Tested: 04/05/2021 - 17/05/2021
Sampling Method: Sampled by Engineering Department
The results apply to the sample as received
Sample Location: **Pit 3 , Depth: 0.6-0.8**
Material: Tonalite

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	5 mm		
CBR %	**17.0**		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity	Visual Assessment		
Maximum Dry Density (t/m^3)	1.96		
Optimum Moisture Content (%)	12.5		
Laboratory Density Ratio (%)	100.0		
Laboratory Moisture Ratio (%)	101.0		
Dry Density after Soaking (t/m^3)	1.96		
Field Moisture Content (%)	8.7		
Moisture Content at Placement (%)	12.5		
Moisture Content Top 30mm (%)	14.1		
Moisture Content Rest of Sample (%)	12.9		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours	64.5		
Swell (%)	0.0		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	0		

Moisture Content (AS 1289 2.1.1)	
Moisture Content (%)	8.7



Material Test Report

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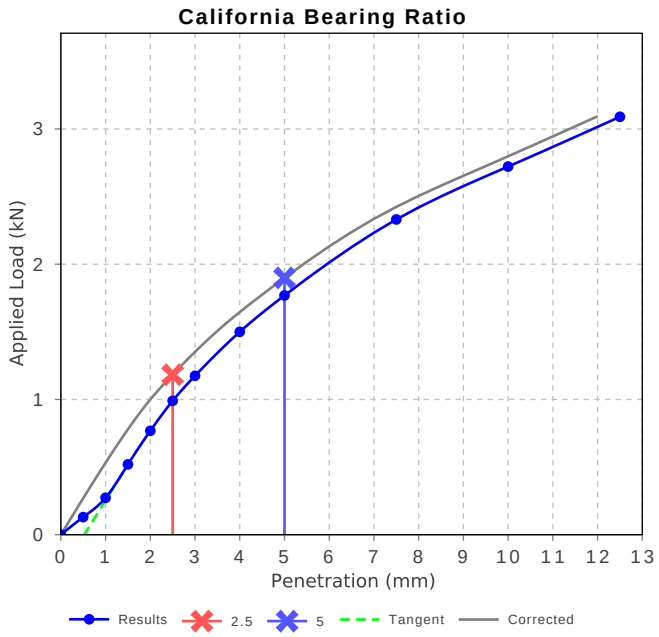
Report Number: **103109.02-2**
Issue Number: 1
Date Issued: 21/05/2021
Client: NSW Department of Education - School Infrastructure NSW
Level 8, 259 George Street, Sydney NSW 2000
Contact: Neil Hogan
Project Number: 103109.02
Project Name: Jindabyne Central School
Project Location: Part Lot 101 DP1019527, Jindabyne NSW
Work Request: 5892
Sample Number: GU-5892C
Date Sampled: 20/04/2021
Dates Tested: 04/05/2021 - 17/05/2021
Sampling Method: Sampled by Engineering Department
The results apply to the sample as received
Sample Location: **Pit 11 , Depth: 0.5-0.7**
Material: Sandy Clay

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	5 mm		
CBR %	**10.0**		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity	Visual Assessment		
Maximum Dry Density (t/m^3)	1.86		
Optimum Moisture Content (%)	12.5		
Laboratory Density Ratio (%)	100.0		
Laboratory Moisture Ratio (%)	99.0		
Dry Density after Soaking (t/m^3)	1.84		
Field Moisture Content (%)	9.2		
Moisture Content at Placement (%)	12.6		
Moisture Content Top 30mm (%)	15.4		
Moisture Content Rest of Sample (%)	13.8		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours	48.2		
Swell (%)	1.0		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	0		

