Douglas Partners
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Integrated Practical Solutions

Report on
Geotechnical Investigation

T21-2072 Wurrumiyanga Subdivision
Wurrumiyanga, Bathurst Island

Prepared for
NT Department of Infrastructure Planning & Logistics

Project 209497.00
July 2024

Douglas Partners
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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.

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*Douglas Partners acknowledges Australia's First Peoples as the Traditional Owners of the Land and Sea on which we operate. We pay our respects to Elders past and present and to all Aboriginal and Torres Strait Islander peoples across the many communities in which we live, visit and work. We recognise and respect their ongoing cultural and spiritual connection to Country.*

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# Report on Geotechnical Investigation
# T21-2072 Wurrumiyanga Subdivision
# Wurrumiyanga, Bathurst Island

## 1. Introduction

This report by Douglas Partners Pty Ltd presents the results of a geotechnical investigation undertaken for a proposed new residential subdivision at Wurrumiyanga, Bathurst Island. The investigation was commissioned by Service Order CD2094/22 dated 16 December 2021 from the Northern Territory NT Department of Infrastructure Planning & Logistics (DIPL) and was undertaken in accordance with Douglas Partners' proposal 209497.00.P.001.Rev0 dated 29 June 2023.

It is understood that DIPL have been engaged by the NT Department of Housing to develop a new residential subdivision in the community of Wurrumiyanga, comprising the following elements:

- Municipal infrastructure including roads and stormwater control;
- Utilities infrastructure including water, sewer, power, telecommunications; and
- Residential dwellings for 75 lots.

The aim of the investigation was to assess the subsurface soil and groundwater conditions across the site in order to provide:

- Description of subsurface conditions;
- Excavation conditions for sewer alignments and other buried services;
- Site classification to AS2870-2011;
- Site preparation and earthworks;
- Allowable bearing pressures for shallow footings, and estimated settlements;
- Subgrade CBR values for pavement design by others;
- Lateral earth design parameters for thrust block design;
- Re-use potential of site materials;
- Soil aggressivity;
- Soil erosion potential; and
- Other identified geotechnical issues that may affect development.

The investigation included the excavation of 43 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 the items listed above. This report must be read in conjunction with the notes entitled ‘About This Report’ and should be kept in its entirety without separation of individual pages or sections.

## 2. Concurrent Investigations

The investigation was carried out concurrently with an investigation at four gravel extraction areas which is reported separately (Douglas Partners report reference 209474.00.R.002, dated November 2023). A site contamination assessment report has also been prepared by Douglas Partners for the new Wurrumiyanga subdivision, and this is also reported separately (Douglas Partners report reference 2009497.00.R.003, dated November 2023).

## 3. Previous Nearby Investigations

The following previous Douglas Partners investigations and reports by others have been reviewed as part of the geotechnical assessment for the new subdivision:

- Douglas Partners Pty Ltd, "Report on Geotechnical Investigation, Proposed New Residential Subdivision SIHIP Package 1, Nguiu, Bathurst Island, NT", project 48282.01, April 2010;
- Douglas Partners Pty Ltd, "Report on Geotechnical Investigation, Proposed Headworks Upgrade, SIHIP Package 1, Nguiu, Bathurst Island, NT", project 48282.02, June 2010;
- Douglas Partners Pty Ltd, "Report on Site Classifications, Proposed Residential Development, Wurrumiyanga, Bathurst Island, NT", project 91826.00, February 2018;
- Douglas Partners Pty Ltd, "Geotechnical Assessment for Design and Construction, HOJ35190 new Residential Subdivision, Wurrumiyanga, Bathurst Island, NT", project 92108.00, September 2010;
- Ullman & Nolan Pty Ltd, "Nguiu Subdivision, Bathurst Island, Northern Territory, Geotechnical Investigation", Report U31887, December 2007;
- WANT Geotechnics Pty Ltd, "Geotechnical Report for the Northern Territory Government Department of Infrastructure, Planning and Logistics, T19-2014, Darwin Region – Wurrumiyanga – Consultancy", WANT Geotechnics Project NTG20201297 Rev A", 30 March 2020;
- WANT Geotechnics Pty Ltd, "Geotechnical Report for the Northern Territory Government Department of Infrastructure, Planning and Logistics, T19-2014 Variation, Darwin Region – Wurrumiyanga – Consultancy", WANT Geotechnics Project NTG20201297 Rev 0", 23 March 2020; and
- WANT Geotechnics Pty Ltd, "Geotechnical Report for Lots 925 and 926. Wurrumiyanga, Bathurst Island, for the Northern Territory Government Department of Infrastructure, Planning and Logistics, WANT Geotechnics Project NTG20201307 Rev 0", 26 March 2020.

## 4. Site Description

The community of Wurrumiyanga is located on the south east coastline of Bathurst Island within the Tiwi Islands group, approximately 70 km north of Darwin. The subdivision site is located to the west of the main Wurrumiyanga township as shown in Drawing 1 in Appendix A.

The proposed new residential subdivision site is a broadly rectangular in shape with maximum plan dimensions of approximately 300 m by 500 m. The site is located about 2 km southwest of the town

centre and is bounded by Kerinauia Highway to the south, an existing residential subdivision to the east, and open undeveloped bushland to the north and west. The community aerodrome is about 500 m to the south west of the site. The site location and layout is shown on Drawing 1.

At the time of field work in August 2023 (ie late dry season) the site was undeveloped with moderately dense bushland comprising semi-mature to mature eucalyptus trees, noting it appeared a fire had recently passed through parts of the site and so tall grasses had been burned. The site is generally flat, with a very gentle downward grade to the south. Several gravel roads cross the site.

Figure 1 shows a view of the central part of the site at test pit 16.


**Figure 1: View of central area of the site at test pit 16, with 3 tonne excavator.**

## 5. Published Information

### 5.1 Regional Geology

The Melville Island 1:250 000 Geological Series map (Sheet SC 52-16) indicates the site is underlain by Quaternary age soil deposits (Qs) comprising poorly consolidated sand, silt and clay, overlying Tertiary age sandstone, siltstone and conglomerate belonging to the Van Diemen Sandstone Unit.

The natural subsurface conditions encountered during the field work comprised mostly clay soils which is consistent with the published geology, although the depth to, and type of bedrock, was not determined during the investigation. Figure 2 shows an excerpt of the geology map.

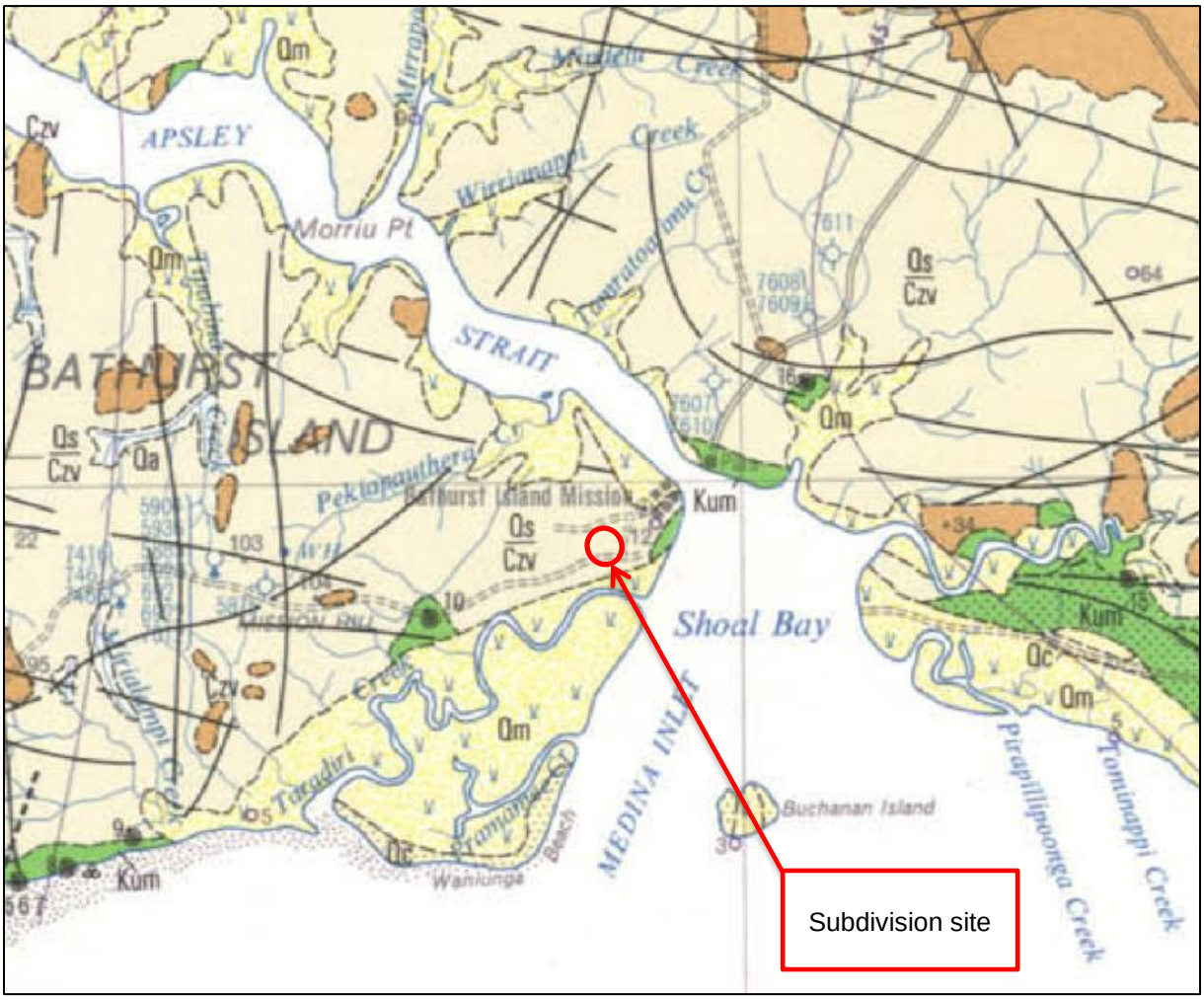



**Figure 2: Excerpt of geology map showing site location.**

## 5.2 Land Unit Mapping

Land unit mapping was accessed through the NT Government Natural Resource Maps online mapping service, and is presented in Drawing 3 in Appendix A. The mapping is based on the work by Fogarty et al (1984), with land units determined by mapping from aerial photographs using landform and vegetation patterns, validated by field sampling at selected sites.

The 1:50,000 mapping shows the presence of three land units across the project area. Table 1 overleaf presents a summary of the three land units mapped across the project site. Figure 3 overleaf shows the extent of the mapped land units.

**Table 1: Land Unit Descriptions**

| Land Unit | Description | Soils (1) | Slope | Surface Drainage | Subsurface Drainage |
|---|---|---|---|---|---|
| 4c | Plains | Deep yellow massive earths; gradational fine sandy loam to fine sandy clay loam; occasionally gravel at depth. | Less than 3% | Slow, subject to inundation and waterlogging | Moderately well to imperfectly drained |
| 6a | Drainage System | Shallow to moderately deep duplex soils; fine sandy loam to gravely light clay; 5-10% gravel in lower A and upper B horizons; | Less than 1% | Slow, subject to inundation and waterlogging | Poorly drained |
| 6b | Drainage System | Shallow to moderately deep duplex soils; sandy loam to light medium clay. | Less than 1% | Slow, subject to inundation and waterlogging | Poorly drained |

Notes: (1) Soil descriptions as per NT Department of Environment, Parks and Water Security, Soils of the Northern Territory Factsheet.

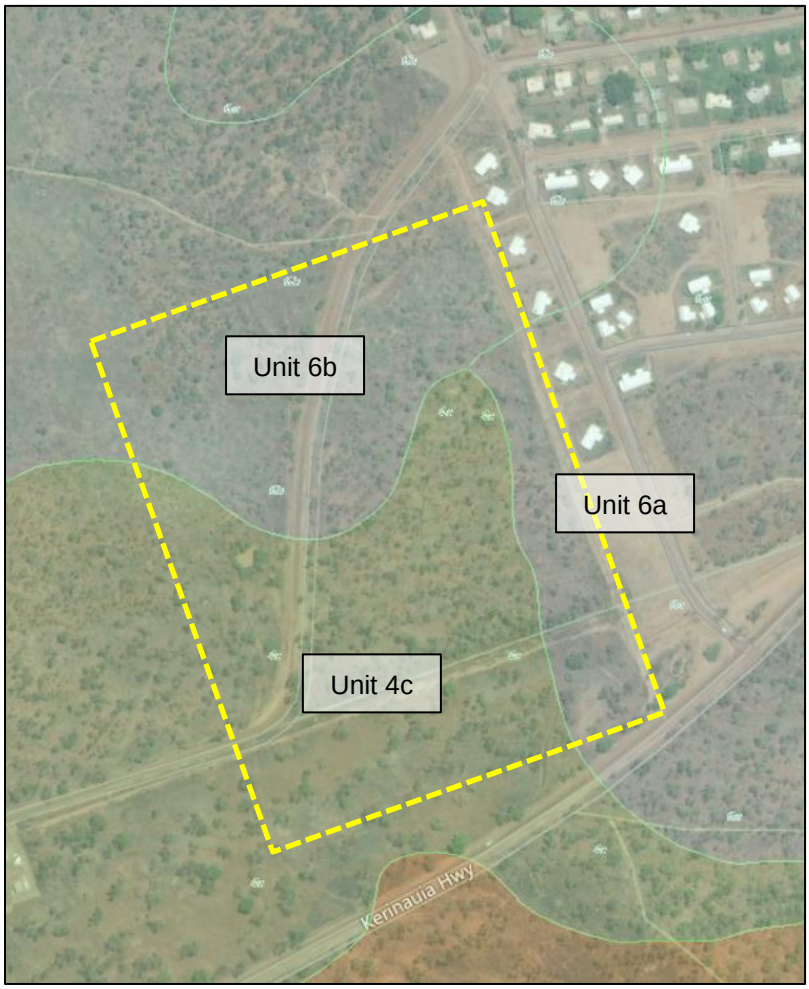



**Figure 3: Land unit mapping, approximate subdivision area shown in yellow.**

### 5.3 Acid Sulfate Soils

ASS mapping was accessed through the NT Government Natural Resource Maps online mapping service. The mapping indicates the site has an extremely low probability of ASS in the area under consideration for the subdivision. An area of high risk is identified to the south of the site and associated with the coastal intertidal estuarine mangrove area. Based on our assessment of likely site conditions, it is therefore assessed that there is a very low risk of ASS being present at the subdivision site.

## 6. Field Work

### 6.1 Field Work Methods

Field work was undertaken on 8 to 14 August 2023 and comprised the excavation and sampling of 43 test pits (designated pits 1 to 43) at the locations shown in Drawing 2 in Appendix A. The test pits were excavated using 3 tonne excavator fitted with a 250 mm wide rock toothed bucket. Final test pit depths were generally limited to the reach of the excavator which was about 2 m. Conditions encountered in the pits were logged and photographed by a geotechnical engineer from Douglas Partners who also took representative samples for laboratory testing.

Dynamic Cone Penetrometer (DCP) testing was carried out adjacent to each bore to give an indication of the in situ strengths / relative densities of the near surface soils. In this test, a 1000 mm length of 16 mm diameter steel rod with a 20 mm diameter cone tip was driven into the ground by successively dropping a 9 kg hammer from a height of 510 mm. Blow counts were recorded for each 100 mm penetration. Tests were taken below the base of the pits where possible.

On completion of excavation, and after checking for signs of groundwater ingress, the test pits were backfilled with excavated spoil material and lightly tamped in layers with the excavator bucket. The final surface was track rolled only, and may subside following rainfall activity.

The test locations were set out in accessible locations across the site, and the coordinates were recorded to MGA2020 Zone 52 using a dGPS unit which is typically accurate to approximately 0.3 m, and are shown on the test pit logs. Surface levels were recorded to AHD in meters and are also recorded on the logs.

### 6.2 Field Work Results

#### 6.2.1 Stratigraphy

Ground conditions encountered in the test pits are summarised below and detailed logs are presented in Appendix B, together with DCP test results and notes explaining classification methods and descriptive terms used on the logs.

The test pits encountered subsurface conditions that can be summarised as follows:

| | |
|---|---|
| TOPSOIL: (Unit 1) | Encountered in all test locations, 0.05 m to 0.4 m thick, but generally about 0.15 m in most test pits. The topsoil compromised low plasticity sandy clay |

| | |
|---|---|
| | and gravelly sandy clay and fine to coarse grained clayey sandy gravel, with surface vegetation and rootlets. At the time of the investigation the topsoil was dry, friable and was light brown in colour. |
| COLLUVIAL SOIL: (Unit 2) | Encountered in all test locations (except pit 11) below the topsoil compromising medium to high plasticity, stiff to hard, yellow-brown silty clay, sandy clay, sandy gravelly clay and medium dense to very dense clayey sand, clayey gravelly sand and clayey sandy gravel. The colluvial soils extended to depths ranging between 0.4 m and 1.6 m, becoming mottled yellow-brown and red-brown with increasing depth. |
| RESIDUAL SOIL: (Unit 3) | Residual soils were encountered in all test pits below the colluvial soils or topsoil and generally comprised medium and high plasticity, stiff to hard, mottled grey and red-brown, silty clay and sandy clay, with some firm zones. The residual clay soils extended to the base of all test pits. The moisture content of the residual soils were at or below the plastic limit at the time of the investigation. |

### 6.3 Groundwater

Groundwater was not encountered in the test pits at the time of the investigation. It should be noted that groundwater levels will vary between wet and dry seasons, depending upon the amount of rainfall, human influences, surface and subsurface drainage, and the permeability of the soils and rock below the site. Assessment of potential seasonal fluctuation of the groundwater level was beyond the scope of the previous investigations but would reasonably be expected to rise during the wet season, with near saturation expected. Further discussion of the groundwater conditions at the site is presented in Section 8 of this report.

## 7. Laboratory Testing

### 7.1 Geotechnical Laboratory Testing

Testing was undertaken on samples collected from selected test pits and was carried out at Douglas Partners NATA accredited laboratory in Darwin and Newcastle. The laboratory testing comprised:

- Particle size distribution;
- Atterberg limit and linear shrinkage;
- California bearing ratio at 95% MMDD with 4 day soak;
- Emerson class;
- Shrink-Swell testing; and
- pH Lime Demand.

The results of the laboratory testing are provided in detail in the test report sheets in Appendix C and are summarised in Tables 2 to 5.

**Table 2: Laboratory Test Results, including PSD and Atterberg Limit Tests.**

| Pit | Depth (m) | Sample Description | Fines (%) | Sand (%) | Gravel (%) | LL (%) | PI (%) | LS (%) | FMC | WPI |
|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 0.4 - 0.6 | Sandy Clay | 50 | 32 | 18 | 49 | 26 | 10 | 14.8 | 1872 |
| 4 | 0.4 | Sandy Clay | 58 | 36 | 6 | 57 | 34 | 13.0 | 17.6 | 2380 |
| 6 | 0.2 – 0.4 | Silty Clay | 76 | 6 | 18 | 36 | 17 | 8.0 | 11.3 | 1360 |
| 7 | 1.8 | Silty Clay | 73 | 11 | 16 | 34 | 17 | 11.0 | 28.2 | 1377 |
| 10 | 1.0 | Sandy Clay | 41 | 33 | 26 | 35 | 18 | 9.0 | 10.2 | 1026 |
| 14 | 0.5 – 0.7 | Silty Clay | 71 | 18 | 11 | 54 | 31 | 11.5 | 14.6 | 2635 |
| 17 | 0.2 – 0.4 | Silty Clay | 58 | 28 | 14 | 45 | 20 | 7.5 | 13.0 | 1580 |
| 19 | 0.8 | Silty Clay | 77 | 16 | 7 | 62 | 39 | 14.0 | 13.4 | 3510 |
| 25 | 0.3 – 0.5 | Silty Clay | 61 | 25 | 14 | 38 | 15 | 7.0 | 9.8 | 1170 |
| 28 | 1.0 | Silty Clay | 71 | 15 | 14 | 66 | 34 | 14.5 | 23.1 | 2788 |
| 31 | 0.5 – 0.7 | Silty Clay | 53 | 26 | 21 | 53 | 21 | 12.0 | 13.8 | 1365 |
| 33 | 1.6 | Silty Clay | 53 | 21 | 26 | 49 | 32 | 6.0 | 17.1 | 1984 |

*Legend:*

*Fines = % passing the 0.075mm sieve*
*Sand = % passing the 2.36mm sieve minus Fines*
*Gravel = % passing the 75mm sieve minus Sand and Fines*
*WPI = % passing the 0.425 mm sieve x PI*
*PI = Plastic Index*
*LL = Liquid Limit*
*LS = Linear Shrinkage*

**Table 3: Summary of CBR Testing**

| Pit | Depth (m) | Soil Description | FMC (%) | OMC (%) | MMDD ($t/m^3$) | CBR (%) | Swell (%) |
|---|---|---|---|---|---|---|---|
| 3 | 0.4 – 0.6 | Sandy Clay | 14.8 | 16.0 | 1.88 | 10 | 1.0 |
| 6 | 0.2 – 0.4 | Silty Clay | 11.3 | 15.0 | 1.91 | 15 | 1.0 |
| 14 | 0.5 - 0.7 | Silty Clay | 14.6 | 13.5 | 1.93 | 4.5 | 6.5 |
| 17 | 0.2 – 0.4 | Silty Clay | 13.0 | 14.5 | 1.86 | 6 | 3.0 |

| Pit | Depth (m) | Soil Description | FMC (%) | OMC (%) | MMDD (t/m$^3$) | CBR (%) | Swell (%) |
|---|---|---|---|---|---|---|---|
| 25 | 0.3 – 0.5 | Silty Clay | 9.8 | 11.0 | 1.97 | 9 | 1.5 |
| 31 | 0.5 – 0.7 | Silty Clay | 13.8 | 13.5 | 1.80 | 2.5 | 6.0 |

*Legend:*
*FMC - Field Moisture Content OMC - Optimum Moisture Content MMDD – Modified Maximum Dry Density*
*CBR – California bearing ratio at 95% MMDD*

**Table 4: Summary of Emerson Crumb Testing**

| Pit | Depth (m) | Material Description | Emerson Class |
|---|---|---|---|
| 3 | 0.4 – 0.6 | Sandy CLAY | 5 |
| 6 | 0.2 – 0.4 | Silty CLAY | 6 |
| 7 | 1.8 | Silty CLAY | 5 |
| 14 | 0.5 – 0.7 | Silty CLAY | 5 |
| 17 | 0.2 – 0.4 | Silty CLAY | 5 |
| 19 | 0.8 | Silty CLAY | 5 |
| 25 | 0.3 – 0.5 | Silty CLAY | 5 |
| 28 | 1.0 | Silty Clay | 5 |
| 31 | 0.5 – 0.7 | Silty Clay | 5 |
| 33 | 1.6 | Silty Clay | 5 |

**Table 5: Results of Shrink Swell Index ($I_{ss}$) Testing, with Swell Pressure Measurement**

| Pit | Depth (m) | Shrinkage (%) | Swell (%) | Swell Pressure (kPa) | $I_{ss}$ (% per ΔpF) | Material |
|---|---|---|---|---|---|---|
| 4 | 0.4 | 0.6 | -0.1 | 25 | 0.3 | Sandy Clay |
| 32 | 1.4 | 3.2 | 2.8 | 86 | 2.6 | Silty Clay |

*Legend: As per Table 1*
*Iss = Shrink-swell Index (AS1289.7.1.1 and 2.1.1)*

## 7.2 Lime Demand Testing

Lime demand testing by pH method to T144 (NSW Roads and Maritime Service testing standard) was carried out at Douglas Partners NATA accredited soil testing laboratory in Newcastle. A summary of the laboratory test results is presented in Table 6. Detailed test reports are also presented in Appendix C.

**Table 6: Summary of Lime Demand Test Results**

| Test Pit | Sample Depth (m) | Lime Demand (lime saturation point) |
|---|---|---|
| 4 | 0.4 | 5.0% |
| 10 | 1.0 | 4.0% |

## 7.3 Soil Aggressivity Testing

Soil aggressivity laboratory testing was performed on three selected soil samples at a NATA registered laboratory in Perth, WA, and comprised the following:

- Chloride and Sulphate;
- pH; and
- Electrical Conductivity (EC) and Resistivity.

The results of the laboratory testing are provided in detail in the test report sheets in Appendix C and are summarised in Table 7.

**Table 7: Summary of Aggressivity Suite Testing (Soil)**

| Pit | Depth (m) | Soil Description | pH | Soluble Sulfates in Soil (mg/kg) | Soluble Chlorides in Soil (mg/kg) | Soil Resistivity (ohm.m) | Electrical Conductivity (µS/cm) |
|---|---|---|---|---|---|---|---|
| 4 | 1 | Silty Clay | 6.4 | < 10 | < 10 | 1200 | 8.2 |
| 12 | 0.2 | Sandy Clay | 5.9 | < 10 | < 10 | 1600 | 6.3 |
| 17 | 0.2 | Silty Clay | 6.0 | < 10 | < 10 | 1700 | 5.9 |
| 20 | 0.2 | Clayey Sandy Gravel | 6.0 | < 10 | < 10 | 1900 | 5.3 |
| 27 | 0.2 | Clayey Gravel | 6.0 | < 10 | < 10 | 1400 | 6.9 |
| 28 | 0.2 | Clayey Sandy Gravel | 6.3 | < 10 | < 10 | 710 | 14 |
| 31 | 0.2 | Clayey Sandy Gravel | 5.8 | < 10 | < 10 | 1500 | 6.8 |
| 33 | 1 | Silty Clay | 6.2 | < 10 | < 10 | 1600 | 6.4 |
| 40 | 0.2 | Clayey Sandy Gravel | 5.9 | < 10 | < 10 | 1100 | 8.9 |
| 42 | 1.3 | Silty Clay | 6.1 | < 10 | < 10 | 1600 | 6.2 |

# 8. Comments

## 8.1 Proposed Development

It is understood that the development will comprise a 75 lot residential subdivision. Allotment sizes are likely to be in the order of 800 $m^2$ to 1000 $m^2$, however several larger allotments may also be developed. The development includes the construction of roads and below ground sewerage and water mains. Based on the civil drawing provided, open unlined stormwater drains will also be implemented within the subdivision to improve site drainage.

Finished site levels were not known at the time of reporting, however, it is expected the building and road footprints will need to be raised above existing levels to facilitate drainage away from pavements and building foundations.

## 8.2 Appreciation of Site Conditions

The subsurface conditions encountered in the test pits are reasonably consistent, with a surface layer of cohesive topsoil, then a layer of low to medium plasticity cohesive colluvial soil then medium and high plasticity residual clay soils extending to depths of at least 2 m. The results of the Dynamic penetrometer testing suggest these clay soils likely continue to depths of at least 3 m. The in situ strength of the clay soils were generally stiff to hard at the time of the investigation, indicating that during the dry season, ground conditions are trafficable and favourable for construction purposes. The reactivity of the clay soils is variable and is discussed in more detail in following sections of the report.

The identified risks and constraints to development of the site as a residential subdivision include:

- Water logging during the wet season making the site un-trafficable and un-workable during and following the wet season;
- Softening of the cohesive topsoil, colluvial and residual soils during the wet season;
- Expected shrink-swell movements due to the presence of reactive soils; and
- Groundwater inflows into excavations during and just after the wet season.

However, the above constraints are considered able to be overcome with standard civil engineering design approaches that are discussed in more detail in the following sections of the report.

Although groundwater was not encountered during the investigation, there is a risk of localised shallow groundwater occurring at the site, especially during or following the wet season. Groundwater impacts need direct engineering measures to enable construction of the residential subdivision. All previous investigation reports listed in Section 3 of this report identify the presence of groundwater as a significant issue to be managed in this part of Wurrumiyanga. The Land Units described in Section 5.2 of this report indicate the terrain generally being poorly drained and associated with broad drainage zones, likely recharged from direct infiltration. Figure 4 overleaf presents an image provided by the client showing standing water in a man-made swamp within the subdivision.

Engineering measures to control the impacts of groundwater are recommended for the subdivision site, including open drains and or subsoil drains.

**Figure 4: Waterlogged swampy area within residential subdivision (image supplied by DIPL from Ecoz Environmental).**

## 8.3 Site Preparation and Earthworks

During previous investigations adjacent to the site conducted in January 2020, near surface soils were saturated and un-trafficable for light construction plant and vehicles. Excavation and construction works for the new subdivision should therefore commence during the dry season between May and October, noting the conditions encountered during the current investigation in August 2023 were considered suitable for earthworks operations. Once access roads and drainage lines within the site have been established, then earthworks could extend into the wet season provided drainage measures are adopted to direct as much surface water as possible off work areas.

Site preparation and earthworks carried out for the support of new building pads and pavements should be in accordance with the following guidelines:

- Strip and remove all vegetation, topsoil, soft and other unsuitable soils.
- Remove and grub out roots larger than about 25 mm in diameter;
- Rip and homogenise the exposed soils, as appropriate, and adjust to modified optimum moisture content. Roll and compact the exposed surface with a minimum eight passes of a 12 tonne roller, with a final proof roll pass accompanied by careful visual inspection by an experienced independent geotechnical specialist to ensure that any deleterious materials such as soft, wet or highly compressible soil and organics are identified for removal and replacement; and

- Engineered fill to raise site levels above saturated ground, including building pads and road pavements, should be placed in layers and compacted to the requirements presented below:

| Purpose | Minimum Dry Density Ratio | Material Type |
|---|---|---|
| To support pavements | 95% Modified | Standard Fill (1) |
| To support residential buildings | 98% Standard | Select Fill (2) |

Notes:

(1) As per DIPL Specification for Roadworks (2020)

(2) As per DIPL Specification for Small Building Works (2018)

Maintain moisture contents of filling materials to within 1% dry to 2% wet of OMC during construction.

Seal or cover any natural or compacted clay foundation soil, at or close to formation level, as soon as practicable, to reduce the opportunity for desiccation, cracking, swelling or softening.

All site preparation, filling placement and compaction should be undertaken under 'Level 1' inspection and testing arrangements, in accordance with Section 8 of AS3798-2007, with preparation of a 'Level 1' report at the conclusion of earthworks. Furthermore, all conformance testing should be based on the principles of 'Section 5, Conformance' of the DIPL (2020) specification, with the acceptance of compaction measured in the field using nuclear gauge methods as per AS1289.5.8.1.

Even with drainage measures in place, careful planning of earthworks operations will be required and it would be prudent to allow for delays due to heavy rainfall and saturation of surface soils during the wet season.

## 8.4 Excavations and Batter Slopes

All soils encountered during the investigations were excavated to typical depths of about 2 m without difficulty with a 3 tonne excavator. Dynamic penetrometer testing suggested the residual soils extend to depths of at least 3 m. It is expected that sewer and water main trenches up to about 3 m would be readily excavated using conventional earthmoving plant such as 12 to 16 tonne excavators. Where excavations are required below 3 m, larger plant is likely required, and allowance for say 25 tonne excavators should be considered if extremely or highly weathered rock is encountered at depth.

For any temporary excavations greater than 1.2 m deep but not exceeding 3 m depth, it is recommended the sides of the excavations be battered no steeper than 1V:1H or benched with an equivalent slope between the crest and base of excavation. Excavations deeper than 3 m should be subject to geotechnical inspection at the time of construction to assess suitable batter slopes. Vertical cuts would require appropriately designed shoring.

Permanent slopes in the colluvial and residual soils should be no steeper than 1V:4H, however it is expected that selection of batter slope angle will be dictated by erosion considerations rather than stability considerations.

## 8.5 Reuse of Excavated Material

Materials sourced from excavations on site are not recommended for use in building pad or road construction due to the generally high plastic fines content and reactivity. The soils could be re-used for backfilling into service trenches as general backfill (not support material), subject to acceptance testing during project construction.

## 8.6 Site Classification

Site classification of foundation soils provides an indication of the propensity of the ground surface to move with seasonal variation in moisture. Site classification is based on procedures presented in AS 2870-2011 and the typical soil profiles indicated in the test pits and laboratory testing.

To estimate the likely characteristic surface movements ($y_s$) for the soil profile at the new subdivision site, shrink-swell index ($I_{ss}$) test values and correlation of the weighted plasticity index (WPI), Atterberg limits and linear shrinkage tests have been used to assign presumptive $I_{ss}$ values for Units 2 and 3. Figure 5 shows the $I_{ss}$ laboratory test results plotted against Linear Shrinkage (Fityus, 2005), suggesting the reactivity at the site is perhaps only 'moderate'.

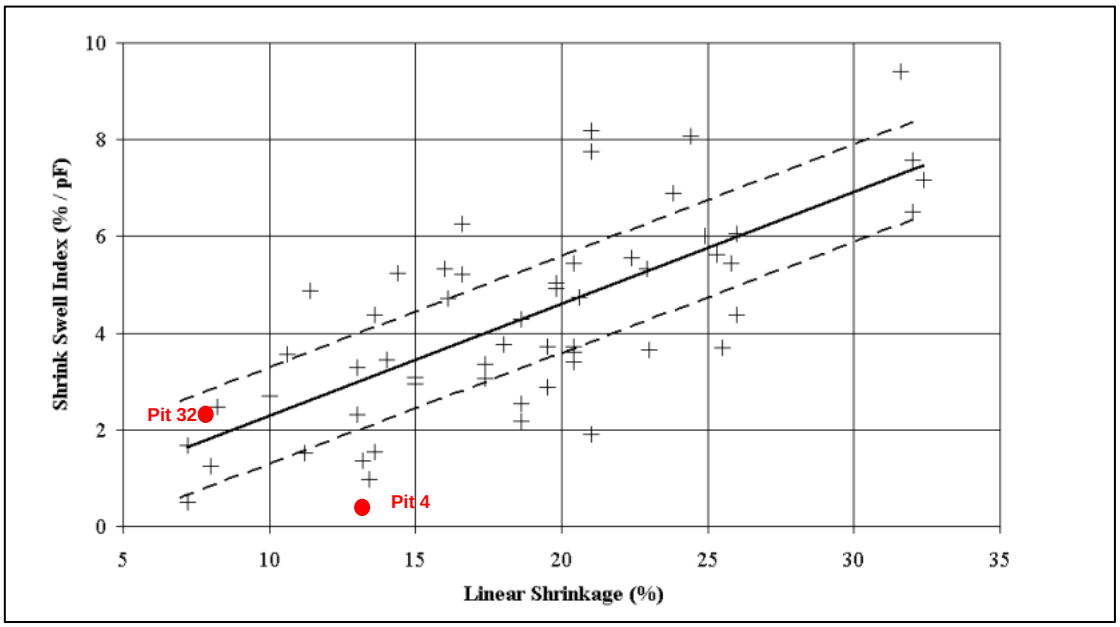



**Figure 5: Excerpt from Fityus et al (2005, per Cameron 1989). Note the Linear Shrinkage value for Pit 32 was taken from the nearby pit 33.**

Soil reactivity can also be assessed using correlations with Atterberg limit tests, including the Weighted Plasticity Index (WPI). Look (2016) suggests categories of reactivity based on Plasticity Index (PI) and WPI based on research of residual clay soils in Queensland. Based on Look (2016), soil reactivity at the subdivision site is highly variable, ranging from 'low' to 'very high'. This variability suggests that ground movements associated with reactive soils will likely be spatially variable across the site, and difficult to predict. It may be too conservative to characterise the whole site a 'highly' or 'very highly' reactive site. Assuming a 'moderate' level of reactivity is assumed, with $I_{ss}$ values selected to reflect this

'moderate' level of reactive soil behaviour may form a suitable approach for the project site. If however the designer wishes to adopt a risk averse approach to ensure design lives of the proposed buildings are achieved with very low risk of adverse behaviour, then further analysis would be required.

Based on the laboratory $I_{ss}$ values and the above discussion with 'moderate' reactive inputs as shown in Table 7, the characteristic surface movement ($y_s$) for the site has been estimated. Results suggest that the site generally is characterised with seasonal surface movements that are in the range of the 30 mm to 40 mm, indicating the lots would classify as Class M.

**Table 8: Input Parameters for Seasonal Surface Movement Estimation for Moderate Reactivity**

| Climate Zone | Depth of Seasonal Moisture Variation $H_s$ (m) (1) | Assumed Depth of Cracked Zone (m) | Change in Suction at Ground Surface Δu (pF) | Assumed Shrink-Swell Index Value (%) | |
|---|---|---|---|---|---|
| | | | | Material | $I_{ss}$ |
| 1 – Wet Coastal (1) | 1.5 | 0 | 1.2 | Colluvial Soil | 1.5 |
| | | | | Residual Soil | 2.5 |

Notes: (1) refer Jackson (2022).

The above classification should be revised following earthworks (fill or cut) as required by AS 2870:2011. The classification would depend on the depth and type of material used as well as the level of compaction and level of quality control. For the Class M site classification to apply to the lots, site preparation and placement of filling for building platforms must be carried out in accordance with the recommendations given in Section 8.3.

For comparison purposes, if a higher assigned value of $I_{ss}$ of say 3.5% is adopted for the residual clay as a 'worst case' based on the (Look 2016) WPI correlations, the predicted surface movement would be in the order of 45 mm, indicating the site would classify as Class H1. The extent to which this higher site classification is adopted for the subdivision should reflect the risk appetite of the designers and maintainers of the housing infrastructure.

## 8.7 Foundation Design

The following sections provide preliminary suggestions for the design of thickened raft slabs, spread footings and bored pier foundations for residential dwellings.

### 8.7.1 Slab on Ground Foundations

The investigation indicates that ground conditions following site preparation are likely to comprise engineered fill overlying medium to high plasticity clays that are highly prone to softening in the wet season. Slab on ground foundations with thickened edge beams would be suitable for structures built on these ground conditions, provided they are supported wholly within a pad of engineered fill, with all edge and internal thickenings supported by the engineered fill.

It is suggested that a maximum allowable bearing pressure of 100 kPa be adopted for thickened edge and internal beams founding a minimum of 300 mm below finished surface level, and providing there is

at least 300 mm of engineered fill below the base of footings. This suggests that the engineered fill pad would require a minimum thickness of about 0.6 m. Estimated settlements for 0.4 m wide shallow strip footing geometries are estimated to be less than 25 mm, with differential settlements up to 50% of the total settlements.

### 8.7.2 Spread Footings

As for the stiffened raft option, it is recommended that pad and/or strip footing would also be suitable for proposed structures provided they are wholly supported with the engineered fill. Pad and/or strip footings could also be designed for a maximum allowable bearing pressure of 100 kPa at a minimum founding depth of 300 mm below the final prepared site surface level. Estimated settlements for 1.5 m wide square footing are estimated to be less than 25 mm, with differential settlements up to 50% of the total settlements.

### 8.7.3 Bored Pier Foundations

Bored piers could be adopted as an alternative to pad footings for fully supported structures where the construction of a 0.6 m fill pad is not possible or if elevated structures are subjected to relatively high uplift loads. For bored piers, uplift resistance will most likely be the critical load case. When assessing pier uplift resistance, it is suggested that zero skin friction be adopted for the upper 0.75 m, and that an allowable skin friction value of 25 kPa be adopted for the underlying clay soils. For downward vertical loads, an allowable end bearing pressure of 200 kPa for stiff or better soils is recommended. Settlements are expected to be less than 1% of the pile diameter. Greater pile end bearing pressure, if required, is anticipated to be available at greater depth in the sandstone indicated in the published geological mapping but not encountered within the investigation depths and would require specific investigation techniques (ie drilling boreholes) to assess.

Uplift design should include a check on the “cone of earth” failure mechanism using an inverted cone with an included angle of 60$^{o}$ from the base of the bored pier, and a factor of safety of 2. Shallow piers which meet the skin friction failure criterion may have to be deepened to satisfy the cone of earth pullout criterion.

To minimise potential for collapse of pier sidewalls, it is suggested that foundation construction be carried out during the dry season. It is essential that footing and pier excavations be inspected by an experienced site supervisor to ensure that the base and sidewalls are cleaned of loose soil and that the design parameters adopted are suitable for the ground conditions encountered.

Pile jacking due to soil reactivity is also a consideration for this site. If piles are subject to substantive shrink-swell behaviour due to the upper ‘active zone’ of the soil profile, it tends to cause the pile to ‘jack’ out of the ground if sufficient pile embedment is not achieved to anchor the pile in the underlying non-active zone. Embedment below the ‘active zone’ depth of 1.5 m becomes the critical design consideration. The method of Goodall and Merrifield (2021) could be applied to determine pile embedment length.

## 8.8 Groundwater and Site Maintenance

Shallow perched groundwater, poor drainage and ponding surface water were all observed at the site during previous investigations. Therefore, careful design of site drainage both during construction and for the life of the subdivision will be required to ensure wet season groundwater levels and surface flows do not impact on any proposed structures and pavements on the site. It is therefore recommended that all road pavements be constructed with sub-soil drains along each kerb line. It is also recommended that subsoil drains be installed as part of the open drainage network around the site (as shown on the civil layout drawings) to intercept and control the effects of groundwater. Additionally, subsoil drains are recommended to be installed around the outer footprint of each house.

## 8.9 Road Subgrade Design Considerations

Road design levels are not yet known, however it is expected that roads will be at or above grade. Pavement subgrades for the subdivision are therefore expected to comprise cohesive colluvial and residual soils of medium to high plasticity clay. The results of the laboratory CBR testing for samples prepared at 95% MMDD and soaked for 4 days ranged from 2.5% to 15%, with an average of about 6%.

It is noted that the laboratory tests are conducted at a higher density ratios than the in situ condition, with field density ratios often as low at 90% MMDD. Reduction factors suggested by Mulholland (1987) to convert laboratory CBR values to field CBR values for soils in an environment with rainfall of at least 1000 mm per year are in the order of 0.4 to 0.9, depending on drainage conditions. Additionally, the low repeatability of CBR testing results should also be considered in the selection of a design value.

Laboratory test results for the previous nearby investigations are summarised in Table 9.

**Table 9: Summary of Previous Laboratory CBR Testing**

| Investigation | Material | CBR (at 95% MMDD) |
|---|---|---|
| Ullman & Nolan (2007) | Clayey Gravel | 20 |
| | Sandy Clayey Gravel | 100 |
| | Clayey Sandy Gravel | 120 |
| | Clayey Gravelly Sand | 60 |
| Douglas Partners (2010) | Clayey Gravel | 3.5 to 4.5 |
| | Clayey Sand | 20 |
| | Clayey Gravel | 45-50 |
| | Clayey Sandy Gravel | 5 |
| WANT (2020) | Clay | 1.5 |
| | Clayey Gravel | 16 |
| | Clay | 35 |
| | Clayey Gravel | 35 |

It is noted that the material descriptions for the U&N (2007) and DP (2010) investigations were based on an earlier version of AS1726 Geotechnical Site Investigations, which has since been revised. Under

the current version of AS1726-2017, it is likely that some of the material descriptions would change to be clay soils, particularly the low CBR results. In any event, the lower CBR values are typical of medium to high plasticity clay soils expected at the new subdivision site. The higher values in Table 8 likely reflect materials with greater gravel and sand components than the colluvial and residual soils at the new subdivision site.

The CBR value used for pavement design will need to take into consideration the thickness of fill placed within the pavement footprint. If 600 mm or more (including the 150 mm subgrade layer) of granular fill with a CBR of at least 20% is placed within the pavement footprint, then design could be based on an in situ CBR value of 8%. However, in some areas, it is anticipated that less fill will be required, and it is also unlikely that a uniformly compacted subgrade that reflects conditions in the laboratory will be achieved in the field. Furthermore, waterlogging and wet subgrade conditions are known to exist in the area, and so a lower bound design value is warranted. Therefore, for design purposes an in situ CBR value of 3% is suggested for at-grade pavements, provided that at least 150 mm of granular material is constructed as the subgrade layer (as per DIPL 2020 specification) on which the pavement layers are then placed and constructed.

Alternatively, lime treatment of the in situ cohesive soils would be expected to increase the CBR strength of the treated layer to a maximum of 15%. The treated layer (or layers) could then be incorporated into the pavement profile in accordance with Austroads (2017) design procedures. It is noted that if lime treatment of the subgrade soils is incorporated into the design, then verification of the CBR of the modified material will be required during construction.

The CBR swell values vary from 1% to 6% which indicate a very high degree of variability in reactivity. According to Austroads (2017, Table 5.2) the soils range from moderate reactivity to high reactivity. This variability in reactivity is also reflected in the range of WPI values which varied from 1026 to 3510. The risk of subgrade movement associated with seasonal moisture content variation is therefore considered an important pavement design consideration, but effects may be localised rather widespread across the site. The level of risk accepted by the designers should be governed by assessment of impacts associated with increased pavement roughness over time, and the costs to mitigate against this with sufficient cover. Tseng et al (2018) provide guidance on pavement cover thickness requirements over expansive soils in Western Australia. Figure 6 overleaf is re-produced from this paper and for Climate Zone 1 with a CBR swell of 6%, and an adopted a vertical displacement on the road centreline of 20 mm, then the required cover would be about 450 mm. This appears reasonable, and so design of the new pavements should consider an overall thickness of granular material of at least 450 mm. Depending on design traffic, this may correlate to the required pavement thickness from a structural perspective.

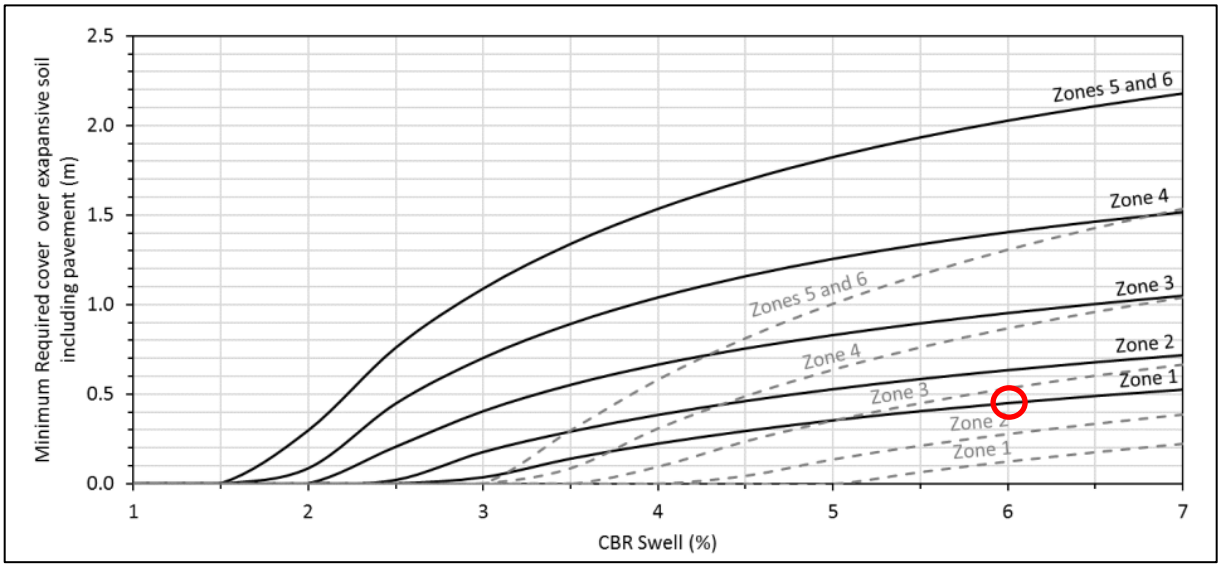



**Figure 6: Suggested minimum cover over reactive material chart based on CBR swell (Tseng et al, 2018), design recommendation highlighted.**

## 8.10 Thrust Block Design

It is understood that thrust blocks may be provided to resist horizontal forces at bends for water main pipelines and that maximum (temporary) pressures are generally experienced during pipe testing.

The design of concrete thrust blocks founded below 0.5 m depth in stiff or better clay soils at the site should be based on an allowable vertical bearing pressure of 100 kPa. Given the added loading of the thrust blocks is not likely to be significantly greater than that exerted by the weight of the soil materials they are replacing, additional short term settlements resulting from thrust block construction are estimated to be negligible.

The allowable lateral pressure on a thrust block is a function of depth and size of the thrust block, soil type and duration of loading. Where lateral pressures are to be sustained long-term, effective stress (drained) soil parameters are adopted. For short-term (temporary) pressures applied to cohesive soils, undrained parameters are adopted.

The design of thrust blocks for cohesive soils under sustained loading (using effective stress parameters) should be based on a uniform triangular earth pressure distribution, where the ultimate passive earth pressure ($P_P$) at any particular depth is given by:

- $P_P = K_P.\gamma'.d$ (in kPa)

Where:

- $K_P$ = 'passive' earth pressure coefficient;
- $\gamma'$ = effective unit weight of soil (20 kN/m$^3$ above water table and 10 kN/m$^3$ below water table - if thrust blocks are submerged due to periodic rises in the groundwater level);
- d = depth below ground level.

For the cohesive soils expected at this site, under drained conditions, $K_P$ is derived from the effective stress Φ' parameter. For short term/transient loading, ultimate passive pressures ($P_P$) are calculated based on the undrained shear strength and are constant with depth.

Passive earth pressure coefficients and ultimate passive pressures (as appropriate) for the range of materials encountered in the investigation are provided in Table 10.

**Table 10: Lateral Earth Pressure Coefficients**

| Material Type | Effective Friction Angle (°) | Passive Earth Pressure Coefficient (Kp) | Ultimate Passive Pressure (kPa) |
|---|---|---|---|
| Stiff or stronger clay | 20 | 2.0 | 150 |

Native soil moduli and embedment soil moduli are suggested in Table 11 overleaf in general accordance with AS/NZS 2566.1:1998.

**Table 11. Soil Modulus for Embedment Design**

| Material Type | Native Soil Modulus $E'_n$ and Embedment Soil Modulus $E'_e$ (MPa) |
|---|---|
| Stiff or stronger clay | 3 |

### 8.11 Soil Aggressivity

Based on the results of laboratory aggressivity testing (Table 9 in Section 8.2), the soils at the site are assessed to have a "non-aggressive" exposure classification for buried steel and concrete in accordance with AS 2159:2009.

### 8.12 Erosion Considerations

Results of the Emerson tests (Table 3, Section 7.1) indicate that the clay site soils with results of class 5 and 6, indicate they do slake in water but do not disperse. Erosion control is therefore warranted by limiting exposure to standing water, and limiting flow velocities that may accelerate any slaking that may occur. Establishment of a vegetation cover over permanent batter slopes in the clay soils should control erosion potential.

## 9. References

AS3798–2007: "Guidelines on Earthworks for Commercial and Residential Developments", Standards Australia.

AS2870–2011: "Residential Slabs and Footings", Standards Australia.

AS1289.5.8.1; “Field density using a nuclear surface moisture-density gauge”, Standard Australia.

AS2566:1:1998, “Buried flexible pipelines”, Standard Australia.

Austroads (2017), *A Guide to Pavement Technology Part 2: Pavement Structural Design*.

Fityus SG, Cameron DA, Walsh PF, 2005, *The Shrink Swell Test*, ASTM Geotechnical Testing Journal, Vol 28, No 1.

Goodall SJ, Merrifield RS, 2021, *Pile Design for Solar Farms and Reactive Clay Sites in Australia*, Australian Geomechanics Journal, Vol 56, No 3, September 2021.

Jackson SDF, 2022, *Thornthwaite Moisture Index and Climate Zones in the Northern Territory*, Australian Geomechanics Journal, Vol 57, No 3, September 2022.

Look, B., G., 2016, *The Weighted Plasticity Index in Road Design and Construction*, Australian Geomechanics Journal, September, Vol. 51, No. 3.

Mulholland PJ, 1987. *Structural Design Criteria for Residential Street Pavements*, Fourth National Local Government Engineering Conference, Perth, 17-20 August, 1987.

Tseng E, Cocks G, Verheyde F, 2018, *Cover Requirement Over Expansive Soils in Flexible Pavement Design in Western Australia*, Australian Geomechanics Journal, Vol 54, No 4, December 2018.

NT Department of Infrastructure, Planning and Logistics (DIPL), 2018, *Standard Specification for Small Building Works*.

NT Department of Infrastructure, Planning and Logistics (DIPL), 2022, *Standard Specification for Roadworks*.

## 10. Limitations

Douglas Partners (DP) has prepared this report for this subdivision project at Wurrumiyanga, Bathurst Island in accordance with DP’s proposal dated 29 June 2023 as part of Service Order CD2094/22. The work was carried out under Northern Territory Government standard terms and conditions for the engagement of consultants. This report is provided for the exclusive use of Department of Infrastructure Planning & Logistics (NT) 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 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 because 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 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.

**Douglas Partners Pty Ltd**

# Appendix A

About This Report
Drawings 1 and 2

# 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.

NOTES:

1. Test locations taken using a hand-held d GPS accurate to approximately 0.2 m.

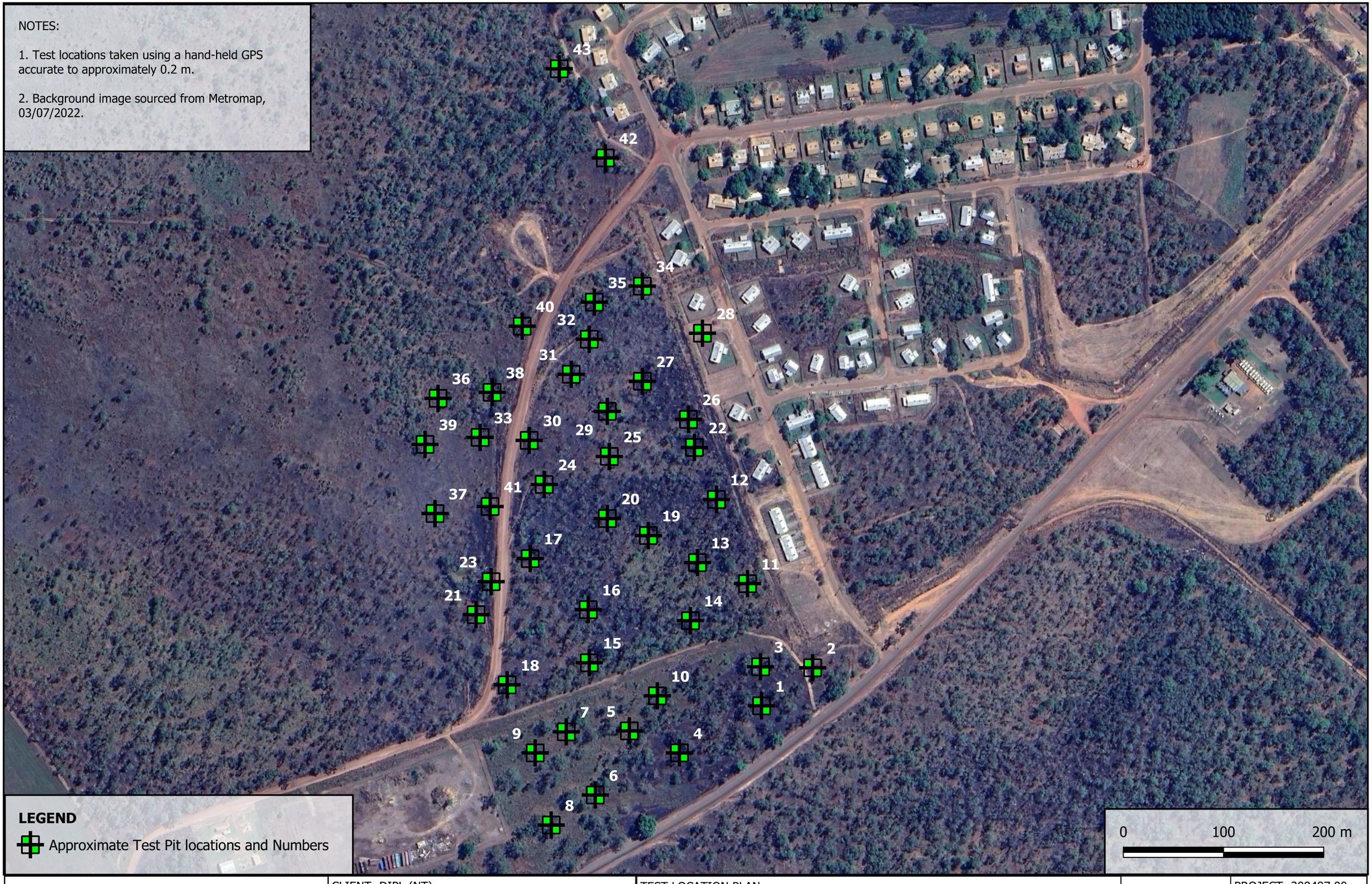
2. Background image sourced from Metromap , 03/07/2022 .


| | | | | |
|---|---|---|---|---|
| Douglas Partners<br>Geotechnics · Environment · Groundwater | CLIENT: DIPL (NT) | | SUBDIVISION LOCATION PLAN<br><br>T21-2072 Wurrumiyanga Subdivision<br>Wurrumiyanga, Bathurst Island. | PROJECT: 209497.00 |
| | OFFICE: Darwin | DRAWN BY: Raj Kumar Lama | | DRAWING No: 1 |
| | SCALE: as shown | DATE: 03/11/2023 | | REVISION: Rev 0 |

NOTES:

1. Test locations taken using a hand-held GPS accurate to approximately 0.2 m.

2. Background image sourced from Metromap, 03/07/2022.




**LEGEND**

Approximate Test Pit locations and Numbers

| | | | |
|---|---|---|---|
| Douglas Partners Geotechnics · Environment · Groundwater | CLIENT: DIPL (NT) | | TEST LOCATION PLAN<br>T21-2072 Wurrumiyanga Subdivision<br>Wurrumiyanga, Bathurst Island. |
| | OFFICE: Darwin | DRAWN BY: Raj Kumar Lama | |
| | SCALE: as shown | DATE: 04/09/2023 | |

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PROJECT: 209497.00

DRAWING No: 2

REVISION: Rev 0

# Appendix B

Sampling Methods
Soil Descriptions
Symbols and Abbreviations
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.

The soil group symbol classifications are given as follows based on two major soil divisions:

- Coarse-grained soils
- Fine-grained soils

| Major Divisions | | | | Description | |
|---|---|---|---|---|---|
| | | | | Group Symbol* | Typical Name |
| COARSE-GRAINED SOILS | More than 65% by dry mass, (excluding that larger than 63 mm) is greater than 0.075 mm | GRAVEL | More than 50% of coarse grains are greater than 2.36 mm | GW | Well graded gravels and gravel-sand mixtures, little or no fines. |
| | | | | GP | Poorly graded gravels and gravel-sand mixtures, little or no fines. |
| | | GRAVELLY SOILS | | GM | Silty gravels, gravel-sand-silt mixtures. |
| | | | | GC | Clay gravels, gravel-sand-clay mixtures. |
| | | SAND | More than 50% of coarse grains are less than 2.36 mm | SW | Well graded sands and gravelly sands, little or no fines. |
| | | | | SP | Poorly graded sands and gravelly sands, little or no fines. |
| | | SANDY SOILS | | SM | Silty sand, sand-silt mixtures. |
| | | | | SC | Clayey sands, sand-clay mixtures. |

* For coarse grained soils where the fines content is between 5% and 12%, the soil shall be given a dual classification eg GP-GM.

| | | | | |
|---|---|---|---|---|
| FINE-GRAINED SOILS | More than 35% by dry mass, (excluding that larger than 63 mm) is less than 0.075 mm | Liquid Limit less than 35% | ML | Inorganic silts, very fine sands, rock flour, silty or clayey fine sands. |
| | | | CL | Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays. |
| | | | OL | Organic silts and organic silty clays of low plasticity |
| | | 35% <LL< 50% | CI | Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays. |
| | | Liquid Limit greater than 50% | MH | Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts. |
| | | | CH | Inorganic clays of high plasticity, fat clays. |
| | | | OH | Organic clays of medium to high plasticity. |
| | | | Pt | Peat muck and other highly organic soils. |

# Soil Descriptions

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## 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, 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, 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, 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.

## 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. |

# TEST PIT LOG

**CLIENT:** DIPL (NT)
**PROJECT:** T21-2072 Wurrumiyanga Subdivision
**LOCATION:** Wurrumiyanga, Bathurst Island

**SURFACE LEVEL:** 14.8 m AHD
**EASTING:** 677140
**NORTHING:** 8698667

**PIT No:** 1
**PROJECT No:** 209497.00
**DATE:** 12/8/2023
**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 100mm) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | TOPSOIL - Sandy CLAY CL: Low plasticity, light-brown, fine to coarse grained sand, with fine to coarse sub-angular to angular gravel and roots, w<PL, hard. | | | | | | | |
| | | Sandy CLAY CI: Medium plasticity, yellow-brown, fine to coarse grained sand, with fine to coarse sub-rounded to rounded gravel, w<PL, hard, colluvial. | | B | 0.3 | | VOC = 0 | | |
| | | - red-brown mottled yellow-brown from 0.4 m depth. | | | 0.5 | | | | |
| 14 | 0.9 | Silty CLAY CI: Medium plasticity, red-brown mottled grey-brown, with fine to coarse grained sand, trace fine to medium gravel, w<PL, very stiff, residual. | | | | | | | |
| | 1 | | | | | | | | 1 |
| | 1.5 | Silty CLAY CI: Medium plasticity, yellow-brown mottled grey-brown, orange-brown, with fine to coarse grained sand, trace fine to medium gravel, w<PL, very stiff to hard, residual. | | D | 1.6 | | VOC = 0 | | |
| 13 | 2 | | | | | | | | 2 |
| | 2.2 | - hard from 2.1 m depth. | | | | | | | |
| | | Pit discontinued at 2.2m depth, Limit of investigation. | | | | | | | |

**RIG:** 3 Tonne excavator with 250 mm rock toothed bucket

**LOGGED:** RL

**SURVEY DATUM:** MGA94 Zone 52

**WATER OBSERVATIONS:** No free groundwater encountered.

**REMARKS:**

☐ 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:** DIPL (NT)
**PROJECT:** T21-2072 Wurrumiyanga Subdivision
**LOCATION:** Wurrumiyanga, Bathurst Island

**SURFACE LEVEL:** 14.0 m AHD
**EASTING:** 677191
**NORTHING:** 8698705

**PIT No:** 2
**PROJECT No:** 209497.00
**DATE:** 12/8/2023
**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 100mm) |
|---|---|---|---|---|---|---|---|---|---|
| 14 | 0.2 | TOPSOIL - Sandy CLAY CL: Low plasticity, yellow-brown, light-brown, fine to coarse grained, with fine to coarse sub-angular to angular gravel and roots, w<PL, hard. | | | | | | | |
| | | Clayey Sandy GRAVEL GC: Fine to coarse sub-angular to sub-rounded gravel, yellow-brown, medium plasticity clay, fine to coarse grained sand, dry, very dense to dense, colluvial. | | B | 0.3 | | VOC = 0 | | |
| | | - dense from 0.7 m depth. | | | 0.5 | | | | |
| 13 | 0.9 | Silty CLAY CI: Medium plasticity clay, red-brown mottled grey-brown, with fine to coarse grained sand, w=PL, very stiff, residual. | | | | | | | 1 |
| | 1.6 | Silty CLAY CI: Medium plasticity, yellow-brown mottled grey-brown, orange-brown, with fine to coarse grained sand, w<PL, hard, residual. | | D | 1.7 | | VOC = 0 | | |
| 12 | 2 | | | | | | | | 2 |
| | 2.1 | Pit discontinued at 2.1m depth, Limit of investigation. | | | | | | | |

Dynamic Penetrometer Test (blows per 100mm): 5, 10, 15, 20

**RIG:** 3 Tonne excavator with 250 mm rock toothed bucket

**LOGGED:** RL

**SURVEY DATUM:** MGA94 Zone 52

**WATER OBSERVATIONS:** No free groundwater encountered.

**REMARKS:**

☐ 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:** DIPL (NT)
**PROJECT:** T21-2072 Wurrumiyanga Subdivision
**LOCATION:** Wurrumiyanga, Bathurst Island

**SURFACE LEVEL:** 14.6 m AHD
**EASTING:** 677139
**NORTHING:** 8698706

**PIT No:** 3
**PROJECT No:** 209497.00
**DATE:** 12/8/2023
**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 100mm) |
|---|---|---|---|---|---|---|---|---|---|
| 14 | 0.3 | TOPSOIL - Sandy CLAY CL: Low plasticity, light-brown, fine to coarse grained sand, with fine to coarse sub-angular to angular gravel and roots, w<PL, hard. | | | | | | | |
| | | Sandy CLAY CI: Medium plasticity, yellow-brown, fine to coarse grained sand, with fine to coarse sub-rounded to rounded gravel, w<PL, hard, colluvial. | | B | 0.4 | | VOC = 0 | | |
| | | - red-brown mottled yellow-brown from 0.4 m depth. | | | 0.6 | | | | |
| | 0.8 | Silty CLAY CI: Medium plasticity, red-brown mottled grey-brown, with fine to coarse grained sand, trace fine to medium gravel, w≤PL, very stiff, residual. | | D | 1.0 | | VOC = 0 | | |
| 13 | 1.5 | Silty CLAY CI: Medium plasticity, yellow-brown mottled grey-brown, orange-brown, with fine to coarse grained sand w<PL, very stiff to hard, residual. | | | | | | | |
| | | - hard from 1.7 m depth. | | | | | | | |
| | 2.2 | Pit discontinued at 2.2m depth, excavator refusal. | | | | | | | |

Dynamic Penetrometer Test (blows per 100mm): 5, 10, 15, 20; 1; 2

**RIG:** 3 Tonne excavator with 250 mm rock toothed bucket

**LOGGED:** RL

**SURVEY DATUM:** MGA94 Zone 52

**WATER OBSERVATIONS:** No free groundwater encountered.

**REMARKS:**

☐ 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:** DIPL (NT)
**PROJECT:** T21-2072 Wurrumiyanga Subdivision
**LOCATION:** Wurrumiyanga, Bathurst Island

**SURFACE LEVEL:** 15.9 m AHD
**EASTING:** 677058
**NORTHING:** 8698620

**PIT No:** 4
**PROJECT No:** 209497.00
**DATE:** 12/8/2023
**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 100mm) |
|---|---|---|---|---|---|---|---|---|---|
| 15 | 0.25 | TOPSOIL - Sandy CLAY CL: Low plasticity, light-brown, fine to coarse grained sand, with fine to coarse gravel and roots, w<PL, stiff. | | E | 0.1 | | VOC = 0 | | |
| | | Sandy CLAY CH: High plasticity, yellow-brown, red-brown, fine to coarse grained sand, trace fine to coarse sub-angular to sub-rounded gravel, w<PL, very stiff to hard, colluvial. | | D<br>U | 0.4<br>0.5 | | VOC = 0 | | |
| | 0.8 | - hard from 0.4 m depth. | | | | | | | |
| 14 | 1 | Silty CLAY CI: Medium plasticity, red-brown mottled grey-brown, low plasticity silt, with fine to coarse grained sand, trace fine to medium gravel, w<PL, very stiff, residual. | | D | 1.0 | | | | |
| | | - grey-brown mottled red-brown at 1.8 m depth. | | | | | | | |
| | 2 2.0 | Pit discontinued at 2.0m depth, Limit of investigation. | | | | | | | |

**RIG:** 3 Tonne excavator with 250 mm rock toothed bucket

**LOGGED:** RL

**SURVEY DATUM:** MGA94 Zone 52

**WATER OBSERVATIONS:** No free groundwater encountered.

**REMARKS:**

☐ 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:** DIPL (NT)
**PROJECT:** T21-2072 Wurrumiyanga Subdivision
**LOCATION:** Wurrumiyanga, Bathurst Island

**SURFACE LEVEL:** 16.4 m AHD
**EASTING:** 677008
**NORTHING:** 8698642

**PIT No:** 5
**PROJECT No:** 209497.00
**DATE:** 12/8/2023
**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 100mm) |
|---|---|---|---|---|---|---|---|---|---|
| 16 | 0.3 | TOPSOIL - Sandy CLAY CL: Low plasticity, light-brown, fine to coarse grained sand, with fine to coarse gravel and roots, w<PL, very stiff. | | D | 0.1 | | VOC = 0 | | |
| | | | | | 0.3 | | VOC = 0 | | |
| | | Clayey Sandy GRAVEL GC: Fine to coarse sub-angular to sub-rounded gravel, yellow-brown, medium plasticity clay, fine to coarse grained sand, dry, dense to very dense , colluvial. | | B | 0.5 | | | | |
| | | - very dense from 0.6 m depth. | | | | | | | |
| 15 | 1.0 | Silty CLAY CI: Medium plasticity, red-brown mottled light-grey, low plasticity silt, with fine to coarse grained sand, trace fine to medium gravel, w<PL, hard to very stiff, residual. | | | | | | | |
| | 1.5 | - very stiff from 1.3 m depth. | | | | | | | |
| | | Silty CLAY CI: Medium plasticity, yellow-brown mottled grey-brown, orange-brown, low plasticity silt, with fine to coarse grained sand, w<PL, very stiff to hard, residual. | | D | 1.7 | | VOC = 0 | | |
| | | - hard from 2.1 m depth. | | | | | | | |
| | 2.25 | Pit discontinued at 2.25m depth, excavator refusal. | | | | | | | |

Dynamic Penetrometer Test (blows per 100mm): 5, 10, 15, 20; 1, 2

**RIG:** 3 Tonne excavator with 250 mm rock toothed bucket

**LOGGED:** RL

**SURVEY DATUM:** MGA94 Zone 52

**WATER OBSERVATIONS:** No free groundwater encountered.

**REMARKS:**

☐ 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:** DIPL (NT)
**PROJECT:** T21-2072 Wurrumiyanga Subdivision
**LOCATION:** Wurrumiyanga, Bathurst Island

**SURFACE LEVEL:** 17.1 m AHD
**EASTING:** 676974
**NORTHING:** 8698578

**PIT No:** 6
**PROJECT No:** 209497.00
**DATE:** 12/8/2023
**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 100mm) |
|---|---|---|---|---|---|---|---|---|---|
| 17 | 0.15 | TOPSOIL - Sandy CLAY CL: Low plasticity, light-brown, fine to coarse grained sand, with fine to coarse gravel and roots, w<PL, stiff. | | B | 0.2 | | VOC =0 | | |
| | | Silty CLAY CI: Medium plasticity, yellow-brown, with fine to coarse sub-angular to sub-rounded gravel, trace fine to coarse grained sand, w<PL, very stiff, colluvial. | | | 0.4 | | | | |
| | | - red-brown mottled yellow-brown from 0.5 m depth. | | | | | | | |
| 16 | 1.0 | Silty CLAY CI: Medium plasticity, red-brown mottled light-grey, low plasticity silt, with fine to coarse grained sand, trace fine to medium gravel, w<PL, very stiff to hard, residual. | | D | 1.3 | | VOC = 0 | | |
| 15 | 2.0 | - hard from 2.0 m depth. | | | | | | | |
| | 2.2 | Pit discontinued at 2.2m depth, excavator refusal. | | | | | | | |

Dynamic Penetrometer Test (blows per 100mm): 5, 10, 15, 20; 1, 2

**RIG:** 3 Tonne excavator with 250 mm rock toothed bucket

**LOGGED:** RL

**SURVEY DATUM:** MGA94 Zone 52

**WATER OBSERVATIONS:** No free groundwater encountered.

**REMARKS:** DCP bounced at 2.1 m depth.

☐ 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:** DIPL (NT)
**PROJECT:** T21-2072 Wurrumiyanga Subdivision
**LOCATION:** Wurrumiyanga, Bathurst Island

**SURFACE LEVEL:** 16.9 m AHD
**EASTING:** 676945
**NORTHING:** 8698641

**PIT No:** 7
**PROJECT No:** 209497.00
**DATE:** 12/8/2023
**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 100mm) |
|---|---|---|---|---|---|---|---|---|---|
| 16 | 0.2 | TOPSOIL - Sandy CLAY CL: Low plasticity, light-brown, brown, fine to coarse grained sand, with fine to coarse gravel and roots, w<PL, stiff. | | | | | | | |
| | | Sandy CLAY CI: Medium plasticity, yellow-brown, red-brown, fine to coarse sand, with fine to coarse sub-angular to sub-rounded gravel, w<PL, very stiff, colluvial. | | B | 0.3<br>0.5 | | VOC = 0 | | |
| | 1.1 | Silty CLAY CL-CI: Low to medium plasticity clay, red-brown mottled light-grey, trace fine to coarse grained sand, with fine to medium gravel, w>PL, very stiff, residual. | | | | | | | |
| 15 | | - grey-brown mottled orange-brown, yellow-brown from 1.6 m depth | | D | 1.8 | | VOC = 0 | | |
| | 2.4 | Pit discontinued at 2.4m depth, excavator refusal. | | | | | | | |

Dynamic Penetrometer Test (blows per 100mm): 5, 10, 15, 20; 1, 2

**RIG:** 3 Tonne excavator with 250 mm rock toothed bucket

**LOGGED:** RL

**SURVEY DATUM:** MGA94 Zone 52

**WATER OBSERVATIONS:** No free groundwater encountered.

**REMARKS:**

☐ 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:** DIPL (NT)
**PROJECT:** T21-2072 Wurrumiyanga Subdivision
**LOCATION:** Wurrumiyanga, Bathurst Island