Moisture Content (AS 1289 2.1.1)	
Moisture Content (%)	9.2



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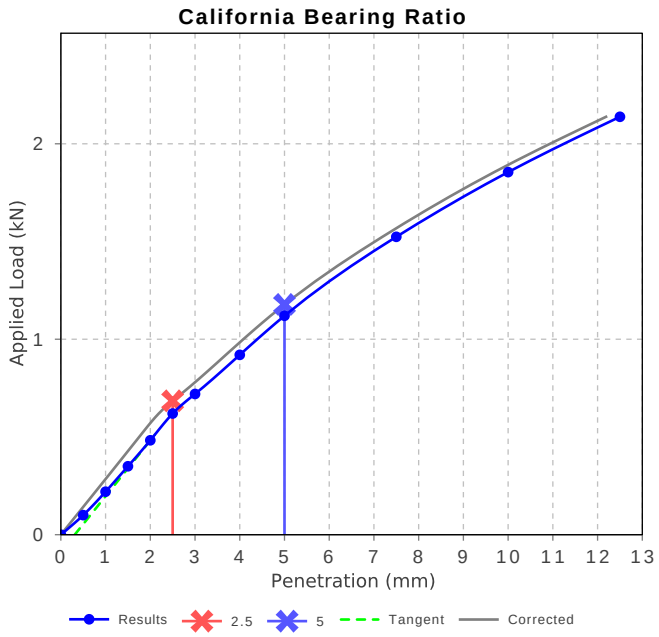
Report Number: **103109.02-2**
Issue Number: 1
Date Issued: 21/05/2021
Client: NSW Department of Education - School Infrastructure NSW
Level 8, 259 George Street, Sydney NSW 2000
Contact: Neil Hogan
Project Number: 103109.02
Project Name: Jindabyne Central School
Project Location: Part Lot 101 DP1019527, Jindabyne NSW
Work Request: 5892
Sample Number: GU-5892D
Date Sampled: 20/04/2021
Dates Tested: 04/05/2021 - 17/05/2021
Sampling Method: Sampled by Engineering Department
The results apply to the sample as received
Sample Location: **Pit 16A , Depth: 0.4-0.6**
Material: Sandy Clay

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	5 mm		
CBR %	**6.0**		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity	Visual Assessment		
Maximum Dry Density (t/m^3)	1.82		
Optimum Moisture Content (%)	15.5		
Laboratory Density Ratio (%)	100.0		
Laboratory Moisture Ratio (%)	102.0		
Dry Density after Soaking (t/m^3)	1.81		
Field Moisture Content (%)	14.0		
Moisture Content at Placement (%)	16.0		
Moisture Content Top 30mm (%)	16.5		
Moisture Content Rest of Sample (%)	16.4		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours	46.3		
Swell (%)	0.0		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	0		

Moisture Content (AS 1289 2.1.1)	
Moisture Content (%)	14.0



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Report Number:	**103109.02-2**
Issue Number:	1
Date Issued:	21/05/2021
Client:	NSW Department of Education - School Infrastructure NSW Level 8, 259 George Street, Sydney NSW 2000
Contact:	Neil Hogan
Project Number:	103109.02
Project Name:	Jindabyne Central School
Project Location:	Part Lot 101 DP1019527, Jindabyne NSW
Work Request:	5892
Sample Number:	GU-5892E
Date Sampled:	20/04/2021
Dates Tested:	04/05/2021 - 13/05/2021
Sampling Method:	Sampled by Engineering Department *The results apply to the sample as received*
Sample Location:	**Pit 4 , Depth: 0.5**
Material:	Sandy Clay

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Assistant Laboratory Manager
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Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	41		
Plastic Limit (%)	19		
Plasticity Index (%)	**22**		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.1		
Linear Shrinkage (%)	11.0		
Cracking Crumbling Curling	None		