**SURFACE LEVEL:** 16.8 m AHD
**EASTING:** 676930
**NORTHING:** 8698548

**PIT No:** 8
**PROJECT No:** 209497.00
**DATE:** 12/8/2023
**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 100mm) |
|---|---|---|---|---|---|---|---|---|---|
| 16 | 0.2 | TOPSOIL - Sandy CLAY CL: Low plasticity, grey-brown, light-brown, fine to coarse grained sand, trace fine to coarse gravel and roots, w<PL, very stiff. | | | | | | | |
| | 1 | Clayey Sandy GRAVEL GC: Fine to coarse sub-angular to sub-rounded gravel, yellow-brown, medium plasticity clay, fine to coarse grained sand, dry, dense, colluvial. - red-brown mottled yellow-brown from 0.4 m depth. | | D | 0.6 | | VOC = 0 | | |
| 15 | 1.1 | Silty CLAY CI: Medium plasticity, red-brown mottled light-grey, with fine to coarse grained sand, trace fine to medium gravel, w<PL, very stiff, residual. - grey-brown mottled orange-brown, red-brown from 1.6 m depth | | D | 1.8 | | VOC = 0 | | |
| | 2 | 2.0 Pit discontinued at 2.0m depth, excavator refusal. | | | | | | | |

Dynamic Penetrometer Test (blows per 100mm): 5, 10, 15, 20

**RIG:** 3 Tonne excavator with 250 mm rock toothed bucket

**LOGGED:** RL

**SURVEY DATUM:** MGA94 Zone 52

**WATER OBSERVATIONS:** No free groundwater encountered.

**REMARKS:** Moved TP location due to big trees.

☐ 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:** DIPL (NT)
**PROJECT:** T21-2072 Wurrumiyanga Subdivision
**LOCATION:** Wurrumiyanga, Bathurst Island

**SURFACE LEVEL:** 17.7 m AHD
**EASTING:** 676914
**NORTHING:** 8698620

**PIT No:** 9
**PROJECT No:** 209497.00
**DATE:** 12/8/2023
**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 100mm) |
|---|---|---|---|---|---|---|---|---|---|
| 17 | 0.15 | TOPSOIL - Sandy CLAY CL: Low plasticity, light-brown, brown, fine to coarse grained sand, with fine to coarse gravel and roots, w<PL, very stiff. | | D | 0.3 | | VOC = 0 | | |
| | | Sandy CLAY CI: Medium plasticity, yellow-brown, fine to coarse grained sand, with fine to coarse sub-angular to sub-rounded gravel, w<PL, hard, colluvial. - red-brown mottled yellow-brown from 0.5 m depth. | | | | | | | |
| | 0.9 | Silty CLAY CI: Medium plasticity clay, red-brown mottled grey-brown, with fine to coarse grained sand, trace fine to medium gravel, w≤PL, very stiff, residual. | | D | 1.2 | | VOC = 0 | | |
| 16 | 2 | - grey-brown mottled orange-brown, yellow-brown from 1.8 m depth | | | | | | | |
| | 2.15 | Pit discontinued at 2.15m depth, Limit of investigation. | | | | | | | |

**RIG:** 3 Tonne excavator with 250 mm rock toothed bucket

**LOGGED:** RL

**SURVEY DATUM:** MGA94 Zone 52

**WATER OBSERVATIONS:** No free groundwater encountered.

**REMARKS:**

☐ 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:** DIPL (NT)
**PROJECT:** T21-2072 Wurrumiyanga Subdivision
**LOCATION:** Wurrumiyanga, Bathurst Island

**SURFACE LEVEL:** 15.8 m AHD
**EASTING:** 677036
**NORTHING:** 8698677

**PIT No:** 10
**PROJECT No:** 209497.00
**DATE:** 12/8/2023
**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 100mm) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | TOPSOIL - Sandy CLAY CL: Low plasticity, light-brown, fine to coarse grained sand, with fine to coarse gravel and roots, w<PL, very stiff. | | | | | | | |
| | | Clayey Sandy GRAVEL GC: Fine to coarse sub-angular to sub-rounded gravel, yellow-brown, red-brown, medium plasticity clay, fine to coarse grained sand, with roots to 0.5 m depth, dry, dense , colluvial. | | D | 0.4 | | VOC = 0 | | |
| 15 | 0.8 | Sandy CLAY CI: Medium plasticity, red-brown mottled grey-brown, fine to coarse grained sand, with fine to medium gravel, w<PL, hard to very stiff, residual. | | D | 1.0 | | VOC = 0 | | |
| | 1 | - very stiff from 1.4 m depth. | | | | | | | 1 |
| 14 | 1.8 | Silty CLAY CI: Medium plasticity, red-brown mottled grey-brown, with fine to coarse grained sand, trace fine to medium gravel, w<PL, hard, residual. | | | | | | | |
| | 2 2.0 | Pit discontinued at 2.0m depth, Limit of investigation. | | | | | | | 2 |

**RIG:** 3 Tonne excavator with 250 mm rock toothed bucket

**LOGGED:** RL

**SURVEY DATUM:** MGA94 Zone 52

**WATER OBSERVATIONS:** No free groundwater encountered.

**REMARKS:**

☐ 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:** DIPL (NT)
**PROJECT:** T21-2072 Wurrumiyanga Subdivision
**LOCATION:** Wurrumiyanga, Bathurst Island

**SURFACE LEVEL:** 14.4 m AHD
**EASTING:** 677126
**NORTHING:** 8698789

**PIT No:** 11
**PROJECT No:** 209497.00
**DATE:** 8/8/2023
**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 100mm) |
|---|---|---|---|---|---|---|---|---|---|
| 14 | 0.35 | TOPSOIL - Gravelly Sandy CLAY CL: Low plasticity, yellow-brown, light-brown, fine to coarse grained sand and roots, w<PL, very stiff. | | D | 0.2 | | VOC = 0 | | |
| | | Silty CLAY CI: Medium plasticity, red-brown mottled grey-brown, low plasticity silt, with fine to coarse grained sand, trace fine to coarse gravel, w=PL, hard, residual. | | B | 0.5<br>0.7 | | VOC = 0 | | |
| 13 | 1.8 | Pit discontinued at 1.8m depth, excavator refusal. | | | | | | | |

Dynamic Penetrometer Test (blows per 100mm): 5, 10, 15, 20

**RIG:** 3 Tonne excavator with 250 mm rock toothed bucket

**LOGGED:** RL

**SURVEY DATUM:** MGA94 Zone 52

**WATER OBSERVATIONS:** No free groundwater encountered.

**REMARKS:**

☐ 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:** DIPL (NT)
**PROJECT:** T21-2072 Wurrumiyanga Subdivision
**LOCATION:** Wurrumiyanga, Bathurst Island

**SURFACE LEVEL:** 14.5 m AHD
**EASTING:** 677095
**NORTHING:** 8698873

**PIT No:** 12
**PROJECT No:** 209497.00
**DATE:** 9/8/2023
**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 100mm) |
|---|---|---|---|---|---|---|---|---|---|
| 14 | 0.1 | TOPSOIL - Sandy CLAY CL: Low plasticity, light-brown, fine to coarse grained sand, with roots, w<PL, stiff. | | D | 0.2 | | VOC = 0 | | |
| | 0.4 | Sandy CLAY CL: Low plasticity, yellow-brown, red-brown, with fine to coarse sub-angular to sub-rounded gravel, fine to coarse grained sand, with roots to 0.3 m depth, w<PL, stiff to very stiff , colluvial. | | E D | 0.3 | | | | |
| | | - very stiff from 0.3 m depth. | | | 0.5 | | VOC = 0 | | |
| 13 | 1 | Silty CLAY CI: Medium plasticity, red-brown mottled grey-brown, with fine to coarse grained sand, trace fine to medium gravel, w<PL, hard, residual. | | B | 0.7 | | | | 1 |
| | | - very stiff from 1.4 m depth. | | | | | | | |
| | 1.8 | Pit discontinued at 1.8m depth, excavator refusal. | | | | | | | |

**RIG:** 3 Tonne excavator with 250 mm rock toothed bucket

**LOGGED:** RL

**SURVEY DATUM:** MGA94 Zone 52

**WATER OBSERVATIONS:** No free groundwater encountered.

**REMARKS:**

☐ 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:** DIPL (NT)
**PROJECT:** T21-2072 Wurrumiyanga Subdivision
**LOCATION:** Wurrumiyanga, Bathurst Island

**SURFACE LEVEL:** 14.9 m AHD
**EASTING:** 677076
**NORTHING:** 8698810

**PIT No:** 13
**PROJECT No:** 209497.00
**DATE:** 8/8/2023
**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 100mm) |
|---|---|---|---|---|---|---|---|---|---|
| 14 | 0.4 | TOPSOIL - Gravelly Sandy CLAY CL: Low plasticity, yellow-brown, grey-brown, fine to coarse sub-rounded to rounded gravel, fine to coarse grained sand, w<PL, very stiff. | | D | 0.1 | | VOC = 0 | | 5 10 15 20 |
| | | | | | 0.4 | | VOC = 0 | | |
| | | Gravelly Sandy CLAY CI: Medium plasticity, red-brown mottle grey-brown, fine to coarse sub-rounded to rounded gravel, fine to coarse grained sand, w<PL, hard, colluvial. | | B | 0.6 | | | | |
| | 0.8 | Silty CLAY CI: Medium plasticity, red-brown mottled grey-brown, with fine to coarse grained sand, trace fine to medium gravel, w<PL, very stiff to hard, residual. | | D | 0.9 | | VOC = 0 | | |
| 1 | | - hard and yellow brown-mottled grey-brown from 1.5 m depth. | | | | | | | 1 |
| | 1.8 | Pit discontinued at 1.8m depth, excavator refusal. | | | | | | | |

**RIG:** 3 Tonne excavator with 250 mm rock toothed bucket

**LOGGED:** RL

**SURVEY DATUM:** MGA94 Zone 52

**WATER OBSERVATIONS:** No free groundwater encountered.

**REMARKS:**

☐ 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:** DIPL (NT)
**PROJECT:** T21-2072 Wurrumiyanga Subdivision
**LOCATION:** Wurrumiyanga, Bathurst Island

**SURFACE LEVEL:** 15.2 m AHD
**EASTING:** 677069
**NORTHING:** 8698752

**PIT No:** 14
**PROJECT No:** 209497.00
**DATE:** 8/8/2023
**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 100mm) |
|---|---|---|---|---|---|---|---|---|---|
| 15 | 0.05 | TOPSOIL - Sandy CLAY CL: Low plasticity, dark-brown, fine to coarse grained, with roots, w<PL, very stiff. | | D | 0.2 | | VOC = 0 | | |
| | 0.4 | Gravelly Sandy CLAY CL: Low plasticity, yellow-brown, fine to coarse sub-angular to sub-rounded gravel, fine to coarse grained sand and roots to 0.3 m, w<PL, very stiff to hard, colluvial. - hard from 0.3 m depth. | | B | 0.5 | | VOC = 0 | | |
| | | | | | 0.7 | | | | |
| 14 | 1 | Silty CLAY CH: Low to medium plasticity, red-brown mottled grey-brown, with fine to coarse grained sand, trace fine to medium gravel, w<PL, hard to very stiff, residual. - very stiff from 1.1 m depth. | | | | | | | 1 |
| | 1.7 | Silty CLAY CI: Medium plasticity, yellow-brown mottled grey-brown, off-white, with fine to coarse grained sand, trace fine to medium gravel, w<PL, very stiff, residual. | | D | 1.8 | | VOC = 0 | | |
| | 2 2.0 | Pit discontinued at 2.0m depth, excavator refusal. | | | | | | | 2 |

Dynamic Penetrometer Test (blows per 100mm): 5, 10, 15, 20

**RIG:** 3 Tonne excavator with 250 mm rock toothed bucket

**LOGGED:** RL

**SURVEY DATUM:** MGA94 Zone 52

**WATER OBSERVATIONS:** No free groundwater encountered.

**REMARKS:**

☐ 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:** DIPL (NT)
**PROJECT:** T21-2072 Wurrumiyanga Subdivision
**LOCATION:** Wurrumiyanga, Bathurst Island

**SURFACE LEVEL:** 17.0 m AHD
**EASTING:** 676968
**NORTHING:** 8698710

**PIT No:** 15
**PROJECT No:** 209497.00
**DATE:** 12/8/2023
**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 100mm) |
|---|---|---|---|---|---|---|---|---|---|
| 17 | 0.25 | TOPSOIL - Sandy CLAY CL: Low plasticity, light-brown, brown, fine to coarse grained sand, with fine to coarse sub-angular to sub-rounded gravel and roots, w<PL, stiff. | | | | | | | |
| | | Sandy CLAY CI: Medium plasticity, yellow-brown mottled red-brown, fine to coarse grained sand, with fine to coarse sub-angular to sub-rounded gravel, w<PL, very stiff to hard, colluvial. | | B | 0.3<br>0.5 | | VOC = 0 | | |
| | | - hard from 0.4 m depth. | | | | | | | |
| 16 | 1 1.0 | Silty CLAY CI: Medium plasticity, red-brown mottled grey-brown, with fine to coarse grained sand, trace fine to medium gravel, w<PL, very stiff, residual. | | D | 1.1 | | VOC = 0 | | 1 |
| 15 | 2 2.0 | Pit discontinued at 2.0m depth, Limit of investigation. | | | | | | | 2 |

Dynamic Penetrometer Test (blows per 100mm): 5, 10, 15, 20

**RIG:** 3 Tonne excavator with 250 mm rock toothed bucket

**LOGGED:** RL

**SURVEY DATUM:** MGA94 Zone 52

**WATER OBSERVATIONS:** No free groundwater encountered.

**REMARKS:**

☐ 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:** DIPL (NT)
**PROJECT:** T21-2072 Wurrumiyanga Subdivision
**LOCATION:** Wurrumiyanga, Bathurst Island

**SURFACE LEVEL:** 16.3 m AHD
**EASTING:** 676967
**NORTHING:** 8698763

**PIT No:** 16
**PROJECT No:** 209497.00
**DATE:** 9/8/2023
**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 100mm) |
|---|---|---|---|---|---|---|---|---|---|
| 16 | 0.1 | TOPSOIL - Sandy CLAY CL: Low plasticity, light-brown, brown, fine to coarse grained, with fine to coarse sub-angular to sub-rounded gravel and roots, w<PL, very stiff. | | D | 0.3 | | VOC = 0 | | |
| | 0.7 | Gravelly Sandy CLAY CI: Medium plasticity, yellow-brown, fine to coarse sub-rounded to rounded gravel, with fine to coarse grained sand, w<PL, very stiff, colluvial. - becoming red-brown mottled yellow-brown at 0.4 m depth. | | D | 0.9 | | VOC = 0 | | |
| 15 | 1 | Silty CLAY CI: Medium plasticity, red-brown mottled grey-brown, with fine to coarse grained sand, trace fine to medium gravel, w<PL, very stiff, residual. | | | | | | | |
| | 1.9 | Pit discontinued at 1.9m depth, excavator refusal. | | | | | | | |

Dynamic Penetrometer Test (blows per 100mm): 5, 10, 15, 20; 1

**RIG:** 3 Tonne excavator with 250 mm rock toothed bucket

**LOGGED:** RL

**SURVEY DATUM:** MGA94 Zone 52

**WATER OBSERVATIONS:** No free groundwater encountered.

**REMARKS:**

☐ 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:** DIPL (NT)
**PROJECT:** T21-2072 Wurrumiyanga Subdivision
**LOCATION:** Wurrumiyanga, Bathurst Island

**SURFACE LEVEL:** 16.6 m AHD
**EASTING:** 676909
**NORTHING:** 8698814

**PIT No:** 17
**PROJECT No:** 209497.00
**DATE:** 9/8/2023
**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 100mm) |
|---|---|---|---|---|---|---|---|---|---|
| 16 | 0.1 | TOPSOIL - Sandy CLAY CL: Low plasticity, light-brown, brown, fine to coarse grained sand, with fine to coarse sub-angular to sub-rounded gravel and roots, w<PL, very stiff. | | D<br>E<br>B | 0.2<br>0.4 | | VOC = 0 | | |
| | 0.7 | Silty CLAY CI: Medium plasticity, yellow-brown, with fine to coarse grained sand, trace fine to medium gravel, with roots to 0.3 m depth, w<PL, very stiff, colluvial.<br>- red-brown mottled yellow-brown from 0.3 m depth. | | D | 0.8 | | VOC = 0 | | |
| 15 | 1 | Silty CLAY CI: Medium plasticity, red-brown mottled grey-brown, with fine to coarse grained sand, trace fine to medium gravel, w<PL, very stiff, residual. | | | | | | | |
| | 2 | | | | | | | | |
| | 2.1 | Pit discontinued at 2.1m depth, Limit of investigation. | | | | | | | |

Dynamic Penetrometer Test (blows per 100mm): 5, 10, 15, 20

**RIG:** 3 Tonne excavator with 250 mm rock toothed bucket

**LOGGED:** RL

**SURVEY DATUM:** MGA94 Zone 52

**WATER OBSERVATIONS:** No free groundwater encountered.

**REMARKS:**

☐ 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:** DIPL (NT)
**PROJECT:** T21-2072 Wurrumiyanga Subdivision
**LOCATION:** Wurrumiyanga, Bathurst Island

**SURFACE LEVEL:** 17.5 m AHD
**EASTING:** 676886
**NORTHING:** 8698688

**PIT No:** 18
**PROJECT No:** 209497.00
**DATE:** 12/8/2023
**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 100mm) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.1 | TOPSOIL - Sandy CLAY CL: Low plasticity, light-brown, brown, fine to coarse grained sand, with fine to coarse gravel and roots, w<PL, stiff. | | | | | | | |
| 17 | | Sandy CLAY CI: Medium plasticity, yellow-brown, fine to coarse grained sand, with fine to coarse sub-rounded to rounded gravel, w<PL, very stiff to hard, colluvial. | | B | 0.3 | | VOC = 0 | | |
| | | - hard from 0.5 m depth. | | | 0.5 | | | | |
| | 0.8 | Silty CLAY CI: Medium plasticity, red-brown mottled grey-brown, with fine to coarse grained sand, trace fine to coarse gravel, w<PL, hard to very stiff, residual. | | D | 1.0 | | VOC = 0 | | |
| 16 | 1 | - very stiff from 1.5 m depth. | | | | | | | 1 |
| | | - grey-brown mottled yellow-brown from 1.6 m depth. | | | | | | | |
| | 2 | - hard from 1.9 m depth. | | | | | | | 2 |
| | 2.3 | Pit discontinued at 2.3m depth, excavator refusal. | | | | | | | |

Dynamic Penetrometer Test (blows per 100mm): 5, 10, 15, 20

**RIG:** 3 Tonne excavator with 250 mm rock toothed bucket

**LOGGED:** RL

**SURVEY DATUM:** MGA94 Zone 52

**WATER OBSERVATIONS:** No free groundwater encountered.

**REMARKS:**

☐ 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:** DIPL (NT)
**PROJECT:** T21-2072 Wurrumiyanga Subdivision
**LOCATION:** Wurrumiyanga, Bathurst Island

**SURFACE LEVEL:** 15.2 m AHD
**EASTING:** 677027
**NORTHING:** 8698837

**PIT No:** 19
**PROJECT No:** 209497.00
**DATE:** 9/8/2023
**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 100mm) |
|---|---|---|---|---|---|---|---|---|---|
| 15 | 0.1 | TOPSOIL - Sandy CLAY CL: Low plasticity, light-brown, brown, fine to coarse grained sand, with fine to coarse gravel and roots, w<PL, very stiff. | | | | | | | |
| | | Sandy Gravelly CLAY CI: Medium plasticity, yellow-brown, fine to coarse grained sand, fine to coarse sub-angular to sub-rounded gravel, w<PL, very stiff, colluvial. | | | 0.4 | | | | |
| | | | | B | | | VOC = 0 | | |
| | 0.7 | - yellow-brown mottled red-brown from 0.4 m depth. | | | 0.6 | | | | |
| | | - hard from 0.5 m depth. | | D | 0.8 | | VOC=0 | | |
| 14 | 1 | Silty CLAY CH: High plasticity, red-brown mottled grey-brown, with fine to coarse grained sand, trace fine to medium gravel, w<PL, very stiff to hard, residual. | | | | | | | |
| | | - hard from 1.6 m depth. | | | | | | | |
| | 1.9 | Pit discontinued at 1.9m depth, excavator refusal. | | | | | | | |

Dynamic Penetrometer Test (blows per 100mm): 5, 10, 15, 20; 1

**RIG:** 3 Tonne excavator with 250 mm rock toothed bucket

**LOGGED:** RL

**SURVEY DATUM:** MGA94 Zone 52

**WATER OBSERVATIONS:** No free groundwater encountered.

**REMARKS:**

☐ 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:** DIPL (NT)
**PROJECT:** T21-2072 Wurrumiyanga Subdivision
**LOCATION:** Wurrumiyanga, Bathurst Island

**SURFACE LEVEL:** 15.1 m AHD
**EASTING:** 676986
**NORTHING:** 8698854

**PIT No:** 20
**PROJECT No:** 209497.00
**DATE:** 9/8/2023
**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 100mm) |
|---|---|---|---|---|---|---|---|---|---|
| 15 | 0.1 | TOPSOIL - Sandy CLAY CL: Low plasticity, light-brown, fine to coarse grained sand, with roots, w<PL, very stiff. | | D | 0.2 | | VOC = 0 | | |
| | | | | E | 0.3 | | VOC = 0 | | |
| | 0.4 | Clayey Sandy GRAVEL GC: Fine to coarse sub-angular to sub-rounded gravel, yellow-brown, medium plasticity clay, fine to coarse grained sand and roots to 0.2 m depth, moist, dense, colluvial. | | D | | | | | |
| 14 | 1 | Silty CLAY CI: Medium plasticity, red-brown mottled grey-brown, with fine to coarse grained sand, trace fine to medium gravel, w<PL, stiff to very stiff, residual. | | D | 0.7 | | VOC = 0 | | |
| | | - very stiff from 0.9 m depth. | | | | | | | |
| | | - stiff from 1.3 m depth. | | | | | | | |
| | 1.8 | Pit discontinued at 1.8m depth, excavator refusal. | | | | | | | |

Dynamic Penetrometer Test (blows per 100mm): 5, 10, 15, 20

**RIG:** 3 Tonne excavator with 250 mm rock toothed bucket

**LOGGED:** RL

**SURVEY DATUM:** MGA94 Zone 52

**WATER OBSERVATIONS:** No free groundwater encountered.

**REMARKS:**

☐ 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:** DIPL (NT)
**PROJECT:** T21-2072 Wurrumiyanga Subdivision
**LOCATION:** Wurrumiyanga, Bathurst Island

**SURFACE LEVEL:** 17.5 m AHD
**EASTING:** 676855
**NORTHING:** 8698758

**PIT No:** 21
**PROJECT No:** 209497.00
**DATE:** 12/8/2023
**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 100mm) |
|---|---|---|---|---|---|---|---|---|---|
| 17 | 0.2 | TOPSOIL - Sandy CLAY CL: Low plasticity, light-brown, brown, fine to coarse grained sand, with fine to coarse gravel and roots, w<PL, hard. | | | | | | | |
| | | Clayey Sandy GRAVEL GC: Fine to coarse sub-angular to angular gravel, yellow-brown, red-brown, medium plasticity clay, fine to coarse grained sand, with roots to 1.0 m depth, dry, dense , colluvial. | | D | 0.4 | | VOC = 0 | | |
| | 1 | | | | | | | | 1 |
| 16 | 1.2 | Silty CLAY CI: Medium plasticity, red-brown mottled grey-brown, with fine to coarse grained sand, trace fine to medium gravel, w<PL, very stiff to hard, residual. | | D | 1.3 | | VOC = 0 | | |
| | 2 | - grey-brown mottled orange-brown, yellow-brown at 1.8 m depth. | | | | | | | 2 |
| | | - hard from 2.1 m depth. | | | | | | | |
| | 2.4 | Pit discontinued at 2.4m depth, excavator refusal. | | | | | | | |

Dynamic Penetrometer Test (blows per 100mm): 5, 10, 15, 20

**RIG:** 3 Tonne excavator with 250 mm rock toothed bucket

**LOGGED:** RL

**SURVEY DATUM:** MGA94 Zone 52

**WATER OBSERVATIONS:** No free groundwater encountered.

**REMARKS:**

☐ 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

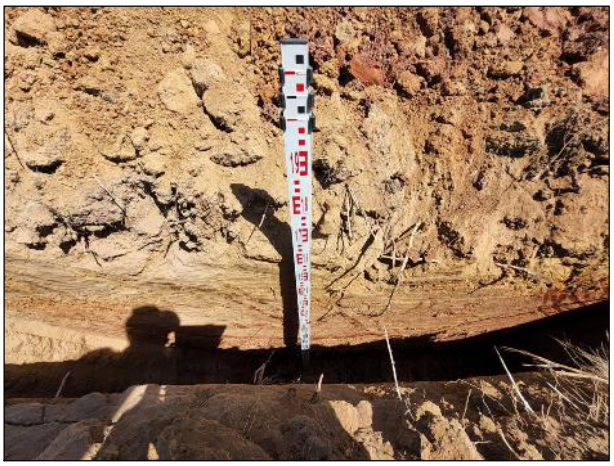
**CLIENT:** DIPL (NT)
**PROJECT:** T21-2072 Wurrumiyanga Subdivision
**LOCATION:** Wurrumiyanga, Bathurst Island

**SURFACE LEVEL:** 14.3 m AHD
**EASTING:** 677073
**NORTHING:** 8698925

**PIT No:** 22
**PROJECT No:** 209497.00
**DATE:** 10/8/2023
**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 100mm) |
|---|---|---|---|---|---|---|---|---|---|
| 14 | 0.1 | TOPSOIL - Sandy CLAY CL: Low plasticity, light-brown, brown, fine to coarse grained sand, with fine to coarse gravel and roots, w<PL, very stiff. | | | | | | | |
| | | Clayey Sandy GRAVEL GC: Fine to coarse sub-rounded to rounded gravel, red-brown mottled yellow-brown, medium plasticity clay, fine to coarse grained sand, dry, dense, colluvial. | | D | 0.4 | | VOC = 0 | | |
| | 0.7 | Silty CLAY CI: Medium plasticity, red-brown mottled grey-brown, with fine to coarse grained sand, trace fine to medium gravel, w<PL, very stiff to hard, residual. | | | | | | | |
| 13 | 1 | - very stiff from 1.4 m depth. | | | | | | | |
| | 1.9 | Pit discontinued at 1.9m depth, excavator refusal. | | | | | | | |

Dynamic Penetrometer Test (blows per 100mm): 5, 10, 15, 20



**RIG:** 3 Tonne excavator with 250 mm rock toothed bucket

**LOGGED:** RL

**SURVEY DATUM:** MGA94 Zone 52

**WATER OBSERVATIONS:** No free groundwater encountered.

**REMARKS:**

☐ 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:** DIPL (NT)
**PROJECT:** T21-2072 Wurrumiyanga Subdivision
**LOCATION:** Wurrumiyanga, Bathurst Island

**SURFACE LEVEL:** 16.8 m AHD
**EASTING:** 676870
**NORTHING:** 8698791

**PIT No:** 23
**PROJECT No:** 209497.00
**DATE:** 11/8/2023
**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 100mm) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | TOPSOIL - Clayey Sandy GRAVEL GC: Fine to coarse sub-rounded to rounded gravel, light-brown, yellow-brown, fine to coarse grained sand, low plasticity clay, with roots, dry, dense. | | D | 0.3 | | VOC = 0 | | |
| | 0.5 | Clayey SAND SC: Fine to coarse grained, yellow-brown, low plasticity clay, with fine to coarse grained, yellow-brown, low to medium plasticity clay, with fine to coarse gravel, dry, medium dense, with roots, colluvial. | | D | 0.6 | | VOC = 0 | | |
| 16 | 1.0 | Clayey Gravelly SAND SC: Fine to coarse grained, yellow-brown, low to medium plasticity clay, fine to coarse sub-rounded to rounded gravel, dry, medium dense to dense, colluvial. - dense from 0.7 m depth. | | D | 1.2 | | VOC = 0 | | |
| 15 | 1.6 | Clayey Sandy GRAVEL GC: Fine to coarse sub-angular to sub-rounded gravel, yellow-brown, red-brown, medium plasticity clay, fine to coarse grained sand, dry, dense , colluvial. | | | | | | | |
| | 2.3 | Silty CLAY CI: Medium plasticity, red-brown mottled grey-brown, with fine to coarse grained sand, trace fine to medium gravel, w<PL, very stiff, residual. | | | | | | | |
| | | Pit discontinued at 2.3m depth, Limit of investigation. | | | | | | | |

**RIG:** 3 Tonne excavator with 250 mm rock toothed bucket

**LOGGED:** RL

**SURVEY DATUM:** MGA94 Zone 52

**WATER OBSERVATIONS:** No free groundwater encountered.

**REMARKS:**

☐ 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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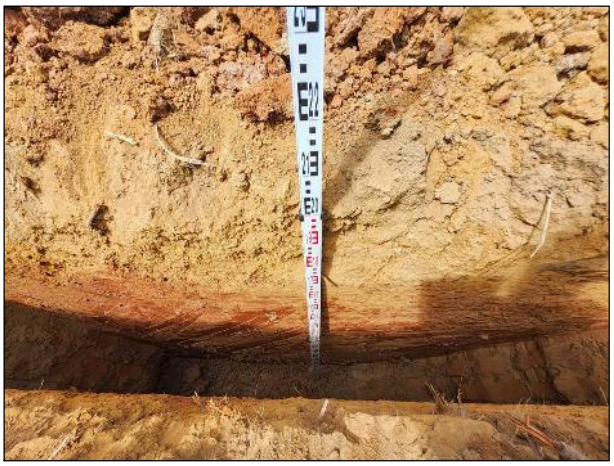
# TEST PIT LOG

**CLIENT:** DIPL (NT)
**PROJECT:** T21-2072 Wurrumiyanga Subdivision
**LOCATION:** Wurrumiyanga, Bathurst Island

**SURFACE LEVEL:** 15.6 m AHD
**EASTING:** 676923
**NORTHING:** 8698888

**PIT No:** 24
**PROJECT No:** 209497.00
**DATE:** 9/8/2023
**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 100mm) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.1 | TOPSOIL - Sandy CLAY CL: Low plasticity, light-brown, brown, fine to coarse grained sand, with fine to coarse sub-angular to sub-rounded gravel and roots, w<PL, very stiff. | | D | 0.2 | | VOC = 0 | | |
| | 0.4 | Clayey Sandy GRAVEL GC: Fine to coarse sub-rounded to rounded gravel, yellow-brown, medium plasticity clay, with fine to coarse grained sand and roots to 0.2 m, moist, dense, colluvial. | | B | 0.4 | | VOC = 0 | | |
| 15 | | | | | 0.6 | | | | |
| | 1 | Silty CLAY CI: Medium plasticity, red-brown mottled grey-brown, with fine to coarse grained sand, trace fine to medium gravel, w<PL, hard to very stiff, residual. | | | | | | | 1 |
| | | - very stiff from 1.2 m depth. | | | | | | | |
| 14 | | | | | | | | | |
| | 2 | - hard and grey-brown mottled red-brown at 1.9 m depth | | D | 2.0 | | VOC = 0 | | 2 |
| | 2.1 | Pit discontinued at 2.1m depth, excavator refusal. | | | | | | | |



**RIG:** 3 Tonne excavator with 250 mm rock toothed bucket

**LOGGED:** RL

**SURVEY DATUM:** MGA94 Zone 52

**WATER OBSERVATIONS:** No free groundwater encountered.

**REMARKS:**

☐ 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:** DIPL (NT)
**PROJECT:** T21-2072 Wurrumiyanga Subdivision
**LOCATION:** Wurrumiyanga, Bathurst Island

**SURFACE LEVEL:** 15.0 m AHD
**EASTING:** 676988
**NORTHING:** 8698916

**PIT No:** 25
**PROJECT No:** 209497.00
**DATE:** 9/8/2023
**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 100mm) |
|---|---|---|---|---|---|---|---|---|---|
| 15 | 0.1 | TOPSOIL - Sandy CLAY CL: Low plasticity, light-brown, brown, fine to coarse grained sand, with fine to coarse sub-angular to sub-rounded gravel and roots, w<PL, very stiff. | | B | 0.3 | | VOC = 0 | | |
| | 0.7 | Silty CLAY CI: Medium plasticity, yellow-brown, with fine to coarse grained sand and roots to 0.3 m, trace fine to medium gravel, w<PL, very stiff, colluvial. | | | 0.5 | | | | |
| 14 | 1 | - becoming red-brown mottled yellow-brown at 0.3 m depth. | | D | 0.8 | | VOC = 0 | | 1 |
| | | Silty CLAY CI: Medium plasticity, red-brown mottled grey-brown, with fine to coarse grained sand, trace fine to medium gravel, w<PL, very stiff to stiff, residual. | | | | | | | |
| | | - stiff from 1.2 m depth. | | | | | | | |
| 13 | 2 | - grey-brown mottled red-brown at 1.9 m depth | | | | | | | 2 |
| | 2.1 | Pit discontinued at 2.1m depth, excavator refusal. | | | | | | | |

**RIG:** 3 Tonne excavator with 250 mm rock toothed bucket

**LOGGED:** RL

**SURVEY DATUM:** MGA94 Zone 52

**WATER OBSERVATIONS:** No free groundwater encountered.

**REMARKS:**

☐ 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

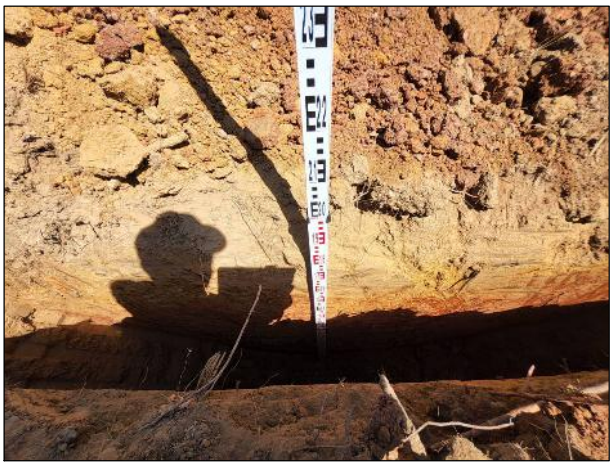
**CLIENT:** DIPL (NT)
**PROJECT:** T21-2072 Wurrumiyanga Subdivision
**LOCATION:** Wurrumiyanga, Bathurst Island

**SURFACE LEVEL:** 14.3 m AHD
**EASTING:** 677067
**NORTHING:** 8698953

**PIT No:** 26
**PROJECT No:** 209497.00
**DATE:** 10/8/2023
**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 100mm) |
|---|---|---|---|---|---|---|---|---|---|
| 14 | 0.1 | TOPSOIL - Sandy CLAY CL: Low plasticity, light-brown, fine to coarse grained, with roots, w<PL, very stiff. | | | | | | | |
| | | Sandy CLAY CI: Medium plasticity, yellow-brown, fine to coarse grained sand, with fine to coarse gravel, w<PL, very stiff to hard, colluvial. | | D | 0.3 | | VOC = 0 | | |
| | | - red-brown mottled yellow-brown from 0.4 m depth. | | | | | | | |
| | | - hard from 0.5 m depth. | | | | | | | |
| | 0.9 | | | | | | | | |
| 13 | 1 | Silty CLAYCI: Medium plasticity, red-brown mottled grey-brown, with fine to coarse grained sand, trace fine to medium gravel, w<PL, hard to very-stiff, residual. | | D | 1.1 | | VOC = 0 | | 1 |
| | | - very stiff from 1.4 m depth. | | | | | | | |
| | 1.9 | - grey-brown mottled red-brown from 1.8 m depth. | | | | | | | |
| | | Pit discontinued at 1.9m depth, excavator refusal. | | | | | | | |

Dynamic Penetrometer Test (blows per 100mm): 5, 10, 15, 20



**RIG:** 3 Tonne excavator with 250 mm rock toothed bucket

**LOGGED:** RL

**SURVEY DATUM:** MGA94 Zone 52

**WATER OBSERVATIONS:** No free groundwater encountered.

**REMARKS:**

☐ 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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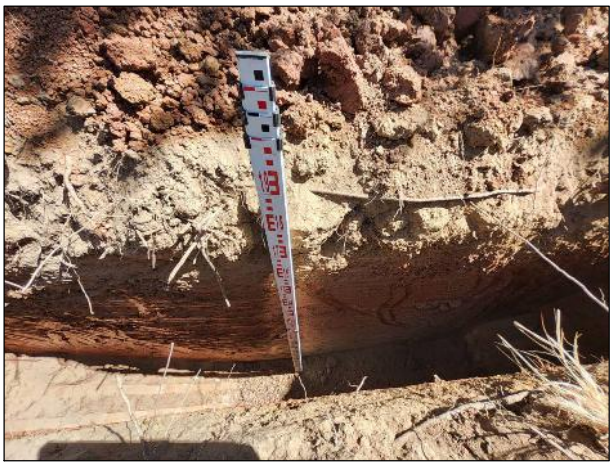
# TEST PIT LOG

**CLIENT:** DIPL (NT)
**PROJECT:** T21-2072 Wurrumiyanga Subdivision
**LOCATION:** Wurrumiyanga, Bathurst Island

**SURFACE LEVEL:** 14.6 m AHD
**EASTING:** 677821
**NORTHING:** 8698991

**PIT No:** 27
**PROJECT No:** 209497.00
**DATE:** 10/8/2023
**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 100mm) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | TOPSOIL - Sandy CLAY CL: Low plasticity, light-brown, fine to coarse grained sand, with roots, w<PL, stiff. | | D | 0.2 | | | | |
| | | Clayey GRAVEL GC: Fine to coarse sub-rounded to rounded gravel, red-brown mottled yellow-brown, low plasticity clay, with fine to coarse grained sand, moist, dense to very dense, colluvial. | | E | 0.3 | | VOC = 0 | | |
| 14 | | - very dense from 0.4 m depth. | | B | 0.5 | | | | |
| | 0.8 | Silty CLAY CI: Medium plasticity, red-brown mottled grey-brown, with fine to coarse grained sand, trace fine to medium gravel, w<PL, estimated very stiff to hard, residual. | | | | | | | 1 |
| 1 | | - grey-brown mottled red-brown from 1.2 m depth. | | D | 1.4 | | VOC = 0 | | |
| 13 | | | | | 1.6 | | | | |
| | 1.9 | Pit discontinued at 1.9m depth, excavator refusal. | | | | | | | |



**RIG:** 3 Tonne excavator with 250 mm rock toothed bucket

**LOGGED:** RL

**SURVEY DATUM:** MGA94 Zone 52

**WATER OBSERVATIONS:** No free groundwater encountered.

**REMARKS:**

☐ 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:** DIPL (NT)
**PROJECT:** T21-2072 Wurrumiyanga Subdivision
**LOCATION:** Wurrumiyanga, Bathurst Island

**SURFACE LEVEL:** 13.6 m AHD
**EASTING:** 677081
**NORTHING:** 8699039

**PIT No:** 28
**PROJECT No:** 209497.00
**DATE:** 10/8/2023
**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 100mm) |
|---|---|---|---|---|---|---|---|---|---|
| 13 | 0.2 | TOPSOIL - Clayey Sandy GRAVEL GC: Fine to coarse sub-angular to sub-rounded gravel, light-brown, low plasticity clay, fine to coarse grained sand and roots, dry, very dense. | | D<br>E<br>B | 0.2<br>0.3<br>0.5 | | VOC = 0 | | |
| | 0.8 | Clayey Sandy GRAVEL GC: Fine to coarse sub-angular to sub-rounded gravel, red-brown, yellow-brown, medium plasticity clay, fine to coarse grained sand, dry, very dense, colluvial. | | | | | | | |
| 12 | 1 | Silty CLAY CH: High plasticity, red-brown mottled grey-brown, trace fine to coarse grained sand and fine to medium gravel, w<PL, estimated very stiff to hard, residual. | | D | 1.0 | | VOC = 0 | | 1 |
| | | - grey-brown mottled red-brown from 1.8 m depth. | | | | | | | |
| | 2 2.0 | Pit discontinued at 2.0m depth, excavator refusal. | | | | | | | 2 |

Dynamic Penetrometer Test (blows per 100mm): 5, 10, 15, 20

**RIG:** 3 Tonne excavator with 250 mm rock toothed bucket

**LOGGED:** RL

**SURVEY DATUM:** MGA94 Zone 52

**WATER OBSERVATIONS:** No free groundwater encountered.

**REMARKS:**

☐ 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:** DIPL (NT)
**PROJECT:** T21-2072 Wurrumiyanga Subdivision
**LOCATION:** Wurrumiyanga, Bathurst Island

**SURFACE LEVEL:** 14.8 m AHD
**EASTING:** 676986
**NORTHING:** 8698961

**PIT No:** 29
**PROJECT No:** 209497.00
**DATE:** 10/8/2023
**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 100mm) |
|---|---|---|---|---|---|---|---|---|---|
| 14 | 0.2 | TOPSOIL - Sandy CLAY CL: Low plasticity, light-brown, fine to coarse grained sand, with roots, w<PL, very stiff. | | | | | | | |
| | 0.5 | Clayey Sandy GRAVEL GC: Fine to coarse sub-angular to sub-rounded gravel, yellow-brown, grey-brown, medium plasticity clay, fine to coarse grained sand, moist, medium dense to dense, colluvial. - dense from 0.4 m depth. | | D | 0.3 | | VOC = 0 | | |
| 13 | 1 | Silty CLAY CI: Medium plasticity, red-brown mottled grey-brown, low plasticity silt, w≤PL, very stiff, residual. | | | | | | | |
| | 2 | | | | | | | | |
| | 2.1 | Pit discontinued at 2.1m depth, Limit of investigation. | | | | | | | |

Dynamic Penetrometer Test (blows per 100mm): 5, 10, 15, 20

**RIG:** 3 Tonne excavator with 250 mm rock toothed bucket

**LOGGED:** RL

**SURVEY DATUM:** MGA94 Zone 52

**WATER OBSERVATIONS:** No free groundwater encountered.

**REMARKS:** Possible floodplain area.

☐ 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:** DIPL (NT)
**PROJECT:** T21-2072 Wurrumiyanga Subdivision
**LOCATION:** Wurrumiyanga, Bathurst Island

**SURFACE LEVEL:** 15.6 m AHD
**EASTING:** 676908
**NORTHING:** 8698932

**PIT No:** 30
**PROJECT No:** 209497.00
**DATE:** 10/8/2023
**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 100mm) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.1 | TOPSOIL - Sandy CLAY CL: Low plasticity, light-brown, fine to coarse grained sand, with roots, w<PL, hard. | | D | 0.2 | | VOC = 0 | | |
| | | Clayey Sandy GRAVEL GC: Fine to coarse sub-angular to sub-rounded gravel, yellow-brown, red-brown, medium plasticity clay, fine to coarse grained sand, moist, medium dense, colluvial. | | U | 0.5 | | | | |
| 15 | 0.7 | Silty CLAY CI: Medium plasticity, red-brown mottled grey-brown, with fine to coarse grained sand, trace fine to medium gravel, w<PL, very stiff, residual. | | | | | | | |
| 14 | 1 | | | | | | | | 1 |
| | | - light-grey mottled red-brown from 1.8 m depth. | | D | 1.8 | | VOC = 0 | | |
| | 2 | | | | | | | | 2 |
| | 2.1 | Pit discontinued at 2.1m depth, Limit of investigation. | | | | | | | |

**RIG:** 3 Tonne excavator with 250 mm rock toothed bucket

**LOGGED:** RL

**SURVEY DATUM:** MGA94 Zone 52

**WATER OBSERVATIONS:** No free groundwater encountered.

**REMARKS:**

☐ 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:** DIPL (NT)
**PROJECT:** T21-2072 Wurrumiyanga Subdivision
**LOCATION:** Wurrumiyanga, Bathurst Island

**SURFACE LEVEL:** 15.3 m AHD
**EASTING:** 676950
**NORTHING:** 8698998

**PIT No:** 31
**PROJECT No:** 209497.00
**DATE:** 10/8/2023
**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 100mm) |
|---|---|---|---|---|---|---|---|---|---|
| 15 | 0.2 | TOPSOIL - Sandy CLAY CL: Low plasticity, light-brown, fine to coarse grained sand, with roots, w<PL, very stiff. | | D | 0.2 | | | | |
| | 0.4 | Sandy Clayey GRAVEL GC: Fine to coarse sub-angular to sub-rounded gravel, yellow-brown, red-brown, low plasticity clay, fine to coarse grained sand, dry, dense, colluvial. | | E D | 0.3 | | VOC = 0 | | |
| | | | | | 0.5 | | VOC = 0 | | |
| | | | | B | 0.7 | | | | |
| 14 | 1 | Silty CLAY CH: High plasticity, red-brown mottled grey-brown, with fine to coarse grained sand, trace fine to medium gravel, w<PL, hard to very stiff, residual.<br>- very stiff from 0.7 m depth.<br>- light-grey mottled red-brown from 1.0 m depth.<br>- hard from 1.4 m depth. | | | | | | | 1 |
| | 1.9 | Pit discontinued at 1.9m depth, excavator refusal. | | | | | | | |

5 10 15 20

**RIG:** 3 Tonne excavator with 250 mm rock toothed bucket

**LOGGED:** RL

**SURVEY DATUM:** MGA94 Zone 52

**WATER OBSERVATIONS:** No free groundwater encountered.

**REMARKS:**

☐ 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:** DIPL (NT)
**PROJECT:** T21-2072 Wurrumiyanga Subdivision
**LOCATION:** Wurrumiyanga, Bathurst Island

**SURFACE LEVEL:** 15.0 m AHD
**EASTING:** 676968
**NORTHING:** 8699033

**PIT No:** 32
**PROJECT No:** 209497.00
**DATE:** 14/8/2023
**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 100mm) |
|---|---|---|---|---|---|---|---|---|---|
| 15 | 0.1 | TOPSOIL - Clayey Sandy GRAVEL GC: Fine to coarse sub-angular to sub-rounded gravel, light-brown, fine to coarse grained sand, low plasticity clay, dry, very dense, roots. | | D | 0.3 | | VOC = 0 | | |
| | 0.7 | Clayey Sandy GRAVEL GC: Fine to coarse sub-rounded to rounded gravel, brown, light-brown, medium plasticity clay, fine to coarse grained sand, dry, very dense, colluvial. | | | | | | | |
| 14 | 1 | Silty CLAY CI: Medium plasticity, red-brown mottled grey-brown, with fine to coarse grained sand, trace fine to medium gravel, w<PL, hard, residual. | | U | 1.4 | | | | |
| 13 | 2 | | | | | | | | |
| | 2.1 | Pit discontinued at 2.1m depth, Limit of investigation. | | | | | | | |

Dynamic Penetrometer Test (blows per 100mm): 5, 10, 15, 20

**RIG:** 3 Tonne excavator with 250 mm rock toothed bucket

**LOGGED:** RL

**SURVEY DATUM:** MGA94 Zone 52

**WATER OBSERVATIONS:** No free groundwater encountered.

**REMARKS:**

☐ 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:** DIPL (NT)
**PROJECT:** T21-2072 Wurrumiyanga Subdivision
**LOCATION:** Wurrumiyanga, Bathurst Island

**SURFACE LEVEL:** 15.8 m AHD
**EASTING:** 676859
**NORTHING:** 8698935

**PIT No:** 33
**PROJECT No:** 209497.00
**DATE:** 11/8/2023
**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 100mm) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | TOPSOIL - Sandy GRAVEL GW: Fine to coarse sub-rounded to rounded gravel, light-brown, fine to coarse grained sand, with roots, trace low plasticity clay, dry, very dense, colluvial. | | B<br>E | 0.3<br>0.4<br>0.5 | | VOC = 0 | | |
| | 0.6 | Clayey Sandy GRAVEL GC: Fine to coarse sub-rounded to rounded gravel, brown, light-brown, medium plasticity clay, fine to coarse grained sand, dry, medium dense, colluvial. | | | | | | | |
| 15 | 1 | Silty CLAY CI: Medium plasticity, red-brown mottled grey-brown, with fine to coarse grained sand, trace fine to medium gravel, w<PL, stiff, residual. | | D | 1.0 | | | | 1 |
| | 1.4 | Silty CLAY CI-CH: Medium to high plasticity, yellow-brown mottled grey-brown, orange-brown, with fine to coarse grained sand, with fine to coarse gravel, w>PL, very stiff to hard, residual. | | D | 1.6 | | VOC = 0 | | |
| 14 | 2 | - hard from 1.7 m depth. | | | | | | | 2 |
| | 2.1 | Pit discontinued at 2.1m depth, excavator refusal. | | | | | | | |

**RIG:** 3 Tonne excavator with 250 mm rock toothed bucket

**LOGGED:** RL

**SURVEY DATUM:** MGA94 Zone 52

**WATER OBSERVATIONS:** No free groundwater encountered.

**REMARKS:**

☐ 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:** DIPL (NT)
**PROJECT:** T21-2072 Wurrumiyanga Subdivision
**LOCATION:** Wurrumiyanga, Bathurst Island

**SURFACE LEVEL:** 13.9 m AHD
**EASTING:** 677021
**NORTHING:** 8699086

**PIT No:** 34
**PROJECT No:** 209497.00
**DATE:** 10/8/2023
**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 100mm) |
|---|---|---|---|---|---|---|---|---|---|
| 13 | 0.2 | TOPSOIL - Clayey Sandy GRAVEL GC: Fine to coarse sub-rounded to rounded gravel, light-brown, grey-brown, fine to coarse grained sand, low plasticity clay and roots, dry, very dense. | | D | 0.1 | | VOC = 0 | | |
| | | | | D | 0.3 | | VOC = 0 | | |
| | 0.5 | Clayey Sandy GRAVEL GC: Fine to coarse sub-rounded to rounded gravel, red-brown mottled yellow-brown, medium plasticity clay, fine to coarse grained sand, dry, very dense, colluvial. | | | | | | | |
| | 1 | Silty CLAY CI: Medium plasticity, grey-brown mottled red-brown, with fine to coarse grained sand, trace fine to medium gravel, w<PL, estimated very stiff to hard, residual. | | | | | | | 1 |
| 12 | 1.9 | Pit discontinued at 1.9m depth, excavator refusal. | | | | | | | |

5 10 15 20

**RIG:** 3 Tonne excavator with 250 mm rock toothed bucket

**LOGGED:** RL

**SURVEY DATUM:** MGA94 Zone 52

**WATER OBSERVATIONS:** No free groundwater encountered.

**REMARKS:** Possible floodplain area.

☐ 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:** DIPL (NT)
**PROJECT:** T21-2072 Wurrumiyanga Subdivision
**LOCATION:** Wurrumiyanga, Bathurst Island

**SURFACE LEVEL:** 14.4 m AHD
**EASTING:** 676973
**NORTHING:** 8699070

**PIT No:** 35
**PROJECT No:** 209497.00
**DATE:** 14/8/2023
**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 100mm) |
|---|---|---|---|---|---|---|---|---|---|
| 14 | 0.2 | TOPSOIL - Clayey Sandy Gravel GC: Fine to coarse sub-rounded to rounded gravel, light-brown, fine to coarse grained sand, dry, dense, colluvial, with roots. | | D | 0.2 | | VOC = 0 | | |
| | 0.5 | Sandy Clayey GRAVEL GC: Fine to coarse sub-rounded to rounded gravel, red-brown, fine to coarse grained sand, medium plasticity clay, dry, medium dense, colluvial. | | D | 0.5 | | VOC = 0 | | |
| 13 | 1 | Silty CLAY CI: Medium plasticity, red-brown mottled light-grey, with fine to coarse grained sand, trace fine to medium gravel, w<PL, very stiff to hard, residual. - hard from 0.6 m depth. - light-grey, red-brown from 1.1m depth | | | | | | | |
| | 2 | | | | | | | | |
| | 2.1 | Pit discontinued at 2.1m depth, excavator refusal. | | | | | | | |

**RIG:** 3 Tonne excavator with 250 mm rock toothed bucket

**LOGGED:** RL

**SURVEY DATUM:** MGA94 Zone 52

**WATER OBSERVATIONS:** No free groundwater encountered.

**REMARKS:**

☐ 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:** DIPL (NT)
**PROJECT:** T21-2072 Wurrumiyanga Subdivision
**LOCATION:** Wurrumiyanga, Bathurst Island

**SURFACE LEVEL:** 15.8 m AHD
**EASTING:** 676817
**NORTHING:** 8698974

**PIT No:** 36
**PROJECT No:** 209497.00
**DATE:** 11/8/2023
**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 100mm) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.1 | TOPSOIL - Clayey Sandy GRAVEL GC: Fine to coarse sub-rounded to rounded gravel, light-brown, fine to coarse grained sand, low plasticity clay, with roots, dry, dense. | | B | 0.2 | | VOC = 0 | | |
| | | | | | 0.4 | | | | |
| 15 | 0.7 | Sandy Clayey GRAVEL GC: Fine to coarse sub-rounded to rounded gravel, red-brown mottled yellow-brown, red-brown, medium plasticity clay, fine to coarse grained sand, dry, dense to very dense, colluvial. - very dense from 0.4 m depth. | | | | | | | |
| 1 | | Silty CLAY CI: Medium plasticity, red-brown mottled grey-brown, with fine to coarse grained sand, trace fine to medium gravel, w<PL, very stiff to hard, residual. | | D | 1.0 | | VOC = 0 | | 1 |
| 14 | | - grey-brown mottled red-brown from 1.7 m depth. | | | | | | | |
| 2 | | - hard from 2.0 m depth. | | | | | | | 2 |
| | 2.4 | Pit discontinued at 2.4m depth, excavator refusal. | | | | | | | |

Dynamic Penetrometer Test (blows per 100mm): 5, 10, 15, 20

**RIG:** 3 Tonne excavator with 250 mm rock toothed bucket

**LOGGED:** RL

**SURVEY DATUM:** MGA94 Zone 52

**WATER OBSERVATIONS:** No free groundwater encountered.

**REMARKS:**

☐ 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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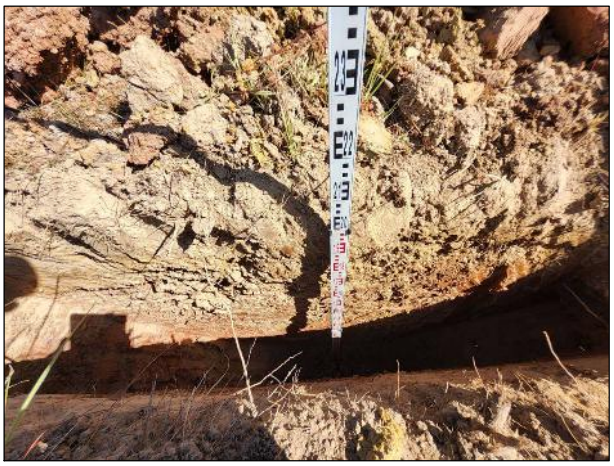
# TEST PIT LOG

**CLIENT:** DIPL (NT)
**PROJECT:** T21-2072 Wurrumiyanga Subdivision
**LOCATION:** Wurrumiyanga, Bathurst Island

**SURFACE LEVEL:** 16.4 m AHD
**EASTING:** 676814
**NORTHING:** 8698859

**PIT No:** 37
**PROJECT No:** 209497.00
**DATE:** 11/8/2023
**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 100mm) |
|---|---|---|---|---|---|---|---|---|---|
| 16 | 0.1 | TOPSOIL - Clayey Sandy GRAVEL GC: Fine to coarse sub-angular to angular gravel, light-brown, brown, fine to coarse grained sand, low plasticity clay, with roots, dry, medium dense. | | D | 0.3 | | VOC = 0 | | |
| | 0.6 | Clayey Sandy GRAVEL GC: Fine to coarse sub-angular to sub-rounded gravel, red-brown, yellow-brown, low plasticity clay, fine to coarse grained sand, dry, dense, colluvial. | | | | | | | |
| 15 | 1 | Silty CLAY CI: Medium plasticity, red-brown mottled grey-brown, with fine to coarse grained sand, trace fine to medium gravel, w<PL, very stiff, residual. | | | | | | | |
| | 1.5 | Silty CLAY CI: Medium plasticity, yellow-brown mottled grey-brown, red-brown, with fine to coarse grained sand, trace fine to medium gravel, w<PL, very stiff, residual. | | D | 1.6 | | VOC = 0 | | |
| | 2 | | | | | | | | |
| | 2.1 | Pit discontinued at 2.1m depth, excavator refusal. | | | | | | | |



**RIG:** 3 Tonne excavator with 250 mm rock toothed bucket

**LOGGED:** RL

**SURVEY DATUM:** MGA94 Zone 52

**WATER OBSERVATIONS:** No free groundwater encountered.

**REMARKS:**

☐ 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:** DIPL (NT)
**PROJECT:** T21-2072 Wurrumiyanga Subdivision
**LOCATION:** Wurrumiyanga, Bathurst Island

**SURFACE LEVEL:** 15.6 m AHD
**EASTING:** 676871
**NORTHING:** 8698980

**PIT No:** 38
**PROJECT No:** 209497.00
**DATE:** 11/8/2023
**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 100mm) |
|---|---|---|---|---|---|---|---|---|---|
| 15 | 0.1 | TOPSOIL - Clayey Sandy GRAVEL GW: Fine to coarse sub-rounded to rounded gravel, light-brown, fine to coarse grained sand, low plasticity clay, with roots, dry, dense, colluvial. | | B | 0.3 | | VOC = 0 | | |
| | 0.7 | Clayey Sandy GRAVEL GC: Fine to coarse sub-rounded to rounded gravel, yellow-brown, red-brown, medium plasticity clay, fine to coarse grained sand, with roots to 0.25 m depth, dry, medium dense to dense, colluvial. - dense from 0.5 m depth. | | | 0.5 | | | | |
| 14 | 1 | Silty CLAY CI: Medium plasticity, red-brown mottled grey-brown, with fine to coarse grained sand, trace fine to medium gravel, w≤PL, hard, residual. - grey-brown mottled red-brown from 1.5 m depth. | | D | 1.7 | | VOC = 0 | | |
| | 2 2.0 | Pit discontinued at 2.0m depth, Limit of investigation. | | | | | | | |

**RIG:** 3 Tonne excavator with 250 mm rock toothed bucket

**LOGGED:** RL

**SURVEY DATUM:** MGA94 Zone 52

**WATER OBSERVATIONS:** No free groundwater encountered.

**REMARKS:**

☐ 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:** DIPL (NT)
**PROJECT:** T21-2072 Wurrumiyanga Subdivision
**LOCATION:** Wurrumiyanga, Bathurst Island

**SURFACE LEVEL:** 16.2 m AHD
**EASTING:** 676804
**NORTHING:** 8698928

**PIT No:** 39
**PROJECT No:** 209497.00
**DATE:** 11/8/2023
**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 100mm) |
|---|---|---|---|---|---|---|---|---|---|
| 16 | 0.15 | TOPSOIL - Clayey Sandy GRAVEL GC: Fine to coarse sub-rounded to rounded gravel, light-brown, fine to coarse grained sand, low plasticity clay, with roots, dry, dense, colluvial. | | D | 0.2 | | VOC = 0 | | |
| | 0.7 | Clayey Sandy GRAVEL GC: Fine to coarse sub-rounded to rounded gravel, yellow-brown, red-brown, medium plasticity clay, fine to coarse grained sand, dry, very dense, colluvial. | | U | 0.7 | | | | |
| 15 | 1 | Silty CLAY CL-CI: Low to medium plasticity, red-brown mottled grey-brown, with fine to coarse grained sand, trace fine to medium gravel, w<PL, very stiff, residual. | | | | | | | |
| | 1.3 | Silty CLAY CI: Medium plasticity, yellow-brown mottled grey-brown, red-brown, with fine to coarse grained sand, trace fine to medium gravel, w<PL, very stiff to hard, residual.<br><br>- hard from 1.8 m depth. | | D | 1.5 | | VOC = 0 | | |
| 14 | 2 | | | | | | | | |
| | 2.2 | Pit discontinued at 2.2m depth, Limit of investigation. | | | | | | | |

**RIG:** 3 Tonne excavator with 250 mm rock toothed bucket

**LOGGED:** RL

**SURVEY DATUM:** MGA94 Zone 52

**WATER OBSERVATIONS:** No free groundwater encountered.

**REMARKS:**

☐ 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:** DIPL (NT)
**PROJECT:** T21-2072 Wurrumiyanga Subdivision
**LOCATION:** Wurrumiyanga, Bathurst Island

**SURFACE LEVEL:** 15.3 m AHD
**EASTING:** 676901
**NORTHING:** 8699046

**PIT No:** 40
**PROJECT No:** 209497.00
**DATE:** 11/8/2023
**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 100mm) |
|---|---|---|---|---|---|---|---|---|---|
| 15 | 0.15 | TOPSOIL - Clayey Sandy GRAVEL GC: Fine to coarse sub-rounded to rounded gravel, light-brown, fine to coarse grained sand, low plasticity clay and roots, dry, dense. | | D | 0.2 | | VOC = 0 | | |
| | | Clayey Sandy GRAVEL GC: Fine to coarse sub-angular to sub-rounded gravel, yellow-brown, red-brown, medium plasticity clay, fine to coarse grained sand, with roots to 0.3 m depth, moist, dense, colluvial. | | E | 0.3 | | | | |
| | 0.6 | | | D | | | | | |
| 14 | 1 | Silty CLAY CI: Medium plasticity, red-brown mottled grey-brown, with fine to coarse grained sand, trace fine to medium gravel, w<PL, very stiff, residual. | | | | | | | 1 |
| | 1.7 | Pit discontinued at 1.7m depth, excavator refusal. | | | | | | | |

Dynamic Penetrometer Test (blows per 100mm): 5, 10, 15, 20

**RIG:** 3 Tonne excavator with 250 mm rock toothed bucket

**LOGGED:** RL

**SURVEY DATUM:** MGA94 Zone 52

**WATER OBSERVATIONS:** No free groundwater encountered.

**REMARKS:**

☐ 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:** DIPL (NT)
**PROJECT:** T21-2072 Wurrumiyanga Subdivision
**LOCATION:** Wurrumiyanga, Bathurst Island

**SURFACE LEVEL:** 16.2 m AHD
**EASTING:** 676869
**NORTHING:** 8698866

**PIT No:** 41
**PROJECT No:** 209497.00
**DATE:** 11/8/2023
**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 100mm) |
|---|---|---|---|---|---|---|---|---|---|
| 16 | 0.1 | TOPSOIL - Clayey Sandy GRAVEL GC: Fine to coarse sub-angular to sub-rounded gravel, grey-brown, yellow-brown, fine to coarse grained sand, low plasticity clay, with roots, dry, medium dense. | | D | 0.2 | | VOC = 0 | | |
| | 0.4 | Clayey Sandy GRAVEL GC: Fine to coarse sub-angular to sub-rounded gravel, grey-brown, yellow-brown, fine to coarse grained sand, medium plasticity clay, with cobbles to 100 mm in size and roots to 0.3 m, dry, medium dense, colluvial. | | D | 0.5 | | VOC = 0 | | |
| | 0.9 | Silty CLAY CI: Medium plasticity, red-brown mottled light-grey, with fine to coarse grained sand and fine to medium gravel, w<PL, very stiff, residual. | | | | | | | |
| 15 | 1 | Silty CLAY CI: Medium plasticity, red-brown mottled grey-brown, with fine to coarse grained sand, trace fine to medium gravel, w<PL, stiff, residual. | | | | | | | |
| | 1.7 | Silty CLAY CI: Medium plasticity, yellow-brown mottled grey-brown, red-brown, with fine to coarse grained sand, trace fine to medium gravel, w<PL, very stiff, residual. | | | | | | | |
| | 2 | | | | | | | | |
| | 2.1 | Pit discontinued at 2.1m depth, excavator refusal. | | | | | | | |

Dynamic Penetrometer Test (blows per 100mm): 5, 10, 15, 20

**RIG:** 3 Tonne excavator with 250 mm rock toothed bucket

**LOGGED:** RL

**SURVEY DATUM:** MGA94 Zone 52

**WATER OBSERVATIONS:** No free groundwater encountered.

**REMARKS:**

☐ 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:** DIPL (NT)
**PROJECT:** T21-2072 Wurrumiyanga Subdivision
**LOCATION:** Wurrumiyanga, Bathurst Island

**SURFACE LEVEL:** 14.0 m AHD
**EASTING:** 676984
**NORTHING:** 8699214

**PIT No:** 42
**PROJECT No:** 209497.00
**DATE:** 14/8/2023
**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 100mm) |
|---|---|---|---|---|---|---|---|---|---|
| 14 | 0.15 | TOPSOIL - Clayey Sandy GRAVEL GC: Fine to coarse sub-angular to sub-rounded gravel, light-brown, fine to coarse grained sand, low plasticity clay, with roots, dry, very dense. | | E<br>D | 0.2<br>0.3 | | VOC = 0 | | |
| 13 | 1 | Clayey Sandy GRAVEL GC: Fine to coarse sub-angular to sub-rounded gravel, red-brown, fine to coarse grained sand, medium plasticity clay, dry, very dense, colluvial. | | | | | | | 1 |
| | 1.2 | Silty CLAY CI: Medium plasticity, grey-brown mottled red-brown, with fine to coarse grained sand, trace fine to medium gravel, w<PL, estimated very hard, residual. | | D<br>D | 1.3<br>1.4 | | VOC = 0 | | |
| 12 | 2 | | | | | | | | 2 |
| | 2.1 | Pit discontinued at 2.1m depth, excavator refusal. | | | | | | | |

5 10 15 20

**RIG:** 3 Tonne excavator with 250 mm rock toothed bucket

**LOGGED:** RL

**SURVEY DATUM:** MGA94 Zone 52

**WATER OBSERVATIONS:** No free groundwater encountered.

**REMARKS:**

☐ 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

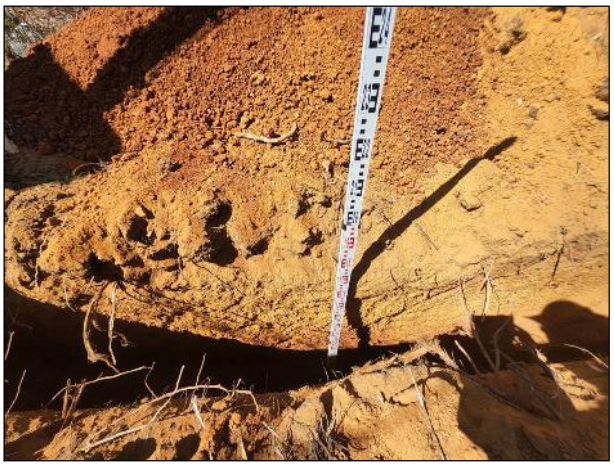
# TEST PIT LOG

**CLIENT:** DIPL (NT)
**PROJECT:** T21-2072 Wurrumiyanga Subdivision
**LOCATION:** Wurrumiyanga, Bathurst Island

**SURFACE LEVEL:** 13.2 m AHD
**EASTING:** 676938
**NORTHING:** 8699303

**PIT No:** 43
**PROJECT No:** 209497.00
**DATE:** 14/8/2023
**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 100mm) |
|---|---|---|---|---|---|---|---|---|---|
| 13 | 0.1 | TOPSOIL - Clayey Sandy GRAVEL GC: Fine to coarse sub-angular to sub-rounded gravel, light-brown, fine to coarse grained sand, low plasticity clay, with roots, dry, dense. | | D | 0.3 | | VOC = 0 | | |
| | | Clayey Sandy GRAVEL GC: Fine to coarse sub-rounded to rounded gravel, yellow-brown, fine to coarse grained sand, medium plasticity clay, dry, dense to very dense, colluvial. | | | | | | | |
| | 1 | - very dense from 0.8 m depth. | | | | | | | 1 |
| 12 | 1.1 | Sandy Clayey GRAVEL GC: Fine to coarse sub-angular to sub-rounded gravel, red-brown, fine to coarse grained, medium plasticity clay, dry, very dense, residual. | | D | 1.3 | | VOC = 0 | | |
| | 2 | 2.0 Pit discontinued at 2.0m depth, excavator refusal. | | | | | | | 2 |



**RIG:** 3 Tonne excavator with 250 mm rock toothed bucket

**LOGGED:** RL

**SURVEY DATUM:** MGA94 Zone 52

**WATER OBSERVATIONS:** No free groundwater encountered.

**REMARKS:** near possible drain during rain

☐ 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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# Appendix C

Laboratory Test Results

# Material Test Report

Douglas Partners
Geotechnics / Environment / Groundwater
Douglas Partners Pty Ltd
Newcastle Laboratory
15 Callistemon Close Warabrook Newcastle NSW 2310
Phone: (02) 4960 9600
Email: Peter.Gorseski@douglaspartners.com.au

Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Peter Gorseski
Laboratory Manager
Laboratory Accreditation Number: 828

**Report Number:** **209497.00-1**
**Issue Number:** 1
**Date Issued:** 04/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5326
**Sample Number:** DW-5326A
**Date Sampled:** 12/08/2023
**Dates Tested:** 11/09/2023 - 27/09/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP04 , Depth: 0.4m**
**Material:** Natural

| Moisture Content (AS 1289 2.1.1) | | Min | Max |
|---|---|---|---|
| Moisture Content (%) | 17.6 | | |

| Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1) | | Min | Max |
|---|---|---|---|
| Sample History | Oven Dried | | |
| Preparation Method | Dry Sieve | | |
| Liquid Limit (%) | 57 | | |
| Plastic Limit (%) | 23 | | |
| **Plasticity Index (%)** | **34** | | |

| Linear Shrinkage (AS1289 3.4.1) | | Min | Max |
|---|---|---|---|
| Moisture Condition Determined By | AS 1289.3.1.1 | | |
| Linear Shrinkage (%) | **13.0** | | |
| Cracking Crumbling Curling | Curling | | |

# Material Test Report

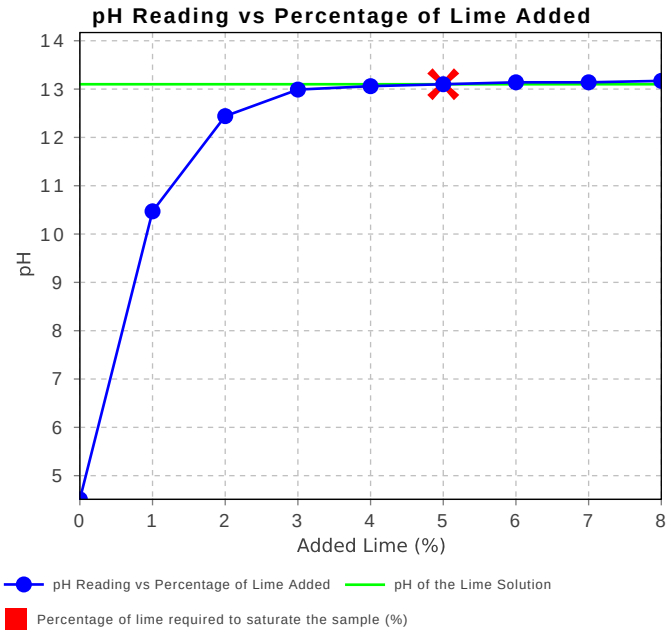
Douglas Partners
Geotechnics / Environment / Groundwater
Douglas Partners Pty Ltd
Newcastle Laboratory
15 Callistemon Close Warabrook Newcastle NSW 2310
Phone: (02) 4960 9600
Email: Peter.Gorseski@douglaspartners.com.au

Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Peter Gorseski
Laboratory Manager
Laboratory Accreditation Number: 828

**Report Number:** **209497.00-1**
**Issue Number:** 1
**Date Issued:** 04/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5326
**Sample Number:** DW-5326A
**Date Sampled:** 12/08/2023
**Dates Tested:** 11/09/2023 - 26/09/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP04 , Depth: 0.4m**
**Material:** Natural

| Lime Demand (RMS T144) | |
|---|---|
| Source of Lime | Boral |
| Type of Lime | Hydrated |
| Calcium Hydroxide (%) | 72 |
| Lime Demand (%) | 5.0 |
| Percentage of lime required to saturate the whole soil (%) | 5.0 |



# Material Test Report

Douglas Partners
Geotechnics / Environment / Groundwater
Douglas Partners Pty Ltd
Newcastle Laboratory
15 Callistemon Close Warabrook Newcastle NSW 2310
Phone: (02) 4960 9600
Email: Peter.Gorseski@douglaspartners.com.au

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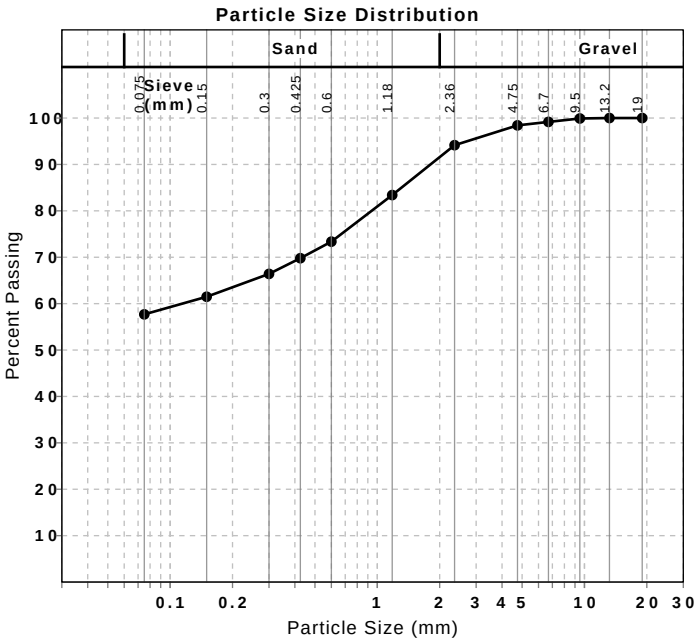
Approved Signatory: Peter Gorseski
Laboratory Manager
Laboratory Accreditation Number: 828