Moisture Content (AS 1289 2.1.1)	
Moisture Content (%)	13.2

Material Test Report

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Report Number: **103109.02-2**
Issue Number: 1
Date Issued: 21/05/2021
Client: NSW Department of Education - School Infrastructure NSW
Level 8, 259 George Street, Sydney NSW 2000
Contact: Neil Hogan
Project Number: 103109.02
Project Name: Jindabyne Central School
Project Location: Part Lot 101 DP1019527, Jindabyne NSW
Work Request: 5892
Sample Number: GU-5892F
Date Sampled: 20/04/2021
Dates Tested: 04/05/2021 - 10/05/2021
Sampling Method: Sampled by Engineering Department
The results apply to the sample as received
Sample Location: **Pit 15 , Depth: 0.5**
Material: Sandy Clay

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	42		
Plastic Limit (%)	18		
Plasticity Index (%)	**24**		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.1		
Linear Shrinkage (%)	11.0		
Cracking Crumbling Curling	Curling		

Moisture Content (AS 1289 2.1.1)	
Moisture Content (%)	11.9

Material Test Report

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Client: NSW Department of Education - School Infrastructure NSW
Level 8, 259 George Street, Sydney NSW 2000
Contact: Neil Hogan
Project Number: 103109.02
Project Name: Jindabyne Central School
Project Location: Part Lot 101 DP1019527, Jindabyne NSW
Work Request: 5892
Sample Number: GU-5892G
Date Sampled: 20/04/2021
Dates Tested: 04/05/2021 - 13/05/2021
Sampling Method: Sampled by Engineering Department
The results apply to the sample as received
Sample Location: **Pit 22 , Depth: 0.4**
Material: Sandy Clay

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	46		
Plastic Limit (%)	19		
Plasticity Index (%)	**27**		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.1		
Linear Shrinkage (%)	12.5		
Cracking Crumbling Curling	None		

Moisture Content (AS 1289 2.1.1)	
Moisture Content (%)	14.9

Material Test Report

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Report Number: **103109.02-2**
Issue Number: 1
Date Issued: 21/05/2021
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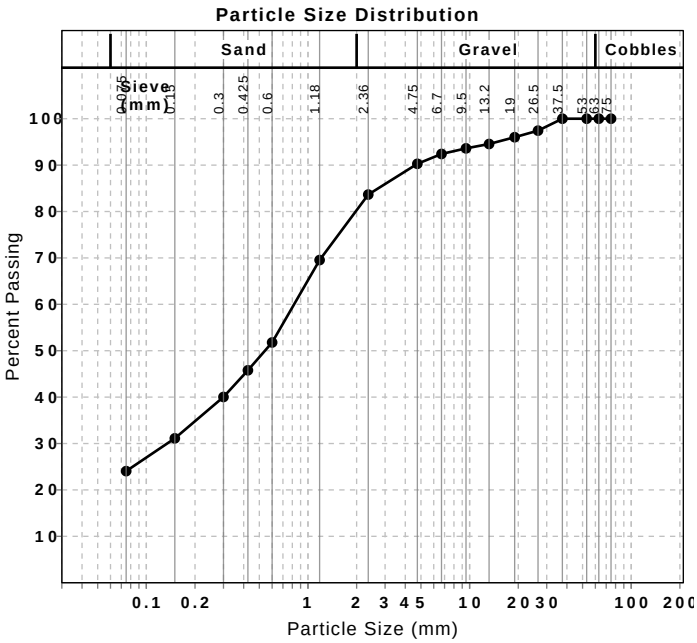
Level 8, 259 George Street, Sydney NSW 2000
Contact: Neil Hogan
Project Number: 103109.02
Project Name: Jindabyne Central School
Project Location: Part Lot 101 DP1019527, Jindabyne NSW
Work Request: 5892
Sample Number: GU-5892H
Date Sampled: 20/04/2021
Dates Tested: 04/05/2021 - 17/05/2021
Sampling Method: Sampled by Engineering Department
The results apply to the sample as received
Sample Location: **Pit 10 , Depth: 0.5**
Material: Possible Colluvial