**Report Number:** **209497.00-1**
**Issue Number:** 1
**Date Issued:** 04/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5326
**Sample Number:** DW-5326A
**Date Sampled:** 12/08/2023
**Dates Tested:** 11/09/2023 - 03/10/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP04 , Depth: 0.4m**
**Material:** Natural

| Particle Size Distribution (AS1289 3.6.1) | | | | | | |
|---|---|---|---|---|---|---|
| Sieve | Passed % | Passing Limits | | Retained % | Retained Limits | |
| 19 mm | **100** | | | 0 | | |
| 13.2 mm | **100** | | | 0 | | |
| 9.5 mm | **100** | | | 0 | | |
| 6.7 mm | **99** | | | 1 | | |
| 4.75 mm | **98** | | | 1 | | |
| 2.36 mm | **94** | | | 4 | | |
| 1.18 mm | **83** | | | 11 | | |
| 0.6 mm | **73** | | | 10 | | |
| 0.425 mm | **70** | | | 4 | | |
| 0.3 mm | **66** | | | 3 | | |
| 0.15 mm | **61** | | | 5 | | |
| 0.075 mm | **58** | | | 4 | | |



# Material Test Report

Douglas Partners
Geotechnics / Environment / Groundwater
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15 Callistemon Close Warabrook Newcastle NSW 2310
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Approved Signatory: Peter Gorseski
Laboratory Manager
Laboratory Accreditation Number: 828

| | |
|---|---|
| **Report Number:** | **209497.00-1** |
| **Issue Number:** | 1 |
| **Date Issued:** | 04/10/2023 |
| **Client:** | Department of Infrastructure Planning & Logistics (NT) |
| | PO Box 61, Palmerston NT 0831 |
| **Project Number:** | 209497.00 |
| **Project Name:** | T21-2072 Wurrumiyanga subdivision |
| **Project Location:** | Wurrumiyanga, Bathurst Island NT |
| **Work Request:** | 5326 |
| **Sample Number:** | DW-5326B |
| **Date Sampled:** | 12/08/2023 |
| **Dates Tested:** | 11/09/2023 - 03/10/2023 |
| **Sampling Method:** | Sampled by Engineering Department |
| | *The results apply to the sample as received* |
| **Sample Location:** | **TP04, Depth: 0.5 - 0.6m** |
| **Material:** | Natural |

| Shrink Swell Index (AS 1289 7.1.1 & 2.1.1) | |
|---|---|
| **Iss (%)** | **0.3** |
| Visual Description | Natural |
| * Shrink Swell Index (Iss) reported as the percentage vertical strain per pF change in suction. | |
| DP300 / Swelling Pressure Index - 25 kPa | |

| Core Shrinkage Test | |
|---|---|
| **Shrinkage Strain - Oven Dried (%)** | **0.6** |
| Estimated % by volume of significant inert inclusions | 10 |
| Cracking | Moderately Cracked |
| Crumbling | No |
| Moisture Content (%) | 13.0 |

| Swell Test | |
|---|---|
| Initial Pocket Penetrometer (kPa) | >600 |
| Final Pocket Penetrometer (kPa) | 120 |
| Initial Moisture Content (%) | 13.4 |
| Final Moisture Content (%) | 26.4 |
| **Swell (%)** | **-0.1** |
| * NATA Accreditation does not cover the performance of pocket penetrometer readings. | |

# Material Test Report

Douglas Partners
Geotechnics / Environment / Groundwater
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Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Peter Gorseski
Laboratory Manager
Laboratory Accreditation Number: 828

**Report Number:** **209497.00-1**
**Issue Number:** 1
**Date Issued:** 04/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5326
**Sample Number:** DW-5326C
**Date Sampled:** 12/08/2023
**Dates Tested:** 11/09/2023 - 27/09/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP10 , Depth: 1.0m**
**Material:** Natural

| Moisture Content (AS 1289 2.1.1) | | Min | Max |
|---|---|---|---|
| Moisture Content (%) | 10.2 | | |

| Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1) | | Min | Max |
|---|---|---|---|
| Sample History | Oven Dried | | |
| Preparation Method | Dry Sieve | | |
| Liquid Limit (%) | 35 | | |
| Plastic Limit (%) | 17 | | |
| **Plasticity Index (%)** | **18** | | |

| Linear Shrinkage (AS1289 3.4.1) | | Min | Max |
|---|---|---|---|
| Moisture Condition Determined By | AS 1289.3.1.1 | | |
| Linear Shrinkage (%) | **9.0** | | |
| Cracking Crumbling Curling | None | | |

# Material Test Report

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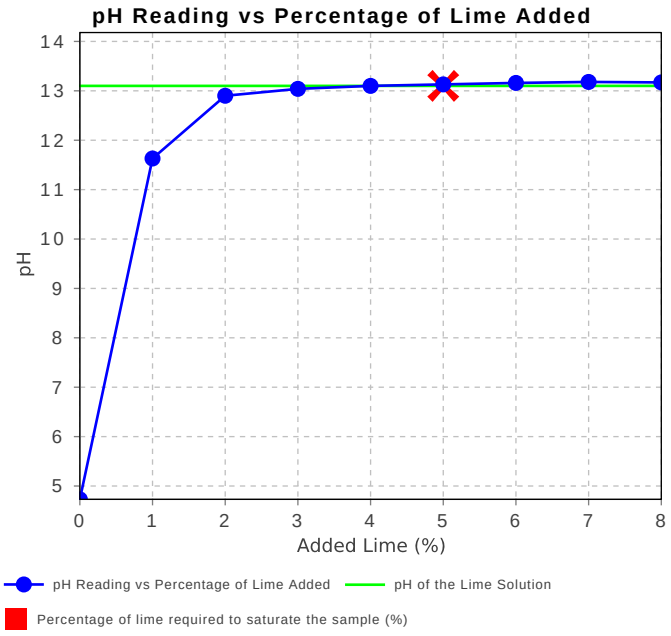
Approved Signatory: Peter Gorseski
Laboratory Manager
Laboratory Accreditation Number: 828

**Report Number:** **209497.00-1**
**Issue Number:** 1
**Date Issued:** 04/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5326
**Sample Number:** DW-5326C
**Date Sampled:** 12/08/2023
**Dates Tested:** 11/09/2023 - 26/09/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP10 , Depth: 1.0m**
**Material:** Natural

| Lime Demand (RMS T144) | |
|---|---|
| Source of Lime | Boral |
| Type of Lime | Hydrated |
| Calcium Hydroxide (%) | 72 |
| Lime Demand (%) | 5.0 |
| Percentage of lime required to saturate the whole soil (%) | 4.0 |



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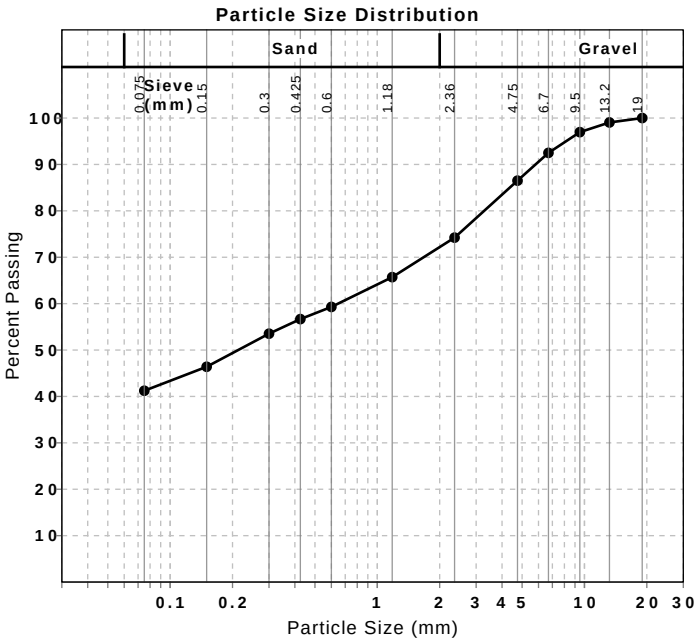
**Report Number:** **209497.00-1**
**Issue Number:** 1
**Date Issued:** 04/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5326
**Sample Number:** DW-5326C
**Date Sampled:** 12/08/2023
**Dates Tested:** 11/09/2023 - 03/10/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP10 , Depth: 1.0m**
**Material:** Natural

| Particle Size Distribution (AS1289 3.6.1) | | | | | | |
|---|---|---|---|---|---|---|
| Sieve | Passed % | Passing Limits | | Retained % | Retained Limits | |
| 19 mm | **100** | | | 0 | | |
| 13.2 mm | **99** | | | 1 | | |
| 9.5 mm | **97** | | | 2 | | |
| 6.7 mm | **92** | | | 4 | | |
| 4.75 mm | **87** | | | 6 | | |
| 2.36 mm | **74** | | | 12 | | |
| 1.18 mm | **66** | | | 9 | | |
| 0.6 mm | **59** | | | 6 | | |
| 0.425 mm | **57** | | | 3 | | |
| 0.3 mm | **54** | | | 3 | | |
| 0.15 mm | **46** | | | 7 | | |
| 0.075 mm | **41** | | | 5 | | |



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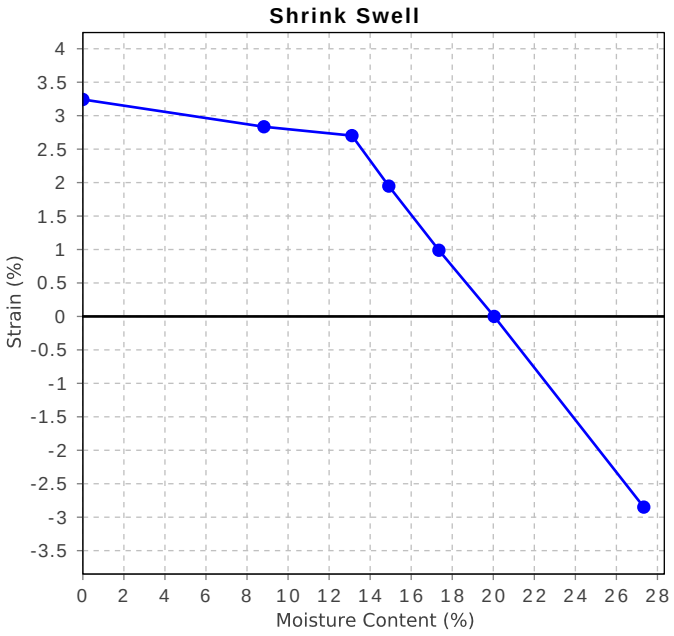
Approved Signatory: Peter Gorseski
Laboratory Manager
Laboratory Accreditation Number: 828

| | |
|---|---|
| **Report Number:** | **209497.00-1** |
| **Issue Number:** | 1 |
| **Date Issued:** | 04/10/2023 |
| **Client:** | Department of Infrastructure Planning & Logistics (NT) |
| | PO Box 61, Palmerston NT 0831 |
| **Project Number:** | 209497.00 |
| **Project Name:** | T21-2072 Wurrumiyanga subdivision |
| **Project Location:** | Wurrumiyanga, Bathurst Island NT |
| **Work Request:** | 5326 |
| **Sample Number:** | DW-5326E |
| **Date Sampled:** | 14/08/2023 |
| **Dates Tested:** | 11/09/2023 - 03/10/2023 |
| **Sampling Method:** | Sampled by Engineering Department |
| | *The results apply to the sample as received* |
| **Sample Location:** | **TP32, Depth: 1.4m** |
| **Material:** | Natural |

| Shrink Swell Index (AS 1289 7.1.1 & 2.1.1) | |
|---|---|
| **Iss (%)** | **2.6** |
| Visual Description | Natural |
| * Shrink Swell Index (Iss) reported as the percentage vertical strain per pF change in suction. | |
| DP300 / Swelling Pressure Index - 86 kPa | |

| Core Shrinkage Test | |
|---|---|
| **Shrinkage Strain - Oven Dried (%)** | **3.2** |
| Estimated % by volume of significant inert inclusions | 10 |
| Cracking | Slightly Cracked |
| Crumbling | No |
| Moisture Content (%) | 20.0 |

| Swell Test | |
|---|---|
| Initial Pocket Penetrometer (kPa) | >600 |
| Final Pocket Penetrometer (kPa) | 200 |
| Initial Moisture Content (%) | 17.3 |
| Final Moisture Content (%) | 27.3 |
| **Swell (%)** | **2.8** |
| * NATA Accreditation does not cover the performance of pocket penetrometer readings. | |



# Material Test Report

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Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Sunil Sukhdeo
Laboratory Manager
Laboratory Accreditation Number: 828

**Report Number:** **209497.00-2**
**Issue Number:** 1
**Date Issued:** 09/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5320
**Sample Number:** DW-5320A
**Date Sampled:** 12/08/2023
**Dates Tested:** 07/09/2023 - 05/10/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP3 , Depth: 0.4 - 0.6m**
**Material:** Natural

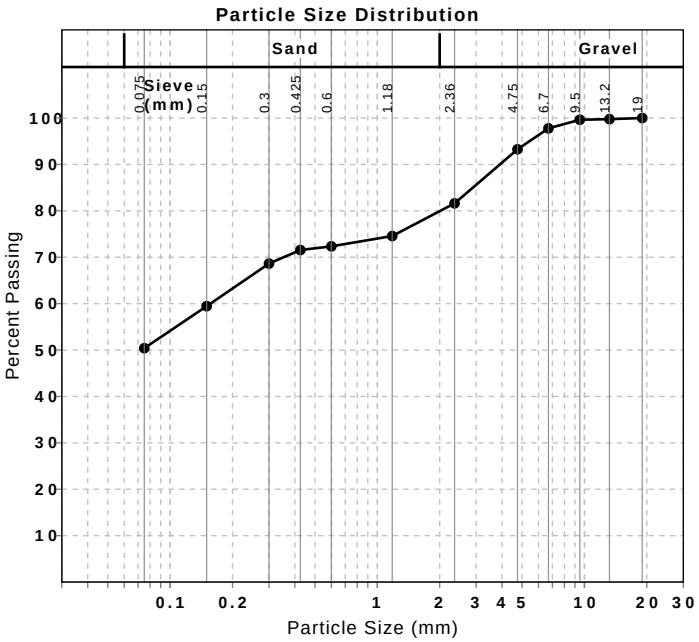
| Particle Size Distribution (AS1289 3.6.1) | | | |
|---|---|---|---|
| Sieve | Passed % | Passing Limits | |
| 19 mm | **100** | | |
| 13.2 mm | **100** | | |
| 9.5 mm | **100** | | |
| 6.7 mm | **98** | | |
| 4.75 mm | **93** | | |
| 2.36 mm | **82** | | |
| 1.18 mm | **75** | | |
| 0.6 mm | **72** | | |
| 0.425 mm | **72** | | |
| 0.3 mm | **69** | | |
| 0.15 mm | **59** | | |
| 0.075 mm | **50** | | |

| Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1) | | Min | Max |
|---|---|---|---|
| Sample History | Air Dried | | |
| Preparation Method | Wet Sieve | | |
| Liquid Limit (%) | 49 | | |
| Plastic Limit (%) | 23 | | |
| **Plasticity Index (%)** | **26** | | |

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

| Emerson Class Number of a Soil (AS 1289 3.8.1) | | Min | Max |
|---|---|---|---|
| Emerson Class | **5** | | |
| Soil Description | Natural Soil | | |
| Nature of Water | Distilled Water | | |
| Temperature of Water ($^{o}$C) | 23 | | |

| Moisture Content (AS 1289 2.1.1) | | Min | Max |
|---|---|---|---|
| Moisture Content (%) | 14.8 | | |



# Material Test Report

Douglas Partners
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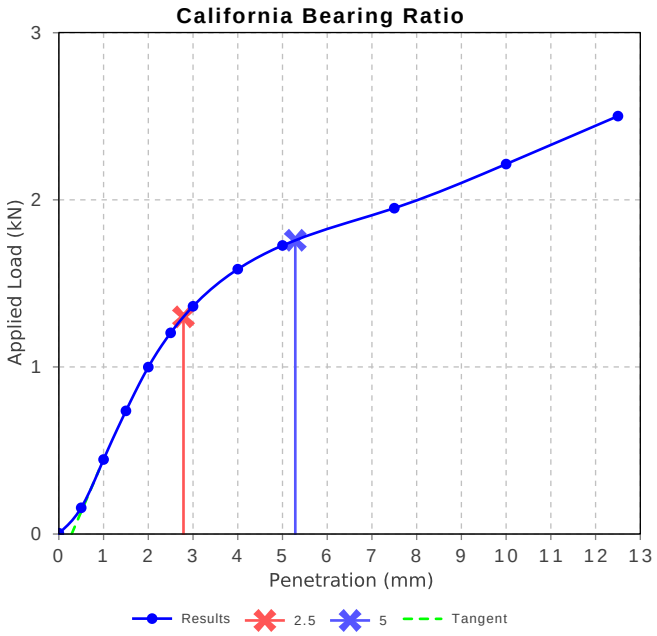
Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Sunil Sukhdeo
Laboratory Manager
Laboratory Accreditation Number: 828

**Report Number:** **209497.00-2**
**Issue Number:** 1
**Date Issued:** 09/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5320
**Sample Number:** DW-5320A
**Date Sampled:** 12/08/2023
**Dates Tested:** 07/09/2023 - 19/09/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP3 , Depth: 0.4 - 0.6m**
**Material:** Natural

| California Bearing Ratio (AS 1289 6.1.1 & 2.1.1) | | Min | Max |
|---|---|---|---|
| CBR taken at | 2.5 mm | | |
| CBR % | **10** | | |
| Method of Compactive Effort | Modified | | |
| Method used to Determine MDD | AS 1289 5.2.1 & 2.1.1 | | |
| Method used to Determine Plasticity | Visual Assessment | | |
| Maximum Dry Density (t/m$^3$) | 1.88 | | |
| Optimum Moisture Content (%) | 16.0 | | |
| Laboratory Density Ratio (%) | 95.0 | | |
| Laboratory Moisture Ratio (%) | 100.0 | | |
| Dry Density after Soaking (t/m$^3$) | 1.77 | | |
| Field Moisture Content (%) | 14.8 | | |
| Moisture Content at Placement (%) | 16.0 | | |
| Moisture Content Top 30mm (%) | 19.8 | | |
| Moisture Content Rest of Sample (%) | 18.3 | | |
| Mass Surcharge (kg) | 4.5 | | |
| Soaking Period (days) | 4 | | |
| Curing Hours (h) | 96.0 | | |
| Swell (%) | 1.0 | | |
| Oversize Material (mm) | 19 | | |
| Oversize Material Included | Excluded | | |
| Oversize Material (%) | 0.0 | | |



# Material Test Report

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Laboratory Manager
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**Report Number:** **209497.00-2**
**Issue Number:** 1
**Date Issued:** 09/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5320
**Sample Number:** DW-5320B
**Date Sampled:** 12/08/2023
**Dates Tested:** 07/09/2023 - 09/10/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP6 , Depth: 0.2 - 0.4m**
**Material:** Natural

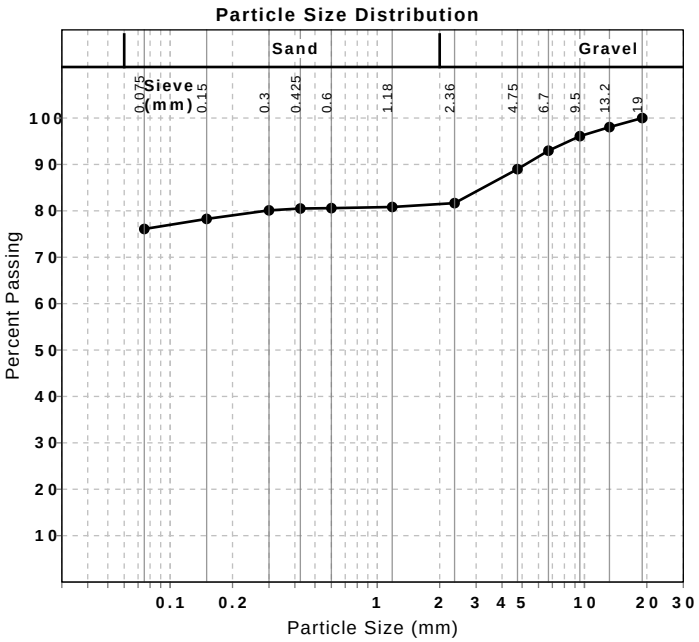
| Particle Size Distribution (AS1289 3.6.1) | | | |
|---|---|---|---|
| Sieve | Passed % | Passing Limits | |
| 19 mm | **100** | | |
| 13.2 mm | **98** | | |
| 9.5 mm | **96** | | |
| 6.7 mm | **93** | | |
| 4.75 mm | **89** | | |
| 2.36 mm | **82** | | |
| 1.18 mm | **81** | | |
| 0.6 mm | **81** | | |
| 0.425 mm | **80** | | |
| 0.3 mm | **80** | | |
| 0.15 mm | **78** | | |
| 0.075 mm | **76** | | |

| Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1) | | Min | Max |
|---|---|---|---|
| Sample History | Air Dried | | |
| Preparation Method | Wet Sieve | | |
| Liquid Limit (%) | 36 | | |
| Plastic Limit (%) | 19 | | |
| **Plasticity Index (%)** | **17** | | |

| Linear Shrinkage (AS1289 3.4.1) | | Min | Max |
|---|---|---|---|
| Moisture Condition Determined By | AS 1289.3.1.2 | | |
| Linear Shrinkage (%) | **8.0** | | |
| Cracking Crumbling Curling | Cracking | | |

| Emerson Class Number of a Soil (AS 1289 3.8.1) | | Min | Max |
|---|---|---|---|
| Emerson Class | **6** | | |
| Soil Description | Natural Soil | | |
| Nature of Water | Distilled Water | | |
| Temperature of Water ($^{o}$C) | | | |

| Moisture Content (AS 1289 2.1.1) | | Min | Max |
|---|---|---|---|
| Moisture Content (%) | 11.3 | | |



# Material Test Report

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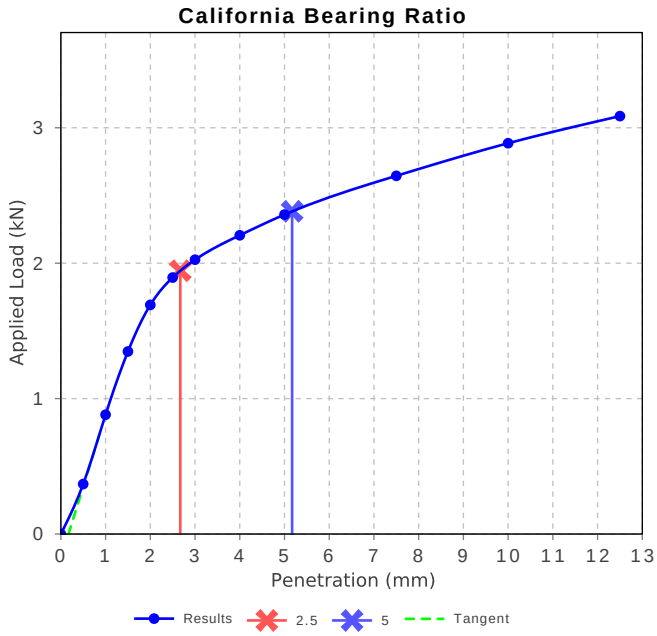
Laboratory Accreditation Number: 828

**Report Number:** **209497.00-2**
**Issue Number:** 1
**Date Issued:** 09/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5320
**Sample Number:** DW-5320B
**Date Sampled:** 12/08/2023
**Dates Tested:** 07/09/2023 - 19/09/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP6 , Depth: 0.2 - 0.4m**
**Material:** Natural

| California Bearing Ratio (AS 1289 6.1.1 & 2.1.1) | | Min | Max |
|---|---|---|---|
| CBR taken at | 2.5 mm | | |
| CBR % | **15** | | |
| Method of Compactive Effort | Modified | | |
| Method used to Determine MDD | AS 1289 5.2.1 & 2.1.1 | | |
| Method used to Determine Plasticity | Visual Assessment | | |
| Maximum Dry Density (t/m$^3$) | 1.91 | | |
| Optimum Moisture Content (%) | 15.0 | | |
| Laboratory Density Ratio (%) | 95.0 | | |
| Laboratory Moisture Ratio (%) | 99.5 | | |
| Dry Density after Soaking (t/m$^3$) | 1.80 | | |
| Field Moisture Content (%) | 11.3 | | |
| Moisture Content at Placement (%) | 14.7 | | |
| Moisture Content Top 30mm (%) | 19.6 | | |
| Moisture Content Rest of Sample (%) | 18.7 | | |
| Mass Surcharge (kg) | 4.5 | | |
| Soaking Period (days) | 4 | | |
| Curing Hours (h) | 97.8 | | |
| Swell (%) | 1.0 | | |
| Oversize Material (mm) | 19 | | |
| Oversize Material Included | Excluded | | |
| Oversize Material (%) | 0.0 | | |



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**Report Number:** **209497.00-2**
**Issue Number:** 1
**Date Issued:** 09/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5320
**Sample Number:** DW-5320C
**Date Sampled:** 12/08/2023
**Dates Tested:** 07/09/2023 - 05/10/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP7 , Depth: 1.8m**
**Material:** Natural

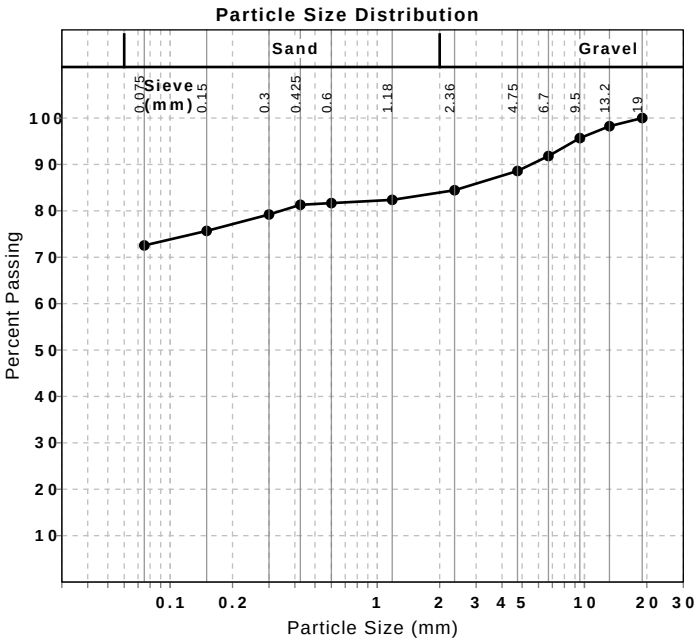
| Particle Size Distribution (AS1289 3.6.1) | | | |
|---|---|---|---|
| Sieve | Passed % | Passing Limits | |
| 19 mm | **100** | | |
| 13.2 mm | **98** | | |
| 9.5 mm | **96** | | |
| 6.7 mm | **92** | | |
| 4.75 mm | **89** | | |
| 2.36 mm | **84** | | |
| 1.18 mm | **82** | | |
| 0.6 mm | **82** | | |
| 0.425 mm | **81** | | |
| 0.3 mm | **79** | | |
| 0.15 mm | **76** | | |
| 0.075 mm | **73** | | |

| Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1) | | Min | Max |
|---|---|---|---|
| Sample History | Air Dried | | |
| Preparation Method | Wet Sieve | | |
| Liquid Limit (%) | 34 | | |
| Plastic Limit (%) | 17 | | |
| **Plasticity Index (%)** | **17** | | |

| Linear Shrinkage (AS1289 3.4.1) | | Min | Max |
|---|---|---|---|
| Moisture Condition Determined By | AS 1289.3.1.2 | | |
| Linear Shrinkage (%) | **11.0** | | |
| Cracking Crumbling Curling | Cracking | | |

| Emerson Class Number of a Soil (AS 1289 3.8.1) | | Min | Max |
|---|---|---|---|
| Emerson Class | **5** | | |
| Soil Description | Natural Soil | | |
| Nature of Water | Distilled Water | | |
| Temperature of Water ($^{o}$C) | | | |

| Moisture Content (AS 1289 2.1.1) | | Min | Max |
|---|---|---|---|
| Moisture Content (%) | 28.2 | | |



# Material Test Report

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Approved Signatory: Sunil Sukhdeo
Laboratory Manager
Laboratory Accreditation Number: 828

**Report Number:** **209497.00-2**
**Issue Number:** 1
**Date Issued:** 09/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5320
**Sample Number:** DW-5320D
**Date Sampled:** 08/08/2023
**Dates Tested:** 07/09/2023 - 05/10/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP14 , Depth: 0.5 - 0.7m**
**Material:** Natural

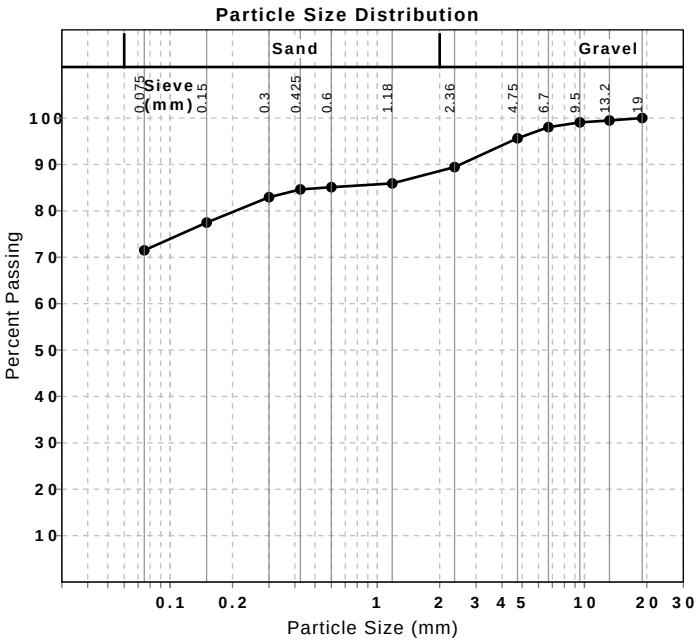
| Particle Size Distribution (AS1289 3.6.1) | | | |
|---|---|---|---|
| Sieve | Passed % | Passing Limits | |
| 19 mm | **100** | | |
| 13.2 mm | **99** | | |
| 9.5 mm | **99** | | |
| 6.7 mm | **98** | | |
| 4.75 mm | **96** | | |
| 2.36 mm | **89** | | |
| 1.18 mm | **86** | | |
| 0.6 mm | **85** | | |
| 0.425 mm | **85** | | |
| 0.3 mm | **83** | | |
| 0.15 mm | **77** | | |
| 0.075 mm | **71** | | |

| Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1) | | Min | Max |
|---|---|---|---|
| Sample History | Air Dried | | |
| Preparation Method | Wet Sieve | | |
| Liquid Limit (%) | 54 | | |
| Plastic Limit (%) | 23 | | |
| **Plasticity Index (%)** | **31** | | |

| Linear Shrinkage (AS1289 3.4.1) | | Min | Max |
|---|---|---|---|
| Moisture Condition Determined By | AS 1289.3.1.2 | | |
| Linear Shrinkage (%) | **11.5** | | |
| Cracking Crumbling Curling | Cracking | | |

| Emerson Class Number of a Soil (AS 1289 3.8.1) | | Min | Max |
|---|---|---|---|
| Emerson Class | **5** | | |
| Soil Description | Natural Soil | | |
| Nature of Water | Distilled Water | | |
| Temperature of Water ($^{o}$C) | 23 | | |

| Moisture Content (AS 1289 2.1.1) | | Min | Max |
|---|---|---|---|
| Moisture Content (%) | 14.6 | | |



# Material Test Report

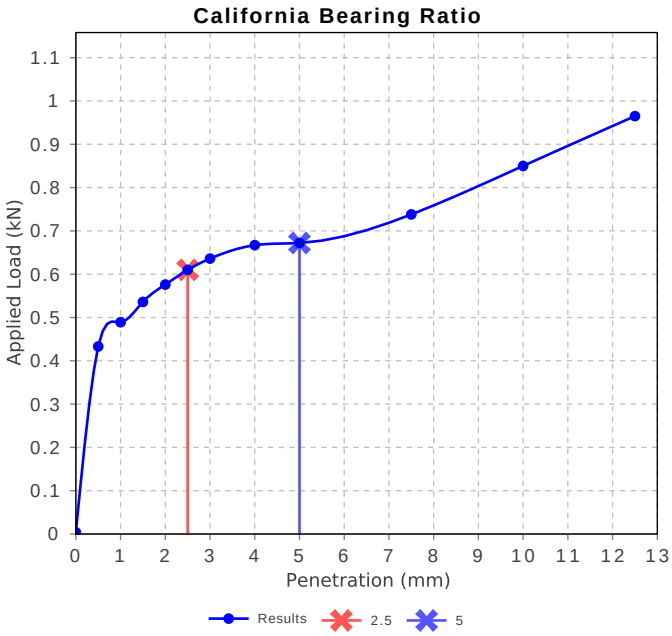
Douglas Partners
Geotechnics / Environment / Groundwater
Douglas Partners Pty Ltd
Darwin Laboratory
Unit 2/14 Caryota Circuit Coconut Grove NT 0810
Phone: (08) 8948 6800
Email: Sunil.Sukhdeo@douglaspartners.com.au

Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Sunil Sukhdeo
Laboratory Manager
Laboratory Accreditation Number: 828

**Report Number:** **209497.00-2**
**Issue Number:** 1
**Date Issued:** 09/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5320
**Sample Number:** DW-5320D
**Date Sampled:** 08/08/2023
**Dates Tested:** 07/09/2023 - 19/09/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP14 , Depth: 0.5 - 0.7m**
**Material:** Natural

| California Bearing Ratio (AS 1289 6.1.1 & 2.1.1) | | Min | Max |
|---|---|---|---|
| CBR taken at | 2.5 mm | | |
| CBR % | **4.5** | | |
| Method of Compactive Effort | Modified | | |
| Method used to Determine MDD | AS 1289 5.2.1 & 2.1.1 | | |
| Method used to Determine Plasticity | Visual Assessment | | |
| Maximum Dry Density (t/m$^3$) | 1.93 | | |
| Optimum Moisture Content (%) | 13.5 | | |
| Laboratory Density Ratio (%) | 95.0 | | |
| Laboratory Moisture Ratio (%) | 99.0 | | |
| Dry Density after Soaking (t/m$^3$) | 1.73 | | |
| Field Moisture Content (%) | 14.6 | | |
| Moisture Content at Placement (%) | 13.3 | | |
| Moisture Content Top 30mm (%) | 27.0 | | |
| Moisture Content Rest of Sample (%) | 23.9 | | |
| Mass Surcharge (kg) | 4.5 | | |
| Soaking Period (days) | 4 | | |
| Curing Hours (h) | 96.0 | | |
| Swell (%) | 6.5 | | |
| Oversize Material (mm) | 19 | | |
| Oversize Material Included | Excluded | | |
| Oversize Material (%) | 0.0 | | |



# Material Test Report

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Approved Signatory: Sunil Sukhdeo
Laboratory Manager
Laboratory Accreditation Number: 828

**Report Number:** **209497.00-2**
**Issue Number:** 1
**Date Issued:** 09/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5320
**Sample Number:** DW-5320E
**Date Sampled:** 09/08/2023
**Dates Tested:** 07/09/2023 - 05/10/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP17 , Depth: 0.2 - 0.4m**
**Material:** Natural

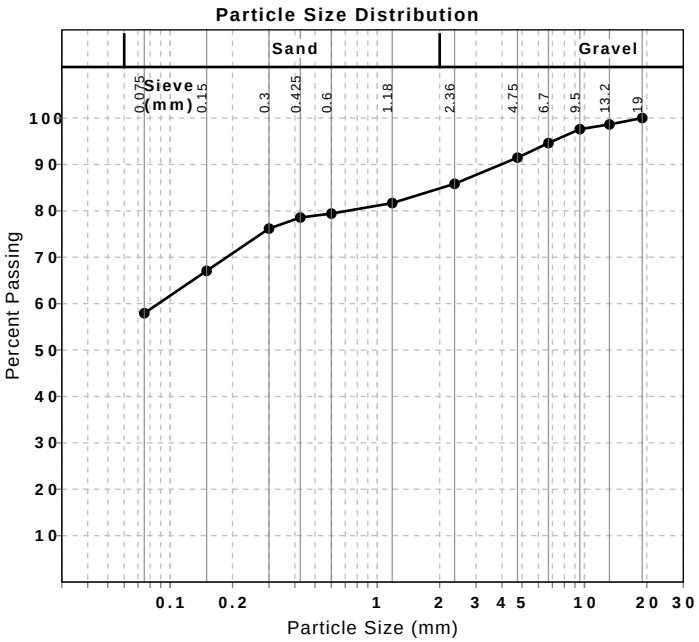
| Particle Size Distribution (AS1289 3.6.1) | | | |
|---|---|---|---|
| Sieve | Passed % | Passing Limits | |
| 19 mm | **100** | | |
| 13.2 mm | **99** | | |
| 9.5 mm | **98** | | |
| 6.7 mm | **95** | | |
| 4.75 mm | **91** | | |
| 2.36 mm | **86** | | |
| 1.18 mm | **82** | | |
| 0.6 mm | **79** | | |
| 0.425 mm | **79** | | |
| 0.3 mm | **76** | | |
| 0.15 mm | **67** | | |
| 0.075 mm | **58** | | |

| Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1) | | Min | Max |
|---|---|---|---|
| Sample History | Air Dried | | |
| Preparation Method | Wet Sieve | | |
| Liquid Limit (%) | 45 | | |
| Plastic Limit (%) | 25 | | |
| **Plasticity Index (%)** | **20** | | |

| Linear Shrinkage (AS1289 3.4.1) | | Min | Max |
|---|---|---|---|
| Moisture Condition Determined By | AS 1289.3.1.2 | | |
| Linear Shrinkage (%) | **7.5** | | |
| Cracking Crumbling Curling | Cracking | | |

| Emerson Class Number of a Soil (AS 1289 3.8.1) | | Min | Max |
|---|---|---|---|
| Emerson Class | **5** | | |
| Soil Description | Natural Soil | | |
| Nature of Water | Distilled Water | | |
| Temperature of Water ($^{o}$C) | 23 | | |

| Moisture Content (AS 1289 2.1.1) | | Min | Max |
|---|---|---|---|
| Moisture Content (%) | 13.0 | | |



# Material Test Report

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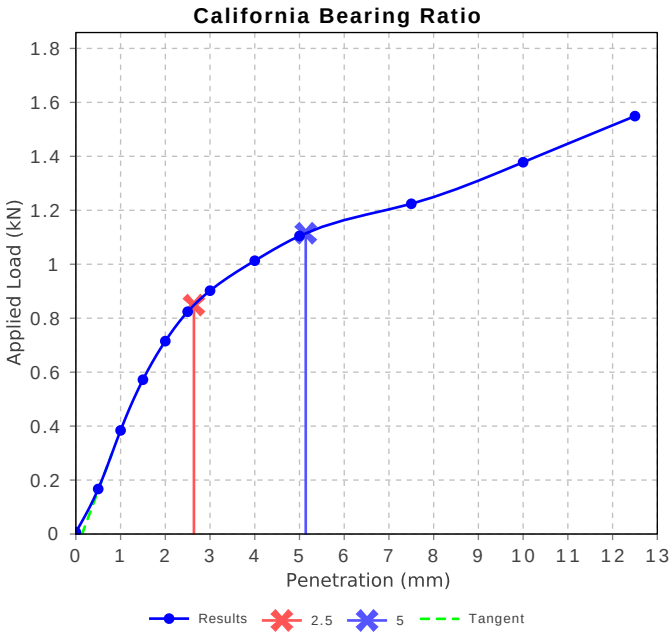
Approved Signatory: Sunil Sukhdeo
Laboratory Manager
Laboratory Accreditation Number: 828

**Report Number:** **209497.00-2**
**Issue Number:** 1
**Date Issued:** 09/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5320
**Sample Number:** DW-5320E
**Date Sampled:** 09/08/2023
**Dates Tested:** 07/09/2023 - 19/09/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP17 , Depth: 0.2 - 0.4m**
**Material:** Natural

| California Bearing Ratio (AS 1289 6.1.1 & 2.1.1) | | Min | Max |
|---|---|---|---|
| CBR taken at | 2.5 mm | | |
| CBR % | **6** | | |
| Method of Compactive Effort | Modified | | |
| Method used to Determine MDD | AS 1289 5.2.1 & 2.1.1 | | |
| Method used to Determine Plasticity | Visual Assessment | | |
| Maximum Dry Density (t/m$^3$) | 1.86 | | |
| Optimum Moisture Content (%) | 14.5 | | |
| Laboratory Density Ratio (%) | 95.0 | | |
| Laboratory Moisture Ratio (%) | 100.0 | | |
| Dry Density after Soaking (t/m$^3$) | 1.71 | | |
| Field Moisture Content (%) | 13.0 | | |
| Moisture Content at Placement (%) | 14.3 | | |
| Moisture Content Top 30mm (%) | 20.8 | | |
| Moisture Content Rest of Sample (%) | 20.8 | | |
| Mass Surcharge (kg) | 4.5 | | |
| Soaking Period (days) | 4 | | |
| Curing Hours (h) | 216.0 | | |
| Swell (%) | 3.0 | | |
| Oversize Material (mm) | 19 | | |
| Oversize Material Included | Excluded | | |
| Oversize Material (%) | 0.0 | | |



# Material Test Report

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**Report Number:** **209497.00-2**
**Issue Number:** 1
**Date Issued:** 09/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5320
**Sample Number:** DW-5320F
**Date Sampled:** 09/08/2023
**Dates Tested:** 07/09/2023 - 05/10/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP19 , Depth: 0.8m**
**Material:** Natural

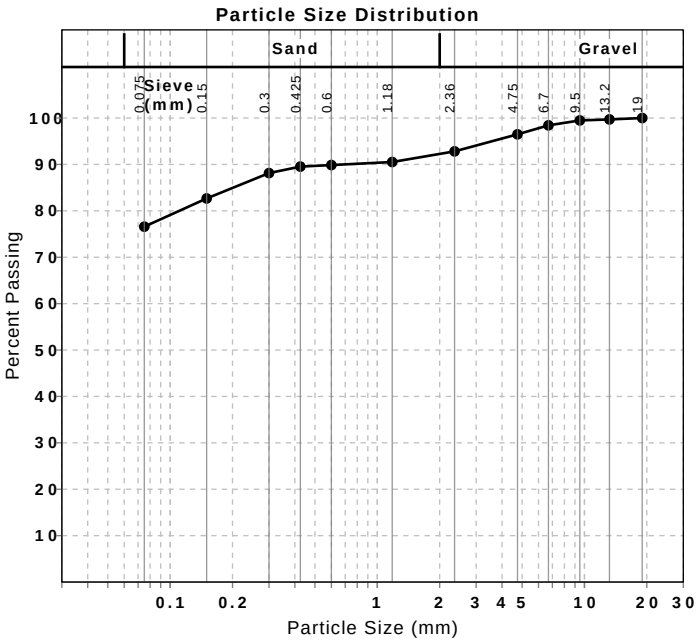
| Particle Size Distribution (AS1289 3.6.1) | | | |
|---|---|---|---|
| Sieve | Passed % | Passing Limits | |
| 19 mm | **100** | | |
| 13.2 mm | **100** | | |
| 9.5 mm | **99** | | |
| 6.7 mm | **98** | | |
| 4.75 mm | **96** | | |
| 2.36 mm | **93** | | |
| 1.18 mm | **91** | | |
| 0.6 mm | **90** | | |
| 0.425 mm | **90** | | |
| 0.3 mm | **88** | | |
| 0.15 mm | **83** | | |
| 0.075 mm | **77** | | |

| Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1) | | Min | Max |
|---|---|---|---|
| Sample History | Air Dried | | |
| Preparation Method | Wet Sieve | | |
| Liquid Limit (%) | 62 | | |
| Plastic Limit (%) | 23 | | |
| **Plasticity Index (%)** | **39** | | |

| Linear Shrinkage (AS1289 3.4.1) | | Min | Max |
|---|---|---|---|
| Moisture Condition Determined By | AS 1289.3.1.2 | | |
| Linear Shrinkage (%) | **14.0** | | |
| Cracking Crumbling Curling | Cracking | | |

| Emerson Class Number of a Soil (AS 1289 3.8.1) | | Min | Max |
|---|---|---|---|
| Emerson Class | **5** | | |
| Soil Description | Natural Soil | | |
| Nature of Water | Distilled Water | | |
| Temperature of Water ($^{o}$C) | 23 | | |

| Moisture Content (AS 1289 2.1.1) | | Min | Max |
|---|---|---|---|
| Moisture Content (%) | 13.4 | | |



# Material Test Report

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Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Sunil Sukhdeo
Laboratory Manager
Laboratory Accreditation Number: 828

**Report Number:** **209497.00-2**
**Issue Number:** 1
**Date Issued:** 09/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5320
**Sample Number:** DW-5320G
**Date Sampled:** 09/08/2023
**Dates Tested:** 07/09/2023 - 05/10/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP25 , Depth: 0.3 - 0.5m**
**Material:** Natural

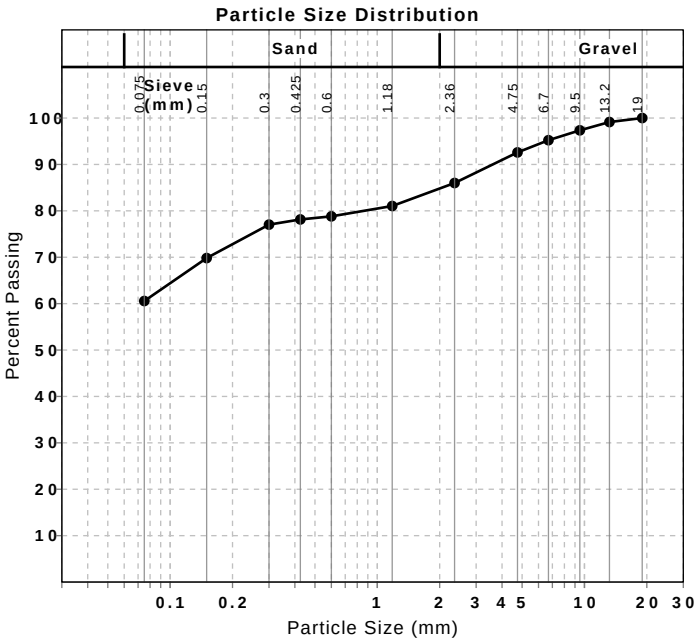
| Particle Size Distribution (AS1289 3.6.1) | | | |
|---|---|---|---|
| Sieve | Passed % | Passing Limits | |
| 19 mm | **100** | | |
| 13.2 mm | **99** | | |
| 9.5 mm | **97** | | |
| 6.7 mm | **95** | | |
| 4.75 mm | **93** | | |
| 2.36 mm | **86** | | |
| 1.18 mm | **81** | | |
| 0.6 mm | **79** | | |
| 0.425 mm | **78** | | |
| 0.3 mm | **77** | | |
| 0.15 mm | **70** | | |
| 0.075 mm | **61** | | |

| Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1) | | Min | Max |
|---|---|---|---|
| Sample History | Air Dried | | |
| Preparation Method | Wet Sieve | | |
| Liquid Limit (%) | 38 | | |
| Plastic Limit (%) | 23 | | |
| **Plasticity Index (%)** | **15** | | |

| Linear Shrinkage (AS1289 3.4.1) | | Min | Max |
|---|---|---|---|
| Moisture Condition Determined By | AS 1289.3.1.2 | | |
| Linear Shrinkage (%) | **7.0** | | |
| Cracking Crumbling Curling | Cracking | | |

| Emerson Class Number of a Soil (AS 1289 3.8.1) | | Min | Max |
|---|---|---|---|
| Emerson Class | **5** | | |
| Soil Description | Natural Soil | | |
| Nature of Water | Distilled Water | | |
| Temperature of Water ($^{o}$C) | 23 | | |

| Moisture Content (AS 1289 2.1.1) | | Min | Max |
|---|---|---|---|
| Moisture Content (%) | 9.8 | | |



# Material Test Report

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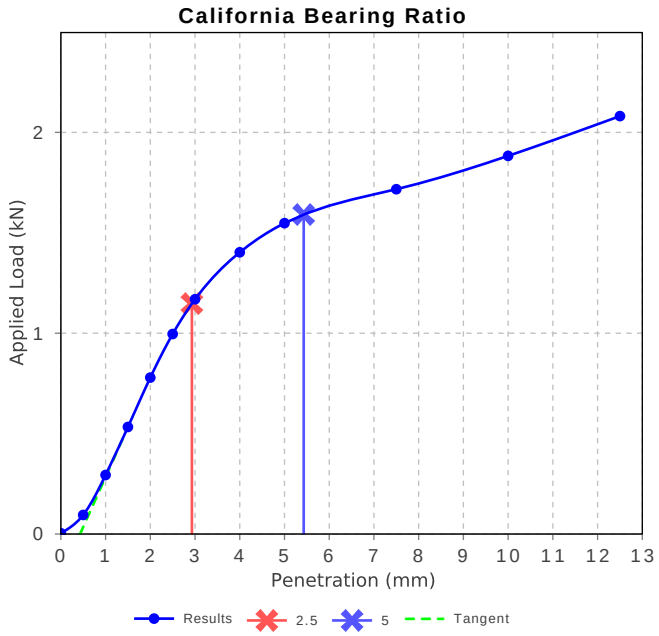
Approved Signatory: Sunil Sukhdeo
Laboratory Manager
Laboratory Accreditation Number: 828

**Report Number:** **209497.00-2**
**Issue Number:** 1
**Date Issued:** 09/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5320
**Sample Number:** DW-5320G
**Date Sampled:** 09/08/2023
**Dates Tested:** 07/09/2023 - 19/09/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP25 , Depth: 0.3 - 0.5m**
**Material:** Natural

| California Bearing Ratio (AS 1289 6.1.1 & 2.1.1) | | Min | Max |
|---|---|---|---|
| CBR taken at | 2.5 mm | | |
| CBR % | **9** | | |
| Method of Compactive Effort | Modified | | |
| Method used to Determine MDD | AS 1289 5.2.1 & 2.1.1 | | |
| Method used to Determine Plasticity | Visual Assessment | | |
| Maximum Dry Density (t/m$^3$) | 1.97 | | |
| Optimum Moisture Content (%) | 11.0 | | |
| Laboratory Density Ratio (%) | 95.0 | | |
| Laboratory Moisture Ratio (%) | 98.5 | | |
| Dry Density after Soaking (t/m$^3$) | 1.85 | | |
| Field Moisture Content (%) | 9.8 | | |
| Moisture Content at Placement (%) | 11.0 | | |
| Moisture Content Top 30mm (%) | 20.4 | | |
| Moisture Content Rest of Sample (%) | 18.4 | | |
| Mass Surcharge (kg) | 4.5 | | |
| Soaking Period (days) | 4 | | |
| Curing Hours (h) | 96.0 | | |
| Swell (%) | 1.5 | | |
| Oversize Material (mm) | 19 | | |
| Oversize Material Included | Excluded | | |
| Oversize Material (%) | 0.0 | | |



# Material Test Report

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Laboratory Manager
Laboratory Accreditation Number: 828

**Report Number:** **209497.00-2**
**Issue Number:** 1
**Date Issued:** 09/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5320
**Sample Number:** DW-5320H
**Date Sampled:** 10/08/2023
**Dates Tested:** 07/09/2023 - 09/10/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP28 , Depth: 1.0m**
**Material:** Natural

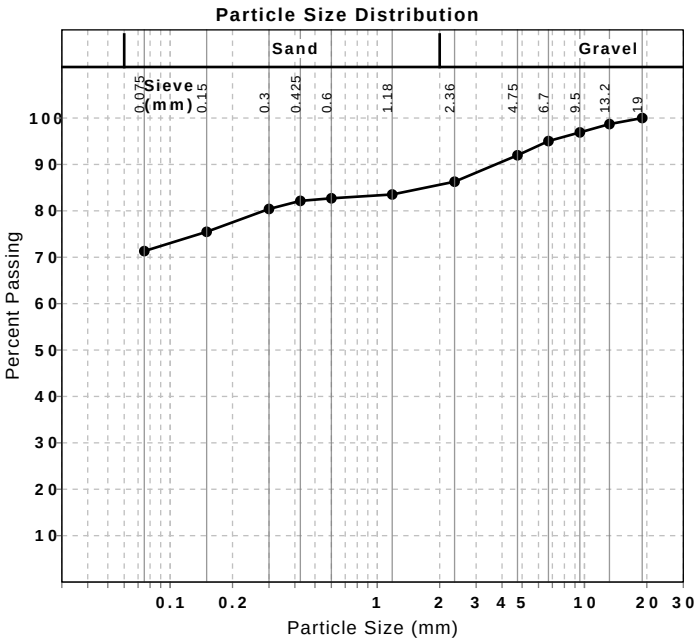
| Particle Size Distribution (AS1289 3.6.1) | | | |
|---|---|---|---|
| Sieve | Passed % | Passing Limits | |
| 19 mm | **100** | | |
| 13.2 mm | **99** | | |
| 9.5 mm | **97** | | |
| 6.7 mm | **95** | | |
| 4.75 mm | **92** | | |
| 2.36 mm | **86** | | |
| 1.18 mm | **84** | | |
| 0.6 mm | **83** | | |
| 0.425 mm | **82** | | |
| 0.3 mm | **80** | | |
| 0.15 mm | **75** | | |
| 0.075 mm | **71** | | |

| Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1) | | Min | Max |
|---|---|---|---|
| Sample History | Air Dried | | |
| Preparation Method | Wet Sieve | | |
| Liquid Limit (%) | 66 | | |
| Plastic Limit (%) | 32 | | |
| **Plasticity Index (%)** | **34** | | |

| Linear Shrinkage (AS1289 3.4.1) | | Min | Max |
|---|---|---|---|
| Moisture Condition Determined By | AS 1289.3.1.2 | | |
| Linear Shrinkage (%) | **14.5** | | |
| Cracking Crumbling Curling | Cracking | | |

| Emerson Class Number of a Soil (AS 1289 3.8.1) | | Min | Max |
|---|---|---|---|
| Emerson Class | **5** | | |
| Soil Description | Natural Soil | | |
| Nature of Water | Distilled Water | | |
| Temperature of Water ($^{o}$C) | 24 | | |

| Moisture Content (AS 1289 2.1.1) | | Min | Max |
|---|---|---|---|
| Moisture Content (%) | 23.1 | | |



# Material Test Report

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Approved Signatory: Sunil Sukhdeo
Laboratory Manager
Laboratory Accreditation Number: 828

**Report Number:** **209497.00-2**
**Issue Number:** 1
**Date Issued:** 09/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5320
**Sample Number:** DW-5320I
**Date Sampled:** 10/08/2023
**Dates Tested:** 07/09/2023 - 09/10/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP31 , Depth: 0.5 - 0.7m**
**Material:** Natural

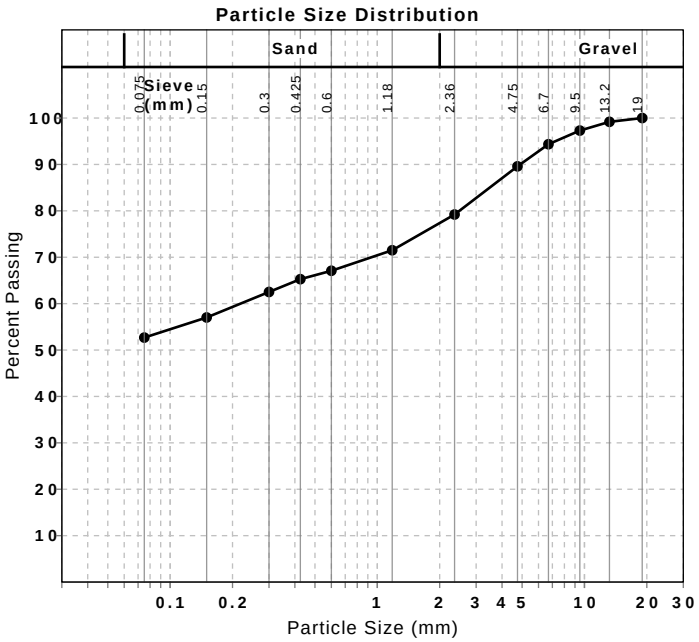
| Particle Size Distribution (AS1289 3.6.1) | | | |
|---|---|---|---|
| Sieve | Passed % | Passing Limits | |
| 19 mm | **100** | | |
| 13.2 mm | **99** | | |
| 9.5 mm | **97** | | |
| 6.7 mm | **94** | | |
| 4.75 mm | **90** | | |
| 2.36 mm | **79** | | |
| 1.18 mm | **72** | | |
| 0.6 mm | **67** | | |
| 0.425 mm | **65** | | |
| 0.3 mm | **63** | | |
| 0.15 mm | **57** | | |
| 0.075 mm | **53** | | |

| Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1) | | Min | Max |
|---|---|---|---|
| Sample History | Air Dried | | |
| Preparation Method | Wet Sieve | | |
| Liquid Limit (%) | 53 | | |
| Plastic Limit (%) | 32 | | |
| **Plasticity Index (%)** | **21** | | |

| Linear Shrinkage (AS1289 3.4.1) | | Min | Max |
|---|---|---|---|
| Moisture Condition Determined By | AS 1289.3.1.2 | | |
| Linear Shrinkage (%) | **12.0** | | |
| Cracking Crumbling Curling | Cracking | | |

| Emerson Class Number of a Soil (AS 1289 3.8.1) | | Min | Max |
|---|---|---|---|
| Emerson Class | **5** | | |
| Soil Description | Natural Soil | | |
| Nature of Water | Distilled Water | | |
| Temperature of Water ($^{o}$C) | 23 | | |

| Moisture Content (AS 1289 2.1.1) | | Min | Max |
|---|---|---|---|
| Moisture Content (%) | 13.8 | | |



# Material Test Report

Douglas Partners
Geotechnics / Environment / Groundwater
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Darwin Laboratory
Unit 2/14 Caryota Circuit Coconut Grove NT 0810
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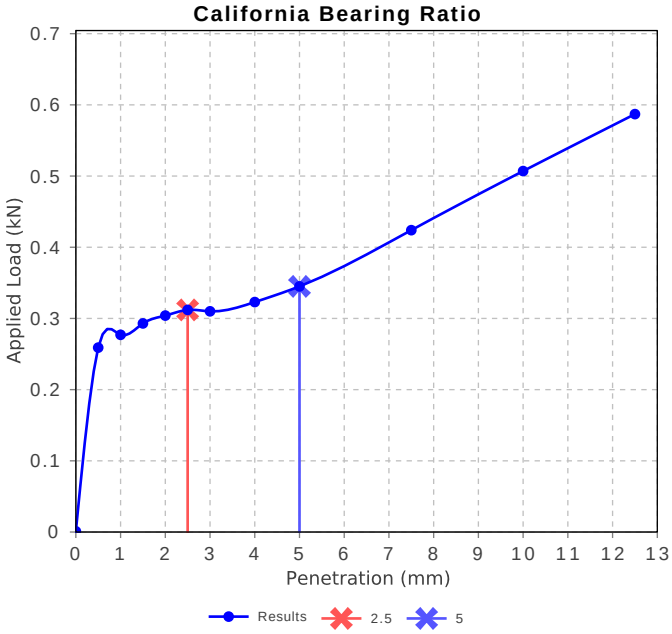
Email: Sunil.Sukhdeo@douglaspartners.com.au

Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Sunil Sukhdeo
Laboratory Manager
Laboratory Accreditation Number: 828

**Report Number:** **209497.00-2**
**Issue Number:** 1
**Date Issued:** 09/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5320
**Sample Number:** DW-5320I
**Date Sampled:** 10/08/2023
**Dates Tested:** 07/09/2023 - 19/09/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP31 , Depth: 0.5 - 0.7m**
**Material:** Natural

| California Bearing Ratio (AS 1289 6.1.1 & 2.1.1) | | Min | Max |
|---|---|---|---|
| CBR taken at | 2.5 mm | | |
| CBR % | **2.5** | | |
| Method of Compactive Effort | Modified | | |
| Method used to Determine MDD | AS 1289 5.2.1 & 2.1.1 | | |
| Method used to Determine Plasticity | Visual Assessment | | |
| Maximum Dry Density (t/m$^3$) | 1.80 | | |
| Optimum Moisture Content (%) | 13.5 | | |
| Laboratory Density Ratio (%) | 95.0 | | |
| Laboratory Moisture Ratio (%) | 100.0 | | |
| Dry Density after Soaking (t/m$^3$) | 1.62 | | |
| Field Moisture Content (%) | 13.8 | | |
| Moisture Content at Placement (%) | 13.5 | | |
| Moisture Content Top 30mm (%) | 26.7 | | |
| Moisture Content Rest of Sample (%) | 24.5 | | |
| Mass Surcharge (kg) | 4.5 | | |
| Soaking Period (days) | 4 | | |
| Curing Hours (h) | 96.0 | | |
| Swell (%) | 6.0 | | |
| Oversize Material (mm) | 19 | | |
| Oversize Material Included | Excluded | | |
| Oversize Material (%) | 0.0 | | |



# Material Test Report

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Approved Signatory: Sunil Sukhdeo
Laboratory Manager
Laboratory Accreditation Number: 828

**Report Number:** **209497.00-2**
**Issue Number:** 1
**Date Issued:** 09/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5320
**Sample Number:** DW-5320J
**Date Sampled:** 11/08/2023
**Dates Tested:** 07/09/2023 - 05/10/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP33 , Depth: 1.6m**
**Material:** Natural

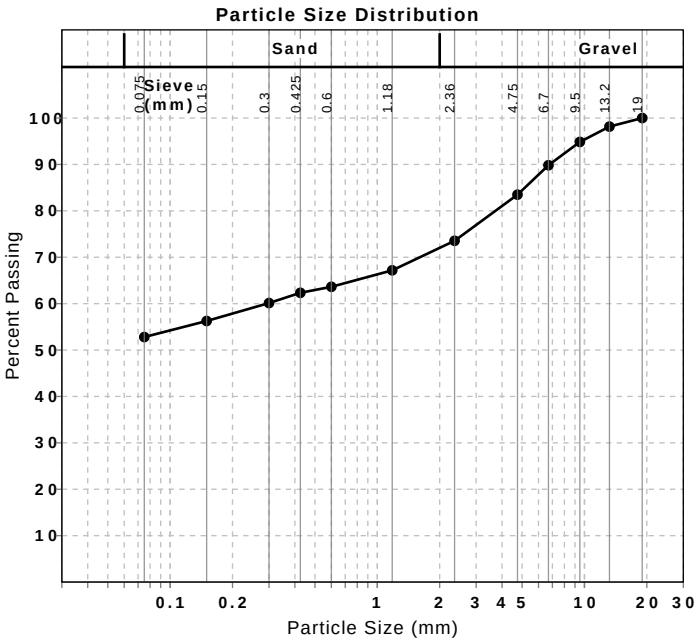
| Particle Size Distribution (AS1289 3.6.1) | | | |
|---|---|---|---|
| Sieve | Passed % | Passing Limits | |
| 19 mm | **100** | | |
| 13.2 mm | **98** | | |
| 9.5 mm | **95** | | |
| 6.7 mm | **90** | | |
| 4.75 mm | **83** | | |
| 2.36 mm | **74** | | |
| 1.18 mm | **67** | | |
| 0.6 mm | **64** | | |
| 0.425 mm | **62** | | |
| 0.3 mm | **60** | | |
| 0.15 mm | **56** | | |
| 0.075 mm | **53** | | |

| Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1) | | Min | Max |
|---|---|---|---|
| Sample History | Air Dried | | |
| Preparation Method | Wet Sieve | | |
| Liquid Limit (%) | 49 | | |
| Plastic Limit (%) | 17 | | |
| **Plasticity Index (%)** | **32** | | |

| Linear Shrinkage (AS1289 3.4.1) | | Min | Max |
|---|---|---|---|
| Moisture Condition Determined By | AS 1289.3.1.2 | | |
| Linear Shrinkage (%) | **6.0** | | |
| Cracking Crumbling Curling | Cracking | | |

| Emerson Class Number of a Soil (AS 1289 3.8.1) | | Min | Max |
|---|---|---|---|
| Emerson Class | **5** | | |
| Soil Description | Natural Soil | | |
| Nature of Water | Distilled Water | | |
| Temperature of Water ($^{o}$C) | 23 | | |

| Moisture Content (AS 1289 2.1.1) | | Min | Max |
|---|---|---|---|
| Moisture Content (%) | 17.1 | | |



# Material Test Report

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Approved Signatory: Sunil Sukhdeo
Laboratory Manager
Laboratory Accreditation Number: 828

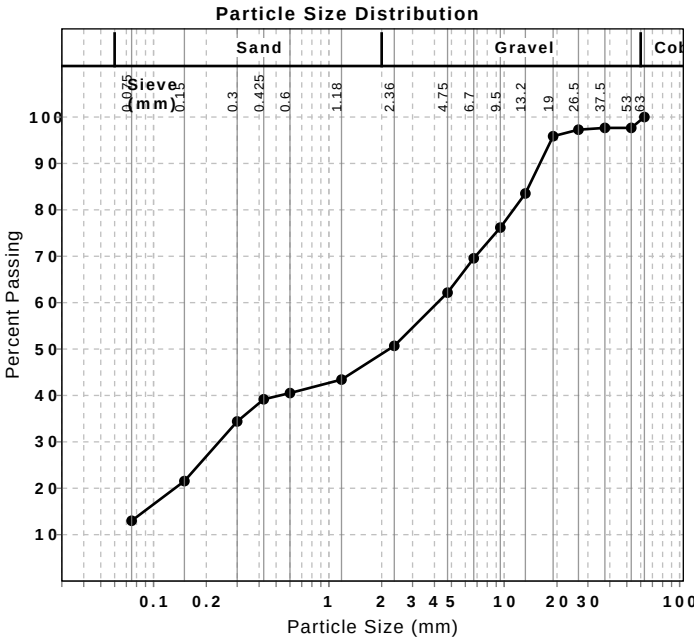
**Report Number:** **209497.00-3**
**Issue Number:** 2 - *This version supersedes all previous issues*
**Reissue Reason:** *CBR added*
**Date Issued:** 25/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5321
**Sample Number:** DW-5321A
**Date Sampled:** 15/08/2023
**Dates Tested:** 07/09/2023 - 06/10/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP50 , Depth: 0.3 - 0.5m**
**Material:** Natural

| Particle Size Distribution (AS1289 3.6.1) | | | |
|---|---|---|---|
| Sieve | Passed % | Passing Limits | |
| 63 mm | **100** | | |
| 53 mm | **98** | | |
| 37.5 mm | **98** | | |
| 26.5 mm | **97** | | |
| 19 mm | **96** | | |
| 13.2 mm | **84** | | |
| 9.5 mm | **76** | | |
| 6.7 mm | **70** | | |
| 4.75 mm | **62** | | |
| 2.36 mm | **51** | | |
| 1.18 mm | **43** | | |
| 0.6 mm | **41** | | |
| 0.425 mm | **39** | | |
| 0.3 mm | **34** | | |
| 0.15 mm | **22** | | |
| 0.075 mm | **13** | | |

| Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1) | | Min | Max |
|---|---|---|---|
| Sample History | Air Dried | | |
| Preparation Method | Wet Sieve | | |
| Liquid Limit (%) | 18 | | |
| Plastic Limit (%) | 13 | | |
| **Plasticity Index (%)** | **5** | | |

| Linear Shrinkage (AS1289 3.4.1) | | Min | Max |
|---|---|---|---|
| Moisture Condition Determined By | AS 1289.3.1.2 | | |
| Linear Shrinkage (%) | **1.5** | | |
| Cracking Crumbling Curling | Cracking | | |

| Moisture Content (AS 1289 2.1.1) | | Min | Max |
|---|---|---|---|
| Moisture Content (%) | 8.3 | | |



# Material Test Report

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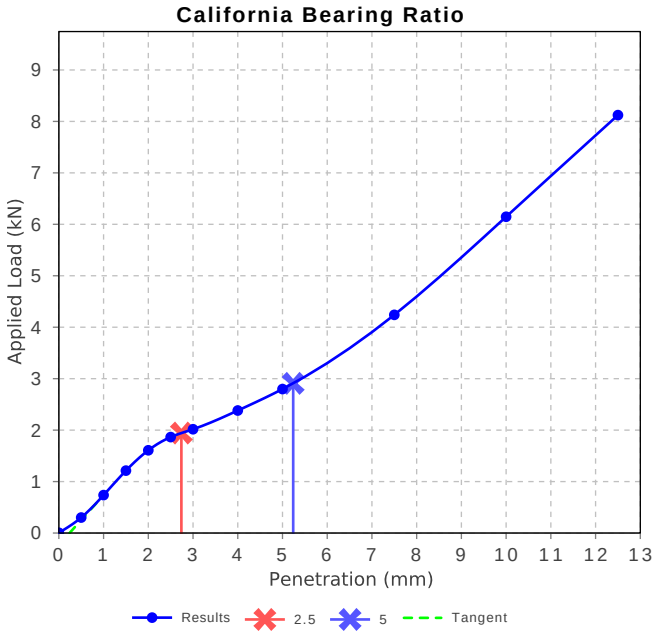
Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Sunil Sukhdeo
Laboratory Manager
Laboratory Accreditation Number: 828

**Report Number:** **209497.00-3**
**Issue Number:** 2 - *This version supersedes all previous issues*
**Reissue Reason:** *CBR added*
**Date Issued:** 25/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5321
**Sample Number:** DW-5321A
**Date Sampled:** 15/08/2023
**Dates Tested:** 07/09/2023 - 02/10/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP50 , Depth: 0.3 - 0.5m**
**Material:** Natural

| California Bearing Ratio (AS 1289 6.1.1 & 2.1.1) | | Min | Max |
|---|---|---|---|
| CBR taken at | 2.5 mm | | |
| CBR % | **15** | | |
| Method of Compactive Effort | Modified | | |
| Method used to Determine MDD | AS 1289 5.2.1 & 2.1.1 | | |
| Method used to Determine Plasticity | Visual Assessment | | |
| Maximum Dry Density (t/m$^3$) | 2.15 | | |
| Optimum Moisture Content (%) | 12.5 | | |
| Laboratory Density Ratio (%) | 100.0 | | |
| Laboratory Moisture Ratio (%) | 98.5 | | |
| Dry Density after Soaking (t/m$^3$) | 2.16 | | |
| Field Moisture Content (%) | 8.3 | | |
| Moisture Content at Placement (%) | 12.4 | | |
| Moisture Content Top 30mm (%) | 16.0 | | |
| Moisture Content Rest of Sample (%) | 14.7 | | |
| Mass Surcharge (kg) | 4.5 | | |
| Soaking Period (days) | 4 | | |
| Curing Hours (h) | 408.0 | | |
| Swell (%) | 0.0 | | |
| Oversize Material (mm) | 19 | | |
| Oversize Material Included | Excluded | | |
| Oversize Material (%) | 3.8 | | |



# Material Test Report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Approved Signatory: Sunil Sukhdeo
Laboratory Manager
Laboratory Accreditation Number: 828

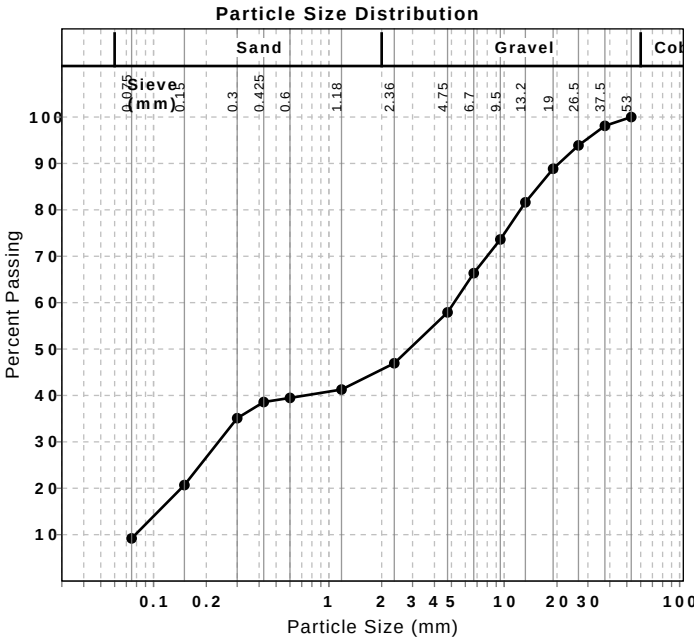
**Report Number:** **209497.00-3**
**Issue Number:** 2 - *This version supersedes all previous issues*
**Reissue Reason:** *CBR added*
**Date Issued:** 25/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5321
**Sample Number:** DW-5321B
**Date Sampled:** 15/08/2023
**Dates Tested:** 07/09/2023 - 05/10/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP51 , Depth: 0.2 - 0.4m**
**Material:** Natural

| Particle Size Distribution (AS1289 3.6.1) | | | |
|---|---|---|---|
| Sieve | Passed % | Passing Limits | |
| 53 mm | **100** | | |
| 37.5 mm | **98** | | |
| 26.5 mm | **94** | | |
| 19 mm | **89** | | |
| 13.2 mm | **82** | | |
| 9.5 mm | **74** | | |
| 6.7 mm | **66** | | |
| 4.75 mm | **58** | | |
| 2.36 mm | **47** | | |
| 1.18 mm | **41** | | |
| 0.6 mm | **39** | | |
| 0.425 mm | **39** | | |
| 0.3 mm | **35** | | |
| 0.15 mm | **21** | | |
| 0.075 mm | **9** | | |

| Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1) | | Min | Max |
|---|---|---|---|
| Sample History | Air Dried | | |
| Preparation Method | Wet Sieve | | |
| Liquid Limit (%) | Not Obtainable | | |
| Plastic Limit (%) | Not Obtainable | | |
| **Plasticity Index (%)** | **Non Plastic** | | |
| Linear Shrinkage (AS1289 3.4.1) non obtainable | | | |

| Linear Shrinkage (AS1289 3.4.1) | | Min | Max |
|---|---|---|---|
| Moisture Condition Determined By | AS 1289.3.1.2 | | |
| Linear Shrinkage (%) | | | |
| Cracking Crumbling Curling | | | |
| Linear Shrinkage (AS1289 3.4.1) non obtainable | | | |

| Moisture Content (AS 1289 2.1.1) | | Min | Max |
|---|---|---|---|
| Moisture Content (%) | 4.7 | | |