Particle Size Distribution (AS1289 3.6.1)						
Sieve	Passed %	Passing Limits		Retained %	Retained Limits	
37.5 mm	**100**			0		
26.5 mm	**97**			3		
19 mm	**96**			1		
13.2 mm	**95**			1		
9.5 mm	**94**			1		
6.7 mm	**92**			1		
4.75 mm	**90**			2		
2.36 mm	**84**			7		
1.18 mm	**70**			14		
0.6 mm	**52**			18		
0.425 mm	**46**			6		
0.3 mm	**40**			6		
0.15 mm	**31**			9		
0.075 mm	**24**			7		

Moisture Content (AS 1289 2.1.1)	
Moisture Content (%)	6.1



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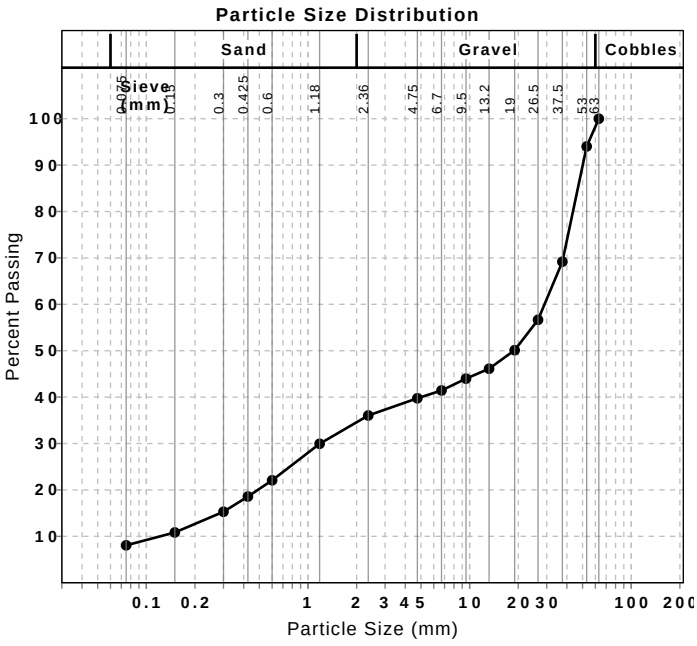
Level 8, 259 George Street, Sydney NSW 2000
Contact: Neil Hogan
Project Number: 103109.02
Project Name: Jindabyne Central School
Project Location: Part Lot 101 DP1019527, Jindabyne NSW
Work Request: 5892
Sample Number: GU-5892I
Date Sampled: 20/04/2021
Dates Tested: 04/05/2021 - 17/05/2021
Sampling Method: Sampled by Engineering Department
The results apply to the sample as received
Sample Location: **Pit 21 , Depth: 0.5**
Material: Possible Colluvial

Particle Size Distribution (AS1289 3.6.1)						
Sieve	Passed %	Passing Limits		Retained %	Retained Limits	
63 mm	**100**			0		
53 mm	**94**			6		
37.5 mm	**69**			25		
26.5 mm	**57**			13		
19 mm	**50**			7		
13.2 mm	**46**			4		
9.5 mm	**44**			2		
6.7 mm	**41**			3		
4.75 mm	**40**			2		
2.36 mm	**36**			4		
1.18 mm	**30**			6		
0.6 mm	**22**			8		
0.425 mm	**19**			4		
0.3 mm	**15**			3		
0.15 mm	**11**			4		
0.075 mm	**8**			3		

Moisture Content (AS 1289 2.1.1)	
Moisture Content (%)	5.6



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CERTIFICATE OF ANALYSIS 267874-A

Client Details

Client	Douglas Partners Canberra
Attention	Shannon Goodsell
Address	Unit 2, 73 Sheppard St,, HUME, ACT, 2620

Sample Details

Your Reference	**103109.03, Jindabyne**
Number of Samples	49 Soil, 4 Material
Date samples received	29/04/2021
Date completed instructions received	30/04/2021

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.