# Material Test Report

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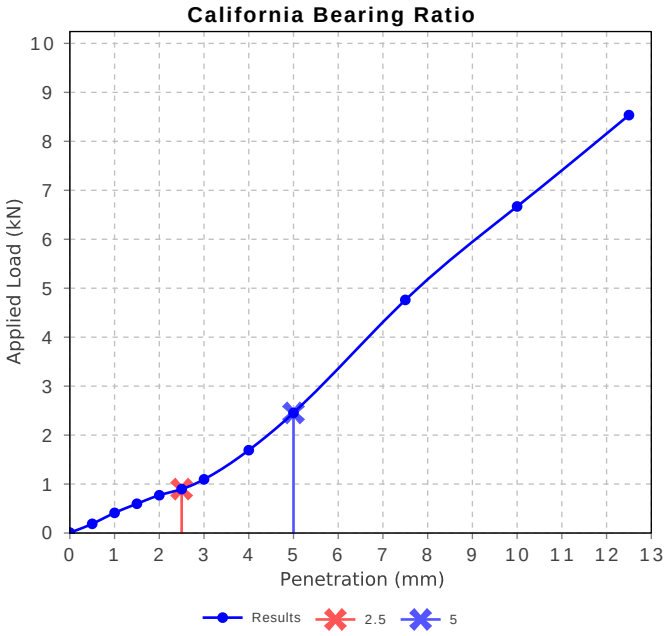
Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Sunil Sukhdeo
Laboratory Manager
Laboratory Accreditation Number: 828

**Report Number:** **209497.00-3**
**Issue Number:** 2 - *This version supersedes all previous issues*
**Reissue Reason:** *CBR added*
**Date Issued:** 25/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5321
**Sample Number:** DW-5321B
**Date Sampled:** 15/08/2023
**Dates Tested:** 07/09/2023 - 02/10/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP51 , Depth: 0.2 - 0.4m**
**Material:** Natural

| California Bearing Ratio (AS 1289 6.1.1 & 2.1.1) | | Min | Max |
|---|---|---|---|
| CBR taken at | 5 mm | | |
| CBR % | **12** | | |
| Method of Compactive Effort | Modified | | |
| Method used to Determine MDD | AS 1289 5.2.1 & 2.1.1 | | |
| Method used to Determine Plasticity | Visual Assessment | | |
| Maximum Dry Density (t/m$^3$) | 2.06 | | |
| Optimum Moisture Content (%) | 7.0 | | |
| Laboratory Density Ratio (%) | 95.5 | | |
| Laboratory Moisture Ratio (%) | 97.5 | | |
| Dry Density after Soaking (t/m$^3$) | 1.99 | | |
| Field Moisture Content (%) | 4.7 | | |
| Moisture Content at Placement (%) | 6.7 | | |
| Moisture Content Top 30mm (%) | 11.4 | | |
| Moisture Content Rest of Sample (%) | 11.3 | | |
| Mass Surcharge (kg) | 4.5 | | |
| Soaking Period (days) | 4 | | |
| Curing Hours (h) | 384.0 | | |
| Swell (%) | -1.5 | | |
| Oversize Material (mm) | 19 | | |
| Oversize Material Included | Excluded | | |
| Oversize Material (%) | 10.7 | | |



# Material Test Report

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Approved Signatory: Sunil Sukhdeo
Laboratory Manager
Laboratory Accreditation Number: 828

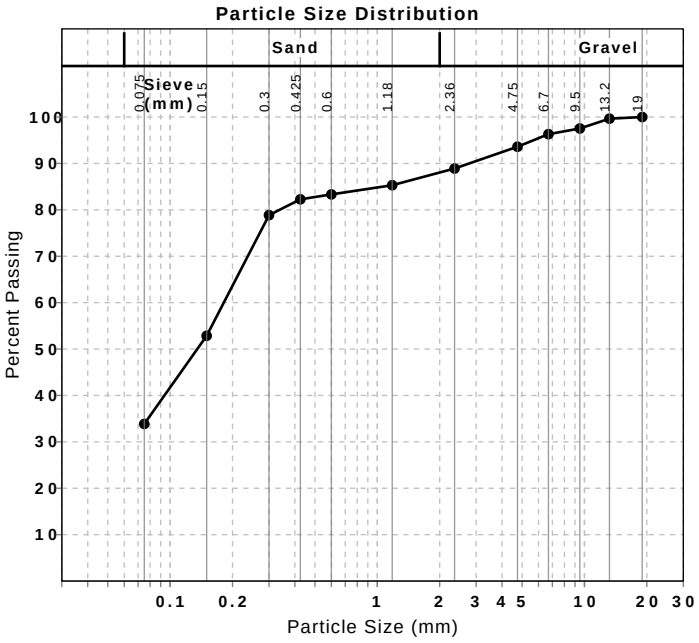
**Report Number:** **209497.00-3**
**Issue Number:** 2 - *This version supersedes all previous issues*
**Reissue Reason:** *CBR added*
**Date Issued:** 25/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5321
**Sample Number:** DW-5321C
**Date Sampled:** 15/08/2023
**Dates Tested:** 07/09/2023 - 04/10/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP52 , Depth: 0.4 - 0.6m**
**Material:** Natural

| Particle Size Distribution (AS1289 3.6.1) | | | |
|---|---|---|---|
| Sieve | Passed % | Passing Limits | |
| 19 mm | **100** | | |
| 13.2 mm | **100** | | |
| 9.5 mm | **98** | | |
| 6.7 mm | **96** | | |
| 4.75 mm | **94** | | |
| 2.36 mm | **89** | | |
| 1.18 mm | **85** | | |
| 0.6 mm | **83** | | |
| 0.425 mm | **82** | | |
| 0.3 mm | **79** | | |
| 0.15 mm | **53** | | |
| 0.075 mm | **34** | | |

| Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1) | | Min | Max |
|---|---|---|---|
| Sample History | Air Dried | | |
| Preparation Method | Wet Sieve | | |
| Liquid Limit (%) | 31 | | |
| Plastic Limit (%) | 16 | | |
| **Plasticity Index (%)** | **15** | | |

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

| Moisture Content (AS 1289 2.1.1) | | Min | Max |
|---|---|---|---|
| Moisture Content (%) | 12.1 | | |



# Material Test Report

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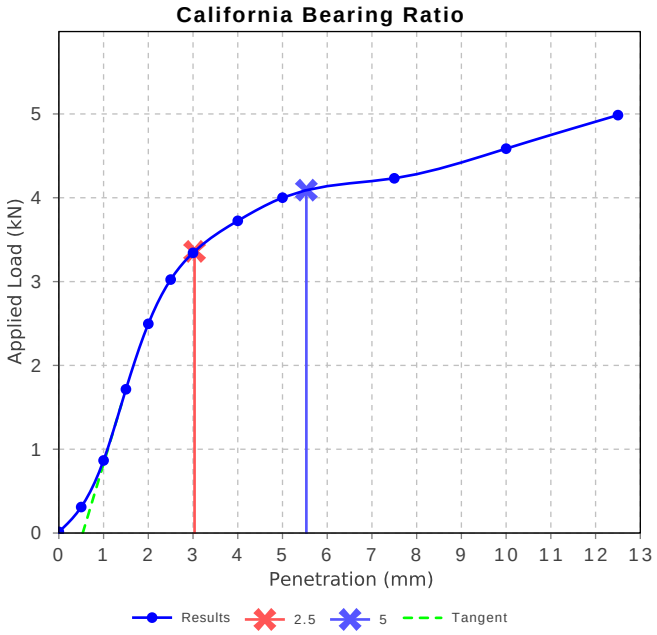
Approved Signatory: Sunil Sukhdeo
Laboratory Manager
Laboratory Accreditation Number: 828

**Report Number:** **209497.00-3**
**Issue Number:** 2 - *This version supersedes all previous issues*
**Reissue Reason:** *CBR added*
**Date Issued:** 25/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5321
**Sample Number:** DW-5321C
**Date Sampled:** 15/08/2023
**Dates Tested:** 07/09/2023 - 02/10/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP52 , Depth: 0.4 - 0.6m**
**Material:** Natural

| California Bearing Ratio (AS 1289 6.1.1 & 2.1.1) | | Min | Max |
|---|---|---|---|
| CBR taken at | 2.5 mm | | |
| CBR % | **25** | | |
| Method of Compactive Effort | Modified | | |
| Method used to Determine MDD | AS 1289 5.2.1 & 2.1.1 | | |
| Method used to Determine Plasticity | Visual Assessment | | |
| Maximum Dry Density (t/m$^3$) | 1.96 | | |
| Optimum Moisture Content (%) | 12.0 | | |
| Laboratory Density Ratio (%) | 95.0 | | |
| Laboratory Moisture Ratio (%) | 99.0 | | |
| Dry Density after Soaking (t/m$^3$) | 1.86 | | |
| Field Moisture Content (%) | 12.1 | | |
| Moisture Content at Placement (%) | 12.0 | | |
| Moisture Content Top 30mm (%) | 15.1 | | |
| Moisture Content Rest of Sample (%) | 14.4 | | |
| Mass Surcharge (kg) | 4.5 | | |
| Soaking Period (days) | 4 | | |
| Curing Hours (h) | 408.0 | | |
| Swell (%) | 0.5 | | |
| Oversize Material (mm) | 19 | | |
| Oversize Material Included | Excluded | | |
| Oversize Material (%) | 0.0 | | |



# Material Test Report

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Approved Signatory: Sunil Sukhdeo
Laboratory Manager
Laboratory Accreditation Number: 828

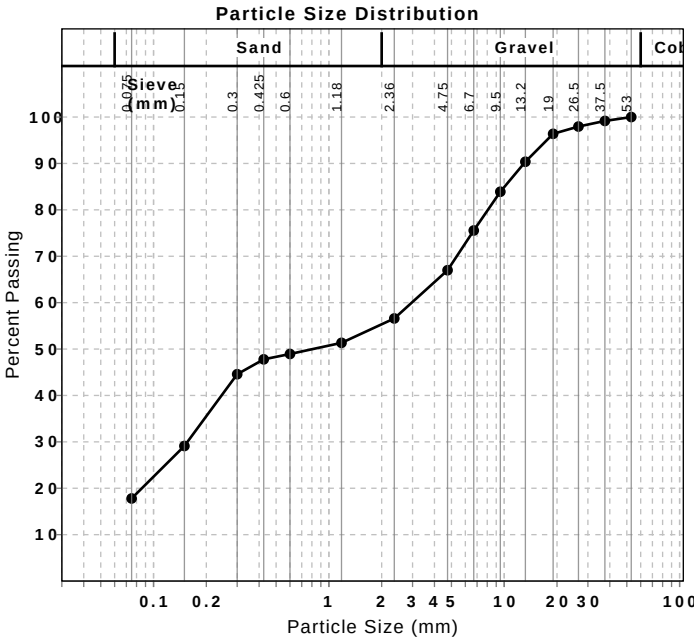
**Report Number:** **209497.00-3**
**Issue Number:** 2 - *This version supersedes all previous issues*
**Reissue Reason:** *CBR added*
**Date Issued:** 25/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5321
**Sample Number:** DW-5321D
**Date Sampled:** 15/08/2023
**Dates Tested:** 07/09/2023 - 06/10/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP54 , Depth: 0.5 - 0.7m**
**Material:** Natural

| Particle Size Distribution (AS1289 3.6.1) | | | |
|---|---|---|---|
| Sieve | Passed % | Passing Limits | |
| 53 mm | **100** | | |
| 37.5 mm | **99** | | |
| 26.5 mm | **98** | | |
| 19 mm | **96** | | |
| 13.2 mm | **90** | | |
| 9.5 mm | **84** | | |
| 6.7 mm | **76** | | |
| 4.75 mm | **67** | | |
| 2.36 mm | **57** | | |
| 1.18 mm | **51** | | |
| 0.6 mm | **49** | | |
| 0.425 mm | **48** | | |
| 0.3 mm | **45** | | |
| 0.15 mm | **29** | | |
| 0.075 mm | **18** | | |

| Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1) | | Min | Max |
|---|---|---|---|
| Sample History | Air Dried | | |
| Preparation Method | Wet Sieve | | |
| Liquid Limit (%) | 26 | | |
| Plastic Limit (%) | 15 | | |
| **Plasticity Index (%)** | **11** | | |

| Linear Shrinkage (AS1289 3.4.1) | | Min | Max |
|---|---|---|---|
| Moisture Condition Determined By | AS 1289.3.1.2 | | |
| Linear Shrinkage (%) | **5.0** | | |
| Cracking Crumbling Curling | Cracking | | |

| Moisture Content (AS 1289 2.1.1) | | Min | Max |
|---|---|---|---|
| Moisture Content (%) | 10.6 | | |



# Material Test Report

Douglas Partners
Geotechnics / Environment / Groundwater
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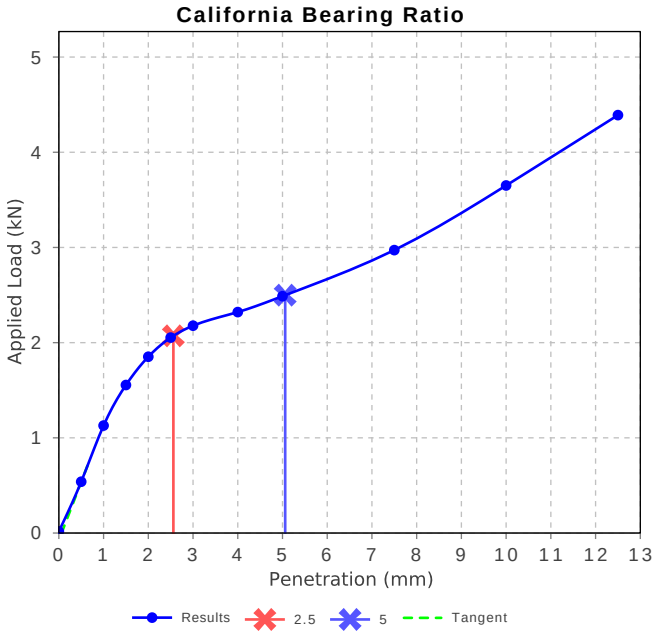
Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Sunil Sukhdeo
Laboratory Manager
Laboratory Accreditation Number: 828

**Report Number:** **209497.00-3**
**Issue Number:** 2 - *This version supersedes all previous issues*
**Reissue Reason:** *CBR added*
**Date Issued:** 25/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5321
**Sample Number:** DW-5321D
**Date Sampled:** 15/08/2023
**Dates Tested:** 07/09/2023 - 02/10/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP54 , Depth: 0.5 - 0.7m**
**Material:** Natural

| California Bearing Ratio (AS 1289 6.1.1 & 2.1.1) | | Min | Max |
|---|---|---|---|
| CBR taken at | 2.5 mm | | |
| CBR % | **16** | | |
| Method of Compactive Effort | Modified | | |
| Method used to Determine MDD | AS 1289 5.2.1 & 2.1.1 | | |
| Method used to Determine Plasticity | Visual Assessment | | |
| Maximum Dry Density (t/m$^3$) | 2.04 | | |
| Optimum Moisture Content (%) | 8.5 | | |
| Laboratory Density Ratio (%) | 95.5 | | |
| Laboratory Moisture Ratio (%) | 99.0 | | |
| Dry Density after Soaking (t/m$^3$) | 1.93 | | |
| Field Moisture Content (%) | 10.6 | | |
| Moisture Content at Placement (%) | 8.6 | | |
| Moisture Content Top 30mm (%) | 15.0 | | |
| Moisture Content Rest of Sample (%) | 12.7 | | |
| Mass Surcharge (kg) | 4.5 | | |
| Soaking Period (days) | 4 | | |
| Curing Hours (h) | 24.0 | | |
| Swell (%) | 0.5 | | |
| Oversize Material (mm) | 19 | | |
| Oversize Material Included | Excluded | | |
| Oversize Material (%) | 3.3 | | |



# Material Test Report

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Approved Signatory: Sunil Sukhdeo
Laboratory Manager
Laboratory Accreditation Number: 828

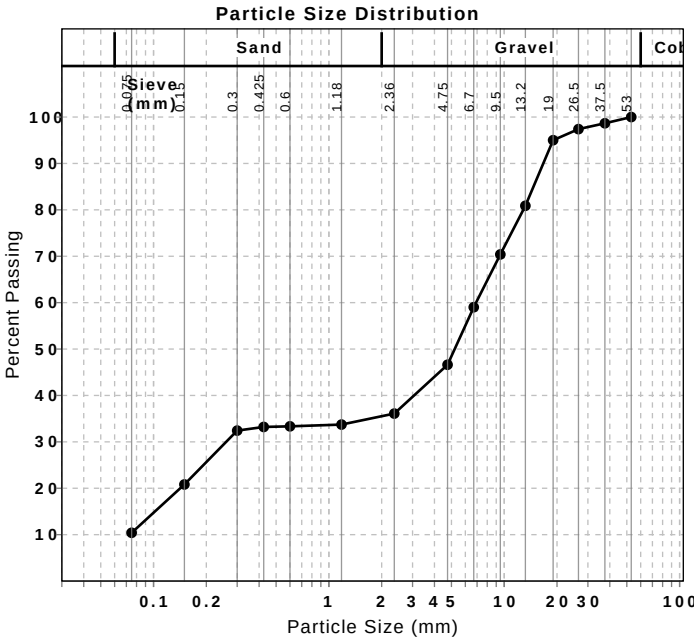
**Report Number:** **209497.00-3**
**Issue Number:** 2 - *This version supersedes all previous issues*
**Reissue Reason:** *CBR added*
**Date Issued:** 25/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5321
**Sample Number:** DW-5321E
**Date Sampled:** 16/08/2023
**Dates Tested:** 07/09/2023 - 29/09/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP60 , Depth: 0.1 - 0.3m**
**Material:** Natural

| Particle Size Distribution (AS1289 3.6.1) | | | |
|---|---|---|---|
| Sieve | Passed % | Passing Limits | |
| 53 mm | **100** | | |
| 37.5 mm | **99** | | |
| 26.5 mm | **97** | | |
| 19 mm | **95** | | |
| 13.2 mm | **81** | | |
| 9.5 mm | **70** | | |
| 6.7 mm | **59** | | |
| 4.75 mm | **47** | | |
| 2.36 mm | **36** | | |
| 1.18 mm | **34** | | |
| 0.6 mm | **33** | | |
| 0.425 mm | **33** | | |
| 0.3 mm | **32** | | |
| 0.15 mm | **21** | | |
| 0.075 mm | **10** | | |

| Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1) | | Min | Max |
|---|---|---|---|
| Sample History | Air Dried | | |
| Preparation Method | Wet Sieve | | |
| Liquid Limit (%) | Not Obtainable | | |
| Plastic Limit (%) | Not Obtainable | | |
| **Plasticity Index (%)** | **Non Plastic** | | |
| Linear Shrinkage (AS1289 3.4.1) non obtainable | | | |

| Linear Shrinkage (AS1289 3.4.1) | | Min | Max |
|---|---|---|---|
| Moisture Condition Determined By | AS 1289.3.1.2 | | |
| Linear Shrinkage (%) | | | |
| Cracking Crumbling Curling | | | |
| Linear Shrinkage (AS1289 3.4.1) non obtainable | | | |

| Moisture Content (AS 1289 2.1.1) | | Min | Max |
|---|---|---|---|
| Moisture Content (%) | 4.0 | | |



# Material Test Report

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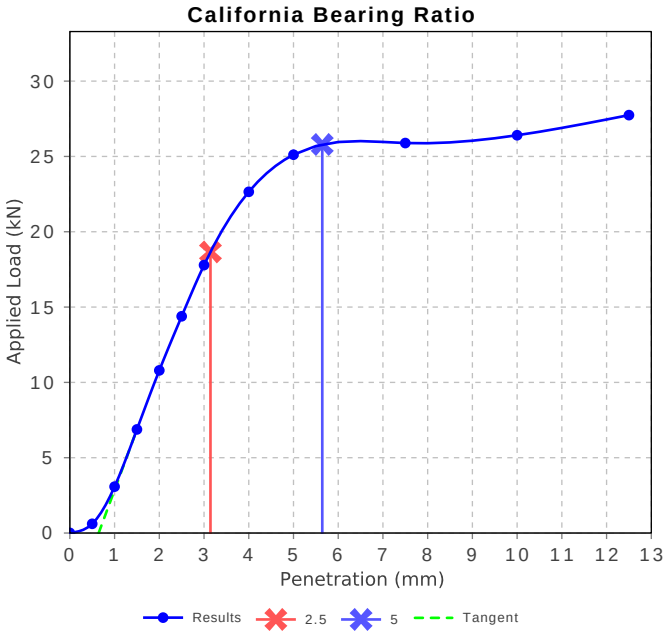
Laboratory Accreditation Number: 828

**Report Number:** **209497.00-3**
**Issue Number:** 2 - *This version supersedes all previous issues*
**Reissue Reason:** *CBR added*
**Date Issued:** 25/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5321
**Sample Number:** DW-5321E
**Date Sampled:** 16/08/2023
**Dates Tested:** 07/09/2023 - 02/10/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP60 , Depth: 0.1 - 0.3m**
**Material:** Natural

| California Bearing Ratio (AS 1289 6.1.1 & 2.1.1) | | Min | Max |
|---|---|---|---|
| CBR taken at | 2.5 mm | | |
| CBR % | **140** | | |
| Method of Compactive Effort | Modified | | |
| Method used to Determine MDD | AS 1289 5.2.1 & 2.1.1 | | |
| Method used to Determine Plasticity | Visual Assessment | | |
| Maximum Dry Density (t/m$^3$) | 2.45 | | |
| Optimum Moisture Content (%) | 6.5 | | |
| Laboratory Density Ratio (%) | 95.0 | | |
| Laboratory Moisture Ratio (%) | 96.5 | | |
| Dry Density after Soaking (t/m$^3$) | 2.33 | | |
| Field Moisture Content (%) | 4.0 | | |
| Moisture Content at Placement (%) | 6.3 | | |
| Moisture Content Top 30mm (%) | 7.7 | | |
| Moisture Content Rest of Sample (%) | 7.6 | | |
| Mass Surcharge (kg) | 4.5 | | |
| Soaking Period (days) | 4 | | |
| Curing Hours (h) | 192.0 | | |
| Swell (%) | 0.0 | | |
| Oversize Material (mm) | 19 | | |
| Oversize Material Included | Excluded | | |
| Oversize Material (%) | 4.8 | | |



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Laboratory Accreditation Number: 828

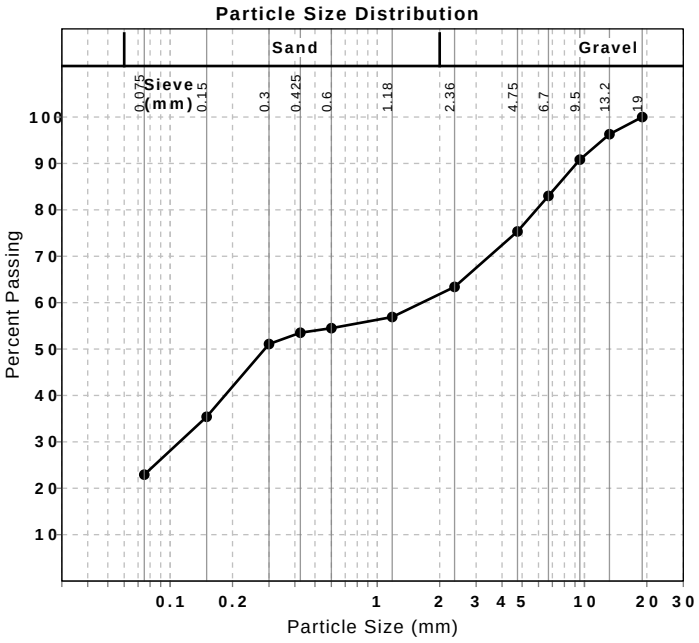
**Report Number:** **209497.00-3**
**Issue Number:** 2 - *This version supersedes all previous issues*
**Reissue Reason:** *CBR added*
**Date Issued:** 25/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5321
**Sample Number:** DW-5321F
**Date Sampled:** 16/08/2023
**Dates Tested:** 07/09/2023 - 06/10/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP60 , Depth: 0.5 - 0.7m**
**Material:** Natural

| Particle Size Distribution (AS1289 3.6.1) | | | |
|---|---|---|---|
| Sieve | Passed % | Passing Limits | |
| 19 mm | **100** | | |
| 13.2 mm | **96** | | |
| 9.5 mm | **91** | | |
| 6.7 mm | **83** | | |
| 4.75 mm | **75** | | |
| 2.36 mm | **63** | | |
| 1.18 mm | **57** | | |
| 0.6 mm | **55** | | |
| 0.425 mm | **54** | | |
| 0.3 mm | **51** | | |
| 0.15 mm | **35** | | |
| 0.075 mm | **23** | | |

| Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1) | | Min | Max |
|---|---|---|---|
| Sample History | Air Dried | | |
| Preparation Method | Wet Sieve | | |
| Liquid Limit (%) | 37 | | |
| Plastic Limit (%) | 22 | | |
| **Plasticity Index (%)** | **15** | | |

| Linear Shrinkage (AS1289 3.4.1) | | Min | Max |
|---|---|---|---|
| Moisture Condition Determined By | AS 1289.3.1.2 | | |
| Linear Shrinkage (%) | **6.0** | | |
| Cracking Crumbling Curling | Cracking | | |

| Moisture Content (AS 1289 2.1.1) | | Min | Max |
|---|---|---|---|
| Moisture Content (%) | 14.7 | | |



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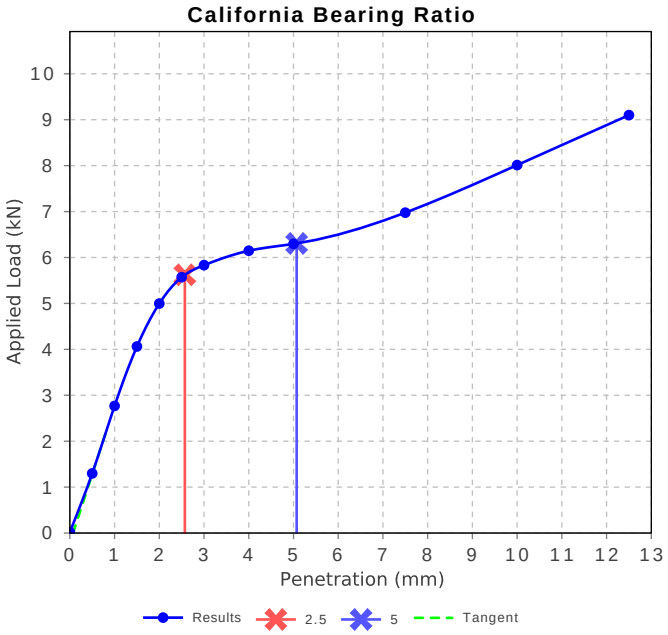
Approved Signatory: Sunil Sukhdeo
Laboratory Manager
Laboratory Accreditation Number: 828

**Report Number:** **209497.00-3**
**Issue Number:** 2 - *This version supersedes all previous issues*
**Reissue Reason:** *CBR added*
**Date Issued:** 25/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5321
**Sample Number:** DW-5321F
**Date Sampled:** 16/08/2023
**Dates Tested:** 07/09/2023 - 02/10/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP60 , Depth: 0.5 - 0.7m**
**Material:** Natural

| California Bearing Ratio (AS 1289 6.1.1 & 2.1.1) | | Min | Max |
|---|---|---|---|
| CBR taken at | 2.5 mm | | |
| CBR % | **45** | | |
| Method of Compactive Effort | Modified | | |
| Method used to Determine MDD | AS 1289 5.2.1 & 2.1.1 | | |
| Method used to Determine Plasticity | Visual Assessment | | |
| Maximum Dry Density (t/m$^3$) | 1.88 | | |
| Optimum Moisture Content (%) | 14.5 | | |
| Laboratory Density Ratio (%) | 100.0 | | |
| Laboratory Moisture Ratio (%) | 100.0 | | |
| Dry Density after Soaking (t/m$^3$) | 1.87 | | |
| Field Moisture Content (%) | 14.7 | | |
| Moisture Content at Placement (%) | 14.4 | | |
| Moisture Content Top 30mm (%) | 10.6 | | |
| Moisture Content Rest of Sample (%) | 13.2 | | |
| Mass Surcharge (kg) | 4.5 | | |
| Soaking Period (days) | 4 | | |
| Curing Hours (h) | 24.0 | | |
| Swell (%) | 0.5 | | |
| Oversize Material (mm) | 19 | | |
| Oversize Material Included | Excluded | | |
| Oversize Material (%) | 0.0 | | |



# Material Test Report

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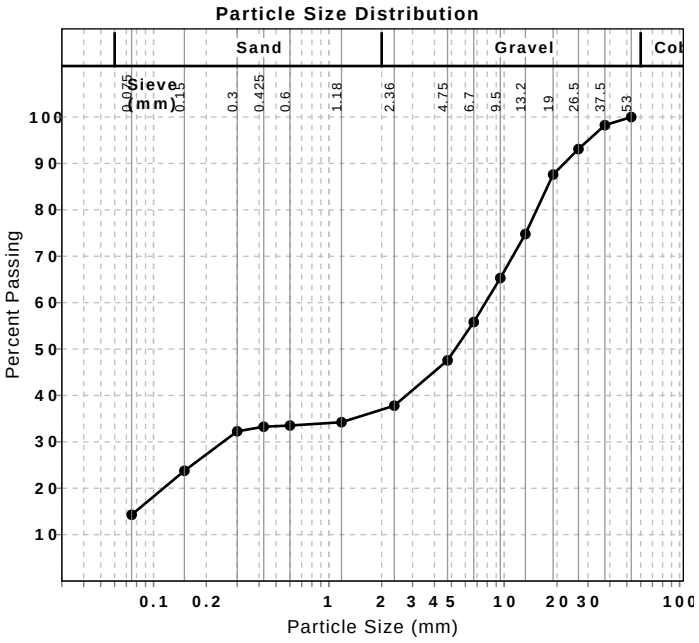
**Reissue Reason:** *CBR added*
**Date Issued:** 25/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5321
**Sample Number:** DW-5321G
**Date Sampled:** 16/08/2023
**Dates Tested:** 07/09/2023 - 09/10/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP61 , Depth: 0.1 - 0.3m**
**Material:** Natural

| Particle Size Distribution (AS1289 3.6.1) | | | |
|---|---|---|---|
| Sieve | Passed % | Passing Limits | |
| 53 mm | **100** | | |
| 37.5 mm | **98** | | |
| 26.5 mm | **93** | | |
| 19 mm | **88** | | |
| 13.2 mm | **75** | | |
| 9.5 mm | **65** | | |
| 6.7 mm | **56** | | |
| 4.75 mm | **48** | | |
| 2.36 mm | **38** | | |
| 1.18 mm | **34** | | |
| 0.6 mm | **34** | | |
| 0.425 mm | **33** | | |
| 0.3 mm | **32** | | |
| 0.15 mm | **24** | | |
| 0.075 mm | **14** | | |

| Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1) | | Min | Max |
|---|---|---|---|
| Sample History | Air Dried | | |
| Preparation Method | Wet Sieve | | |
| Liquid Limit (%) | 25 | | |
| Plastic Limit (%) | 16 | | |
| **Plasticity Index (%)** | **9** | | |

| Linear Shrinkage (AS1289 3.4.1) | | Min | Max |
|---|---|---|---|
| Moisture Condition Determined By | AS 1289.3.1.2 | | |
| Linear Shrinkage (%) | **4.0** | | |
| Cracking Crumbling Curling | Cracking | | |

| Moisture Content (AS 1289 2.1.1) | | Min | Max |
|---|---|---|---|
| Moisture Content (%) | 6.7 | | |



# Material Test Report

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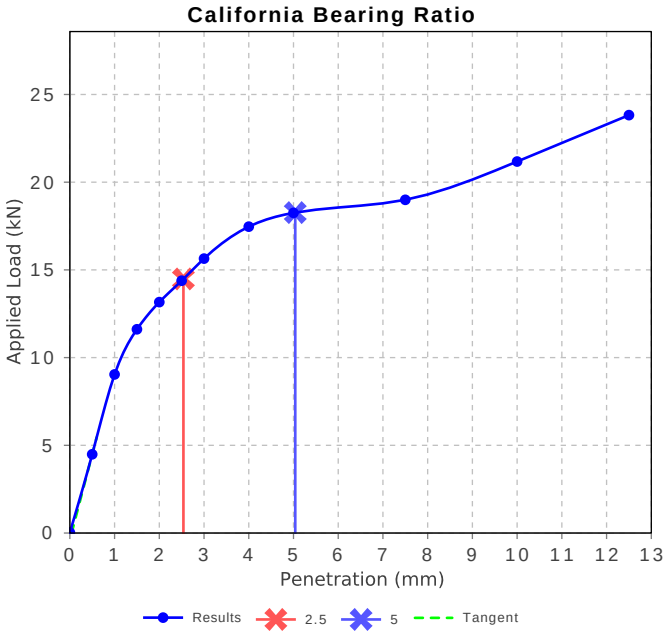
Approved Signatory: Sunil Sukhdeo
Laboratory Manager
Laboratory Accreditation Number: 828

**Report Number:** **209497.00-3**
**Issue Number:** 2 - *This version supersedes all previous issues*
**Reissue Reason:** *CBR added*
**Date Issued:** 25/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5321
**Sample Number:** DW-5321G
**Date Sampled:** 16/08/2023
**Dates Tested:** 07/09/2023 - 03/10/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP61 , Depth: 0.1 - 0.3m**
**Material:** Natural

| California Bearing Ratio (AS 1289 6.1.1 & 2.1.1) | | Min | Max |
|---|---|---|---|
| CBR taken at | 2.5 mm | | |
| CBR % | **110** | | |
| Method of Compactive Effort | Modified | | |
| Method used to Determine MDD | AS 1289 5.2.1 & 2.1.1 | | |
| Method used to Determine Plasticity | Visual Assessment | | |
| Maximum Dry Density (t/m$^3$) | 2.12 | | |
| Optimum Moisture Content (%) | 8.0 | | |
| Laboratory Density Ratio (%) | 100.5 | | |
| Laboratory Moisture Ratio (%) | 98.5 | | |
| Dry Density after Soaking (t/m$^3$) | 2.13 | | |
| Field Moisture Content (%) | 6.7 | | |
| Moisture Content at Placement (%) | 7.7 | | |
| Moisture Content Top 30mm (%) | 9.6 | | |
| Moisture Content Rest of Sample (%) | 10.0 | | |
| Mass Surcharge (kg) | 4.5 | | |
| Soaking Period (days) | 4 | | |
| Curing Hours (h) | 72.0 | | |
| Swell (%) | 0.0 | | |
| Oversize Material (mm) | 19 | | |
| Oversize Material Included | Excluded | | |
| Oversize Material (%) | 11.7 | | |