Report Details

Date results requested by	06/05/2021
Date of Issue	06/05/2021

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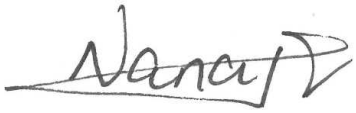
Results Approved By
Priya Samarawickrama, Senior Chemist

Authorised By



Nancy Zhang, Laboratory Manager

Misc Inorg - Soil						
Our Reference		267874-A-11	267874-A-32	267874-A-33	267874-A-34	267874-A-47
Your Reference	UNITS	Pit 11/0.1	Pit 12/0.5	Pit 22/0.5	Pit 19/0.5	Pit 3/0.5
Date Sampled		21/04/2021	21/04/2021	20/04/2021	22/04/2021	20/04/2021
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	05/05/2021	05/05/2021	05/05/2021	05/05/2021	05/05/2021
Date analysed	-	05/05/2021	05/05/2021	05/05/2021	05/05/2021	05/05/2021
pH 1:5 soil:water	pH Units	[NA]	6.9	[NA]	7.3	7.4
Electrical Conductivity 1:5 soil:water	µS/cm	[NA]	12	[NA]	16	10
Chloride, Cl 1:5 soil:water	mg/kg	[NA]	<10	[NA]	<10	<10
Sulphate, SO4 1:5 soil:water	mg/kg	[NA]	<10	[NA]	<10	<10
Resistivity in soil*	ohm m	[NA]	830	[NA]	640	1,100
Estimated Salinity*	mg/kg	56	[NA]	47	[NA]	[NA]

Misc Inorg - Soil						
Our Reference		267874-A-48	267874-A-49	267874-A-50	267874-A-51	267874-A-52
Your Reference	UNITS	Pit 4/1.0	Pit 10/1.0	Pit 4/0.5	Pit 7/0.5	Pit 15/0.5
Date Sampled		20/04/2021	21/04/2021	22/04/2021	20/04/2021	20/04/2021
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	05/05/2021	05/05/2021	05/05/2021	05/05/2021	05/05/2021
Date analysed	-	05/05/2021	05/05/2021	05/05/2021	05/05/2021	05/05/2021
pH 1:5 soil:water	pH Units	7.8	7.2	[NA]	[NA]	[NA]
Electrical Conductivity 1:5 soil:water	µS/cm	20	16	[NA]	[NA]	[NA]
Chloride, Cl 1:5 soil:water	mg/kg	<10	<10	[NA]	[NA]	[NA]
Sulphate, SO4 1:5 soil:water	mg/kg	<10	<10	[NA]	[NA]	[NA]
Resistivity in soil*	ohm m	510	610	[NA]	[NA]	[NA]
Estimated Salinity*	mg/kg	[NA]	[NA]	51	33	83

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-002	Conductivity and Salinity - measured using a conductivity cell at 25oC in accordance with APHA 22nd ED 2510 and Rayment & Lyons. Resistivity is calculated from Conductivity (non NATA). Resistivity (calculated) may not correlate with results otherwise obtained using Resistivity-Current method, depending on the nature of the soil being analysed.
Inorg-034	Soil samples are extracted and measured using a conductivity cell and dedicated meter.
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	267874-A-48
Date prepared	-			05/05/2021	32	05/05/2021	05/05/2021		05/05/2021	05/05/2021
Date analysed	-			05/05/2021	32	05/05/2021	05/05/2021		05/05/2021	05/05/2021
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	32	6.9	6.9	0	102	[NT]
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	<1	32	12	12	0	103	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	10	Inorg-081	<10	32	<10	<10	0	89	81
Sulphate, SO4 1:5 soil:water	mg/kg	10	Inorg-081	<10	32	<10	<10	0	91	78
Resistivity in soil*	ohm m	1	Inorg-002	<1	32	830	820	1	[NT]	[NT]
Estimated Salinity*	mg/kg	5	Inorg-034	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[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.

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.