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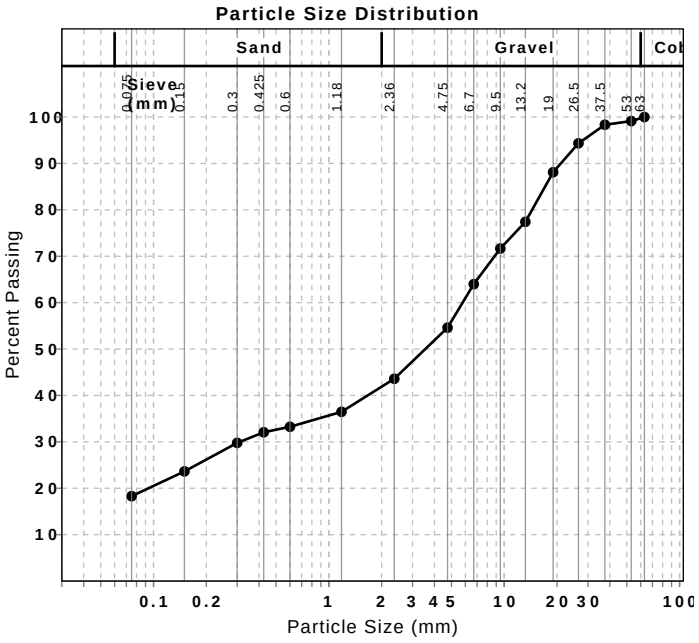
**Report Number:** **209497.00-3**
**Issue Number:** 2 - *This version supersedes all previous issues*
**Reissue Reason:** *CBR added*
**Date Issued:** 25/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5321
**Sample Number:** DW-5321H
**Date Sampled:** 16/08/2023
**Dates Tested:** 07/09/2023 - 06/10/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP62 , Depth: 0.5 - 0.7m**
**Material:** Natural

| Particle Size Distribution (AS1289 3.6.1) | | | |
|---|---|---|---|
| Sieve | Passed % | Passing Limits | |
| 63 mm | **100** | | |
| 53 mm | **99** | | |
| 37.5 mm | **98** | | |
| 26.5 mm | **94** | | |
| 19 mm | **88** | | |
| 13.2 mm | **77** | | |
| 9.5 mm | **72** | | |
| 6.7 mm | **64** | | |
| 4.75 mm | **55** | | |
| 2.36 mm | **44** | | |
| 1.18 mm | **36** | | |
| 0.6 mm | **33** | | |
| 0.425 mm | **32** | | |
| 0.3 mm | **30** | | |
| 0.15 mm | **24** | | |
| 0.075 mm | **18** | | |

| Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1) | | Min | Max |
|---|---|---|---|
| Sample History | Air Dried | | |
| Preparation Method | Wet Sieve | | |
| Liquid Limit (%) | Not Obtainable | | |
| Plastic Limit (%) | Not Obtainable | | |
| **Plasticity Index (%)** | **Non Plastic** | | |
| Linear Shrinkage (AS1289 3.4.1) non obtainable | | | |

| Linear Shrinkage (AS1289 3.4.1) | | Min | Max |
|---|---|---|---|
| Moisture Condition Determined By | AS 1289.3.1.2 | | |
| Linear Shrinkage (%) | | | |
| Cracking Crumbling Curling | | | |
| Linear Shrinkage (AS1289 3.4.1) non obtainable | | | |

| Moisture Content (AS 1289 2.1.1) | | Min | Max |
|---|---|---|---|
| Moisture Content (%) | 10.0 | | |



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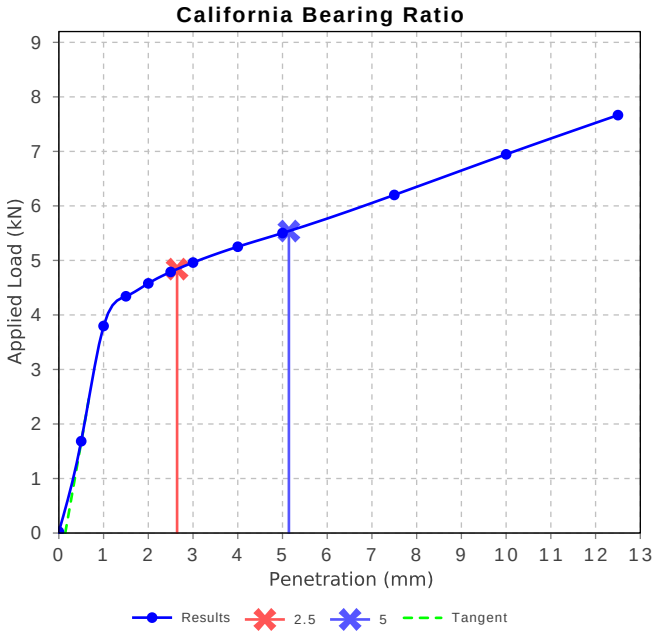
Laboratory Accreditation Number: 828

**Report Number:** **209497.00-3**
**Issue Number:** 2 - *This version supersedes all previous issues*
**Reissue Reason:** *CBR added*
**Date Issued:** 25/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5321
**Sample Number:** DW-5321H
**Date Sampled:** 16/08/2023
**Dates Tested:** 07/09/2023 - 03/10/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP62 , Depth: 0.5 - 0.7m**
**Material:** Natural

| California Bearing Ratio (AS 1289 6.1.1 & 2.1.1) | | Min | Max |
|---|---|---|---|
| CBR taken at | 2.5 mm | | |
| CBR % | **35** | | |
| Method of Compactive Effort | Modified | | |
| Method used to Determine MDD | AS 1289 5.2.1 & 2.1.1 | | |
| Method used to Determine Plasticity | Visual Assessment | | |
| Maximum Dry Density (t/m$^3$) | 2.11 | | |
| Optimum Moisture Content (%) | 10.0 | | |
| Laboratory Density Ratio (%) | 95.0 | | |
| Laboratory Moisture Ratio (%) | 99.5 | | |
| Dry Density after Soaking (t/m$^3$) | 1.99 | | |
| Field Moisture Content (%) | 10.0 | | |
| Moisture Content at Placement (%) | 9.8 | | |
| Moisture Content Top 30mm (%) | 16.3 | | |
| Moisture Content Rest of Sample (%) | 16.1 | | |
| Mass Surcharge (kg) | 4.5 | | |
| Soaking Period (days) | 4 | | |
| Curing Hours (h) | 48.0 | | |
| Swell (%) | 1.0 | | |
| Oversize Material (mm) | 19 | | |
| Oversize Material Included | Excluded | | |
| Oversize Material (%) | 10.9 | | |



# Material Test Report

Douglas Partners
Geotechnics / Environment / Groundwater
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Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Sunil Sukhdeo
Laboratory Manager
Laboratory Accreditation Number: 828

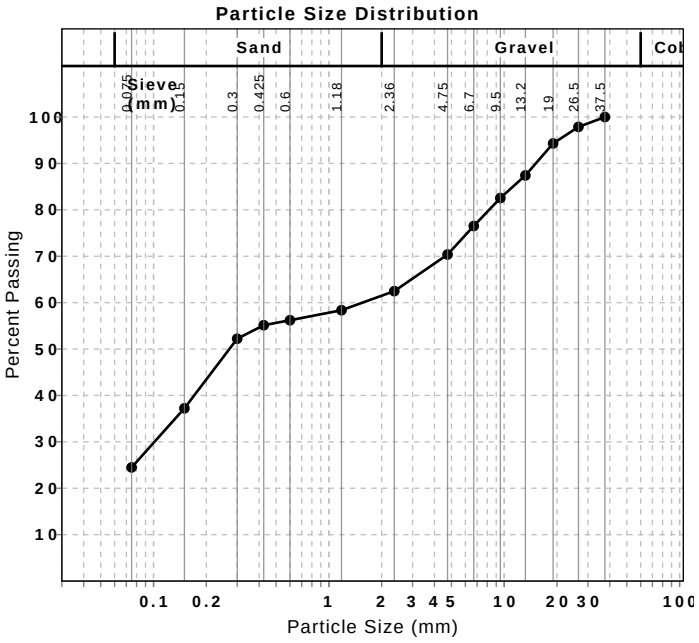
**Report Number:** **209497.00-3**
**Issue Number:** 2 - *This version supersedes all previous issues*
**Reissue Reason:** *CBR added*
**Date Issued:** 25/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5321
**Sample Number:** DW-5321I
**Date Sampled:** 16/08/2023
**Dates Tested:** 07/09/2023 - 06/10/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP64 , Depth: 1.5 - 1.7m**
**Material:** Natural

| Particle Size Distribution (AS1289 3.6.1) | | | |
|---|---|---|---|
| Sieve | Passed % | Passing Limits | |
| 37.5 mm | **100** | | |
| 26.5 mm | **98** | | |
| 19 mm | **94** | | |
| 13.2 mm | **87** | | |
| 9.5 mm | **83** | | |
| 6.7 mm | **77** | | |
| 4.75 mm | **70** | | |
| 2.36 mm | **62** | | |
| 1.18 mm | **58** | | |
| 0.6 mm | **56** | | |
| 0.425 mm | **55** | | |
| 0.3 mm | **52** | | |
| 0.15 mm | **37** | | |
| 0.075 mm | **24** | | |

| Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1) | | Min | Max |
|---|---|---|---|
| Sample History | Air Dried | | |
| Preparation Method | Wet Sieve | | |
| Liquid Limit (%) | 37 | | |
| Plastic Limit (%) | 21 | | |
| **Plasticity Index (%)** | **16** | | |

| Linear Shrinkage (AS1289 3.4.1) | | Min | Max |
|---|---|---|---|
| Moisture Condition Determined By | AS 1289.3.1.2 | | |
| Linear Shrinkage (%) | **7.0** | | |
| Cracking Crumbling Curling | Cracking | | |

| Moisture Content (AS 1289 2.1.1) | | Min | Max |
|---|---|---|---|
| Moisture Content (%) | 12.5 | | |



# Material Test Report

Douglas Partners
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Darwin Laboratory
Unit 2/14 Caryota Circuit Coconut Grove NT 0810
Phone: (08) 8948 6800
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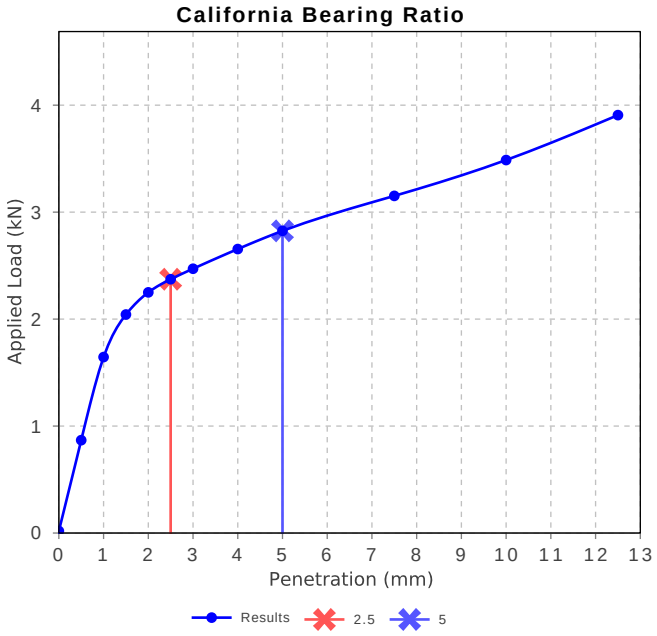
Approved Signatory: Sunil Sukhdeo
Laboratory Manager
Laboratory Accreditation Number: 828

**Report Number:** **209497.00-3**
**Issue Number:** 2 - *This version supersedes all previous issues*
**Reissue Reason:** *CBR added*
**Date Issued:** 25/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5321
**Sample Number:** DW-5321I
**Date Sampled:** 16/08/2023
**Dates Tested:** 07/09/2023 - 03/10/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP64 , Depth: 1.5 - 1.7m**
**Material:** Natural

| California Bearing Ratio (AS 1289 6.1.1 & 2.1.1) | | Min | Max |
|---|---|---|---|
| CBR taken at | 2.5 mm | | |
| CBR % | **18** | | |
| Method of Compactive Effort | Modified | | |
| Method used to Determine MDD | AS 1289 5.2.1 & 2.1.1 | | |
| Method used to Determine Plasticity | Visual Assessment | | |
| Maximum Dry Density (t/m$^3$) | 1.93 | | |
| Optimum Moisture Content (%) | 12.0 | | |
| Laboratory Density Ratio (%) | 94.5 | | |
| Laboratory Moisture Ratio (%) | 101.5 | | |
| Dry Density after Soaking (t/m$^3$) | 1.82 | | |
| Field Moisture Content (%) | 12.5 | | |
| Moisture Content at Placement (%) | 12.3 | | |
| Moisture Content Top 30mm (%) | 14.7 | | |
| Moisture Content Rest of Sample (%) | 16.3 | | |
| Mass Surcharge (kg) | 4.5 | | |
| Soaking Period (days) | 4 | | |
| Curing Hours (h) | 96.0 | | |
| Swell (%) | 0.5 | | |
| Oversize Material (mm) | 19 | | |
| Oversize Material Included | Excluded | | |
| Oversize Material (%) | 5.1 | | |



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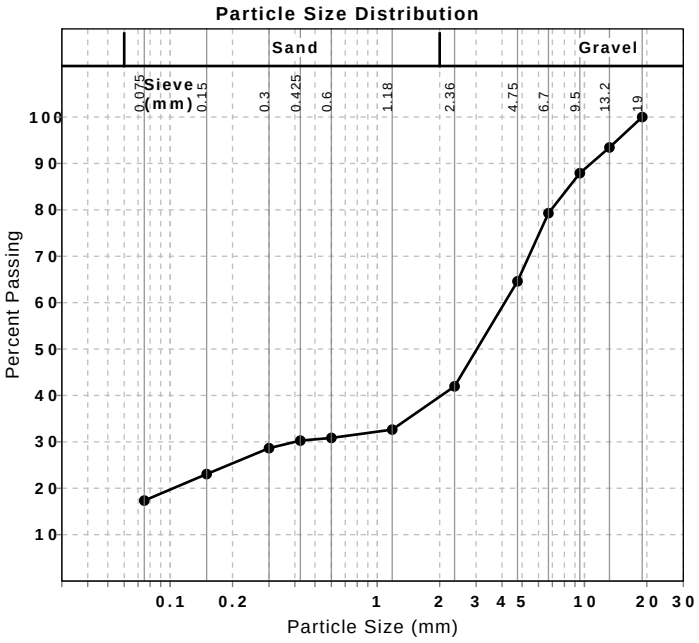
**Date Issued:** 25/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5321
**Sample Number:** DW-5321J
**Date Sampled:** 16/08/2023
**Dates Tested:** 07/09/2023 - 06/10/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP70 , Depth: 0.6 - 0.8m**
**Material:** Natural

| Particle Size Distribution (AS1289 3.6.1) | | | |
|---|---|---|---|
| Sieve | Passed % | Passing Limits | |
| 19 mm | **100** | | |
| 13.2 mm | **93** | | |
| 9.5 mm | **88** | | |
| 6.7 mm | **79** | | |
| 4.75 mm | **65** | | |
| 2.36 mm | **42** | | |
| 1.18 mm | **33** | | |
| 0.6 mm | **31** | | |
| 0.425 mm | **30** | | |
| 0.3 mm | **29** | | |
| 0.15 mm | **23** | | |
| 0.075 mm | **17** | | |

| Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1) | | Min | Max |
|---|---|---|---|
| Sample History | Air Dried | | |
| Preparation Method | Wet Sieve | | |
| Liquid Limit (%) | 39 | | |
| Plastic Limit (%) | 21 | | |
| **Plasticity Index (%)** | **18** | | |

| Linear Shrinkage (AS1289 3.4.1) | | Min | Max |
|---|---|---|---|
| Moisture Condition Determined By | AS 1289.3.1.2 | | |
| Linear Shrinkage (%) | **7.0** | | |
| Cracking Crumbling Curling | Cracking | | |

| Moisture Content (AS 1289 2.1.1) | | Min | Max |
|---|---|---|---|
| Moisture Content (%) | 9.2 | | |



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Laboratory Accreditation Number: 828

**Report Number:** **209497.00-3**
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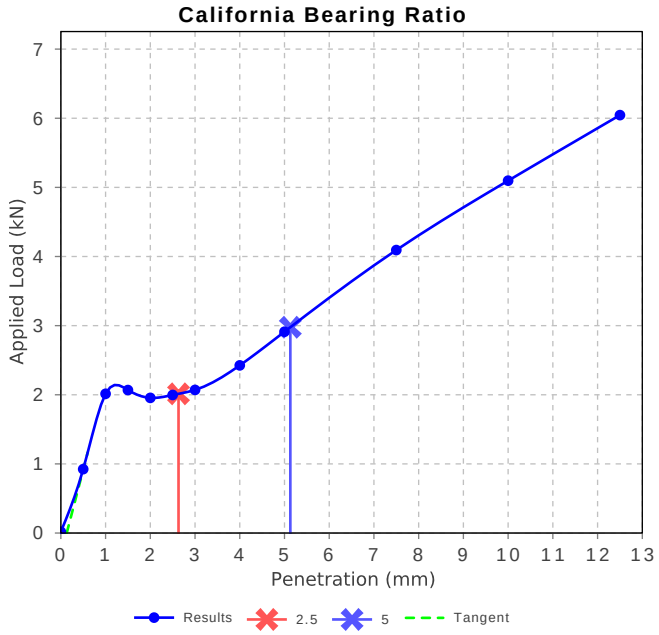
**Reissue Reason:** *CBR added*
**Date Issued:** 25/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5321
**Sample Number:** DW-5321J
**Date Sampled:** 16/08/2023
**Dates Tested:** 07/09/2023 - 03/10/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP70 , Depth: 0.6 - 0.8m**
**Material:** Natural

| California Bearing Ratio (AS 1289 6.1.1 & 2.1.1) | | Min | Max |
|---|---|---|---|
| CBR taken at | 2.5 mm | | |
| CBR % | **15** | | |
| Method of Compactive Effort | Modified | | |
| Method used to Determine MDD | AS 1289 5.2.1 & 2.1.1 | | |
| Method used to Determine Plasticity | Visual Assessment | | |
| Maximum Dry Density (t/m$^3$) | 2.20 | | |
| Optimum Moisture Content (%) | 11.0 | | |
| Laboratory Density Ratio (%) | 95.0 | | |
| Laboratory Moisture Ratio (%) | 97.0 | | |
| Dry Density after Soaking (t/m$^3$) | 2.07 | | |
| Field Moisture Content (%) | 9.2 | | |
| Moisture Content at Placement (%) | 10.6 | | |
| Moisture Content Top 30mm (%) | 12.2 | | |
| Moisture Content Rest of Sample (%) | 13.7 | | |
| Mass Surcharge (kg) | 4.5 | | |
| Soaking Period (days) | 4 | | |
| Curing Hours (h) | 72.0 | | |
| Swell (%) | 1.0 | | |
| Oversize Material (mm) | 19 | | |
| Oversize Material Included | Excluded | | |
| Oversize Material (%) | 0.0 | | |



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**Report Number:** **209497.00-3**
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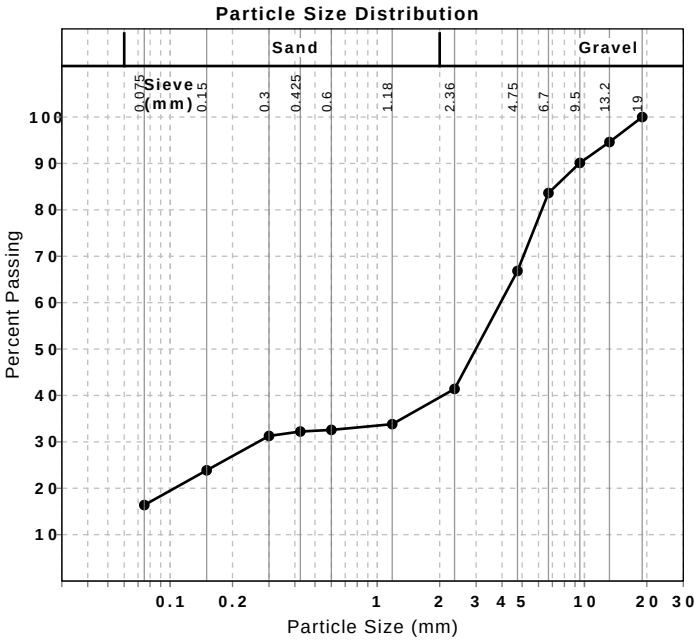
**Reissue Reason:** *CBR added*
**Date Issued:** 25/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5321
**Sample Number:** DW-5321K
**Date Sampled:** 16/08/2023
**Dates Tested:** 07/09/2023 - 06/10/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP71 , Depth: 0.3 - 0.5m**
**Material:** Natural

| Particle Size Distribution (AS1289 3.6.1) | | | |
|---|---|---|---|
| Sieve | Passed % | Passing Limits | |
| 19 mm | **100** | | |
| 13.2 mm | **95** | | |
| 9.5 mm | **90** | | |
| 6.7 mm | **84** | | |
| 4.75 mm | **67** | | |
| 2.36 mm | **41** | | |
| 1.18 mm | **34** | | |
| 0.6 mm | **33** | | |
| 0.425 mm | **32** | | |
| 0.3 mm | **31** | | |
| 0.15 mm | **24** | | |
| 0.075 mm | **16** | | |

| Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1) | | Min | Max |
|---|---|---|---|
| Sample History | Air Dried | | |
| Preparation Method | Wet Sieve | | |
| Liquid Limit (%) | 31 | | |
| Plastic Limit (%) | 22 | | |
| **Plasticity Index (%)** | **9** | | |

| Linear Shrinkage (AS1289 3.4.1) | | Min | Max |
|---|---|---|---|
| Moisture Condition Determined By | AS 1289.3.1.2 | | |
| Linear Shrinkage (%) | **4.0** | | |
| Cracking Crumbling Curling | Cracking | | |

| Moisture Content (AS 1289 2.1.1) | | Min | Max |
|---|---|---|---|
| Moisture Content (%) | 8.2 | | |



# Material Test Report

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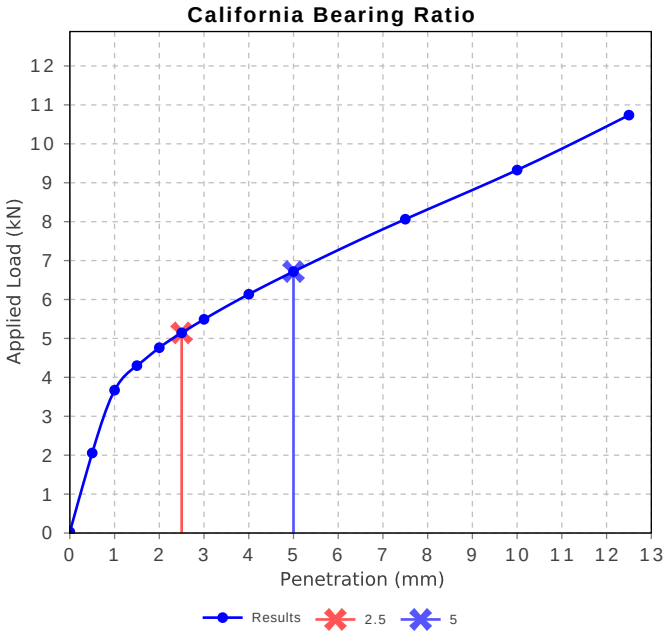
Approved Signatory: Sunil Sukhdeo
Laboratory Manager
Laboratory Accreditation Number: 828

**Report Number:** **209497.00-3**
**Issue Number:** 2 - *This version supersedes all previous issues*
**Reissue Reason:** *CBR added*
**Date Issued:** 25/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5321
**Sample Number:** DW-5321K
**Date Sampled:** 16/08/2023
**Dates Tested:** 07/09/2023 - 03/10/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP71 , Depth: 0.3 - 0.5m**
**Material:** Natural

| California Bearing Ratio (AS 1289 6.1.1 & 2.1.1) | | Min | Max |
|---|---|---|---|
| CBR taken at | 2.5 mm | | |
| CBR % | **40** | | |
| Method of Compactive Effort | Modified | | |
| Method used to Determine MDD | AS 1289 5.2.1 & 2.1.1 | | |
| Method used to Determine Plasticity | Visual Assessment | | |
| Maximum Dry Density (t/m$^3$) | 2.21 | | |
| Optimum Moisture Content (%) | 10.0 | | |
| Laboratory Density Ratio (%) | 95.0 | | |
| Laboratory Moisture Ratio (%) | 100.5 | | |
| Dry Density after Soaking (t/m$^3$) | 2.09 | | |
| Field Moisture Content (%) | 8.2 | | |
| Moisture Content at Placement (%) | 10.1 | | |
| Moisture Content Top 30mm (%) | 12.1 | | |
| Moisture Content Rest of Sample (%) | 11.9 | | |
| Mass Surcharge (kg) | 4.5 | | |
| Soaking Period (days) | 4 | | |
| Curing Hours (h) | 72.0 | | |
| Swell (%) | 0.0 | | |
| Oversize Material (mm) | 19 | | |
| Oversize Material Included | Excluded | | |
| Oversize Material (%) | 0.0 | | |



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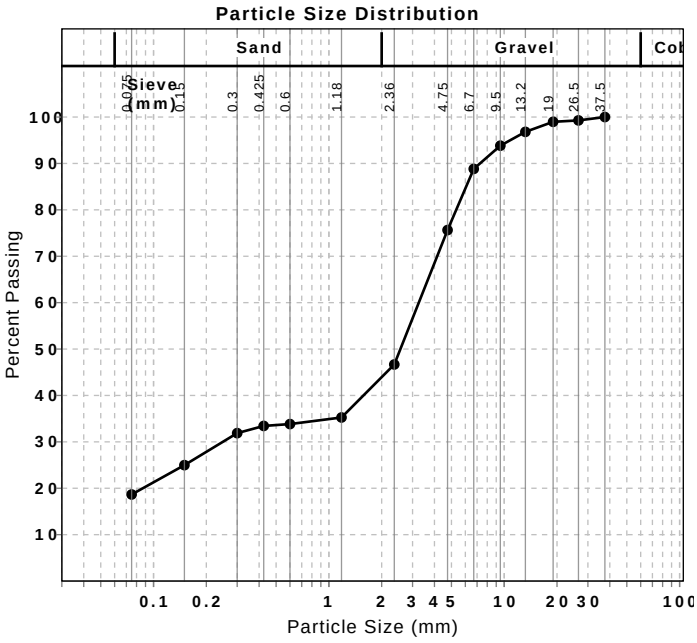
**Reissue Reason:** *CBR added*
**Date Issued:** 25/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5321
**Sample Number:** DW-5321L
**Date Sampled:** 16/08/2023
**Dates Tested:** 07/09/2023 - 06/10/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP72 , Depth: 0.8 - 1.0m**
**Material:** Natural

| Particle Size Distribution (AS1289 3.6.1) | | | |
|---|---|---|---|
| Sieve | Passed % | Passing Limits | |
| 37.5 mm | **100** | | |
| 26.5 mm | **99** | | |
| 19 mm | **99** | | |
| 13.2 mm | **97** | | |
| 9.5 mm | **94** | | |
| 6.7 mm | **89** | | |
| 4.75 mm | **76** | | |
| 2.36 mm | **47** | | |
| 1.18 mm | **35** | | |
| 0.6 mm | **34** | | |
| 0.425 mm | **33** | | |
| 0.3 mm | **32** | | |
| 0.15 mm | **25** | | |
| 0.075 mm | **19** | | |

| Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1) | | Min | Max |
|---|---|---|---|
| Sample History | Air Dried | | |
| Preparation Method | Wet Sieve | | |
| Liquid Limit (%) | 36 | | |
| Plastic Limit (%) | 21 | | |
| **Plasticity Index (%)** | **15** | | |

| Linear Shrinkage (AS1289 3.4.1) | | Min | Max |
|---|---|---|---|
| Moisture Condition Determined By | AS 1289.3.1.2 | | |
| Linear Shrinkage (%) | **6.5** | | |
| Cracking Crumbling Curling | Cracking | | |

| Moisture Content (AS 1289 2.1.1) | | Min | Max |
|---|---|---|---|
| Moisture Content (%) | 9.8 | | |



# Material Test Report

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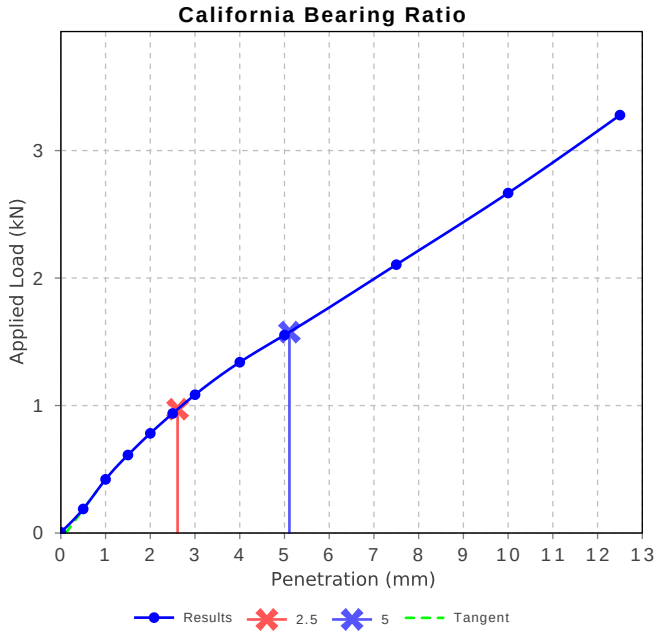
Laboratory Accreditation Number: 828

**Report Number:** **209497.00-3**
**Issue Number:** 2 - *This version supersedes all previous issues*
**Reissue Reason:** *CBR added*
**Date Issued:** 25/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5321
**Sample Number:** DW-5321L
**Date Sampled:** 16/08/2023
**Dates Tested:** 07/09/2023 - 03/10/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP72 , Depth: 0.8 - 1.0m**
**Material:** Natural

| California Bearing Ratio (AS 1289 6.1.1 & 2.1.1) | | Min | Max |
|---|---|---|---|
| CBR taken at | 5 mm | | |
| CBR % | **8** | | |
| Method of Compactive Effort | Modified | | |
| Method used to Determine MDD | AS 1289 5.2.1 & 2.1.1 | | |
| Method used to Determine Plasticity | Visual Assessment | | |
| Maximum Dry Density (t/m$^3$) | 2.16 | | |
| Optimum Moisture Content (%) | 14.5 | | |
| Laboratory Density Ratio (%) | 95.5 | | |
| Laboratory Moisture Ratio (%) | 98.0 | | |
| Dry Density after Soaking (t/m$^3$) | 2.06 | | |
| Field Moisture Content (%) | 9.8 | | |
| Moisture Content at Placement (%) | 14.1 | | |
| Moisture Content Top 30mm (%) | 13.1 | | |
| Moisture Content Rest of Sample (%) | 15.0 | | |
| Mass Surcharge (kg) | 4.5 | | |
| Soaking Period (days) | 4 | | |
| Curing Hours (h) | 72.0 | | |
| Swell (%) | 0.0 | | |
| Oversize Material (mm) | 19 | | |
| Oversize Material Included | Excluded | | |
| Oversize Material (%) | 0.9 | | |



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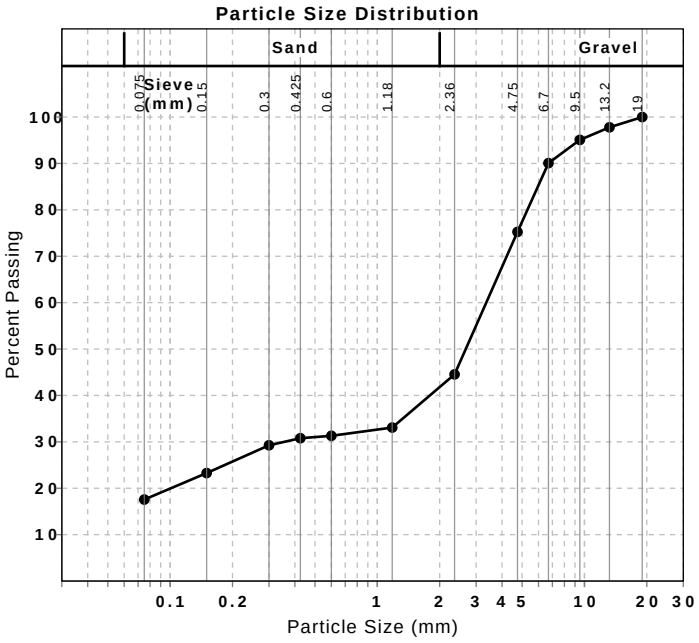
**Reissue Reason:** *CBR added*
**Date Issued:** 25/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5321
**Sample Number:** DW-5321M
**Date Sampled:** 16/08/2023
**Dates Tested:** 07/09/2023 - 06/10/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP72 , Depth: 0.3 - 0.5m**
**Material:** Natural

| Particle Size Distribution (AS1289 3.6.1) | | | |
|---|---|---|---|
| Sieve | Passed % | Passing Limits | |
| 19 mm | **100** | | |
| 13.2 mm | **98** | | |
| 9.5 mm | **95** | | |
| 6.7 mm | **90** | | |
| 4.75 mm | **75** | | |
| 2.36 mm | **45** | | |
| 1.18 mm | **33** | | |
| 0.6 mm | **31** | | |
| 0.425 mm | **31** | | |
| 0.3 mm | **29** | | |
| 0.15 mm | **23** | | |
| 0.075 mm | **18** | | |

| Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1) | | Min | Max |
|---|---|---|---|
| Sample History | Air Dried | | |
| Preparation Method | Wet Sieve | | |
| Liquid Limit (%) | 37 | | |
| Plastic Limit (%) | 21 | | |
| **Plasticity Index (%)** | **16** | | |

| Linear Shrinkage (AS1289 3.4.1) | | Min | Max |
|---|---|---|---|
| Moisture Condition Determined By | AS 1289.3.1.2 | | |
| Linear Shrinkage (%) | **7.0** | | |
| Cracking Crumbling Curling | Cracking | | |

| Moisture Content (AS 1289 2.1.1) | | Min | Max |
|---|---|---|---|
| Moisture Content (%) | 8.2 | | |



# Material Test Report

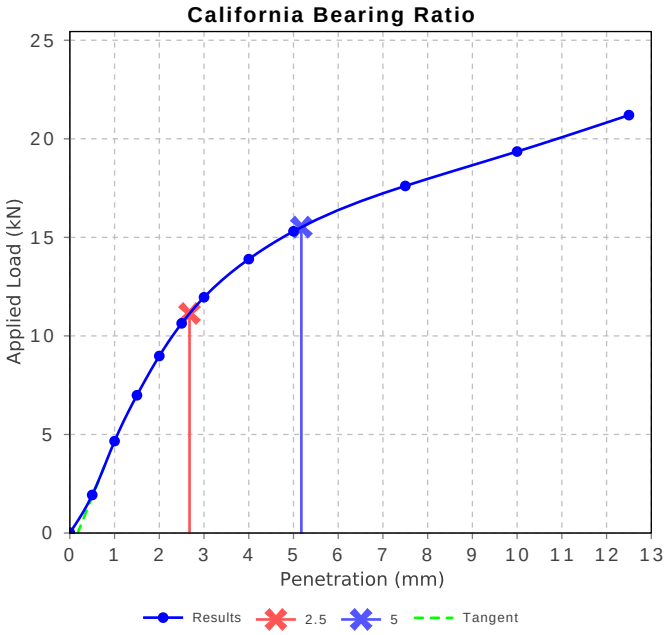
Douglas Partners
Geotechnics / Environment / Groundwater
Douglas Partners Pty Ltd
Darwin Laboratory
Unit 2/14 Caryota Circuit Coconut Grove NT 0810
Phone: (08) 8948 6800
Email: Sunil.Sukhdeo@douglaspartners.com.au

Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Sunil Sukhdeo
Laboratory Manager
Laboratory Accreditation Number: 828

**Report Number:** **209497.00-3**
**Issue Number:** 2 - *This version supersedes all previous issues*
**Reissue Reason:** *CBR added*
**Date Issued:** 25/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5321
**Sample Number:** DW-5321M
**Date Sampled:** 16/08/2023
**Dates Tested:** 07/09/2023 - 03/10/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP72 , Depth: 0.3 - 0.5m**
**Material:** Natural

| California Bearing Ratio (AS 1289 6.1.1 & 2.1.1) | | Min | Max |
|---|---|---|---|
| CBR taken at | 2.5 mm | | |
| CBR % | **80** | | |
| Method of Compactive Effort | Modified | | |
| Method used to Determine MDD | AS 1289 5.2.1 & 2.1.1 | | |
| Method used to Determine Plasticity | Visual Assessment | | |
| Maximum Dry Density (t/m$^3$) | 2.25 | | |
| Optimum Moisture Content (%) | 10.5 | | |
| Laboratory Density Ratio (%) | 99.5 | | |
| Laboratory Moisture Ratio (%) | 101.5 | | |
| Dry Density after Soaking (t/m$^3$) | 2.24 | | |
| Field Moisture Content (%) | 8.2 | | |
| Moisture Content at Placement (%) | 10.6 | | |
| Moisture Content Top 30mm (%) | 11.1 | | |
| Moisture Content Rest of Sample (%) | 11.8 | | |
| Mass Surcharge (kg) | 4.5 | | |
| Soaking Period (days) | 4 | | |
| Curing Hours (h) | 72.0 | | |
| Swell (%) | 0.0 | | |
| Oversize Material (mm) | 19 | | |
| Oversize Material Included | Excluded | | |
| Oversize Material (%) | 0.0 | | |



# Material Test Report

Douglas Partners
Geotechnics / Environment / Groundwater
Douglas Partners Pty Ltd
Darwin Laboratory
Unit 2/14 Caryota Circuit Coconut Grove NT 0810
Phone: (08) 8948 6800
Email: Sunil.Sukhdeo@douglaspartners.com.au

Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Sunil Sukhdeo
Laboratory Manager
Laboratory Accreditation Number: 828

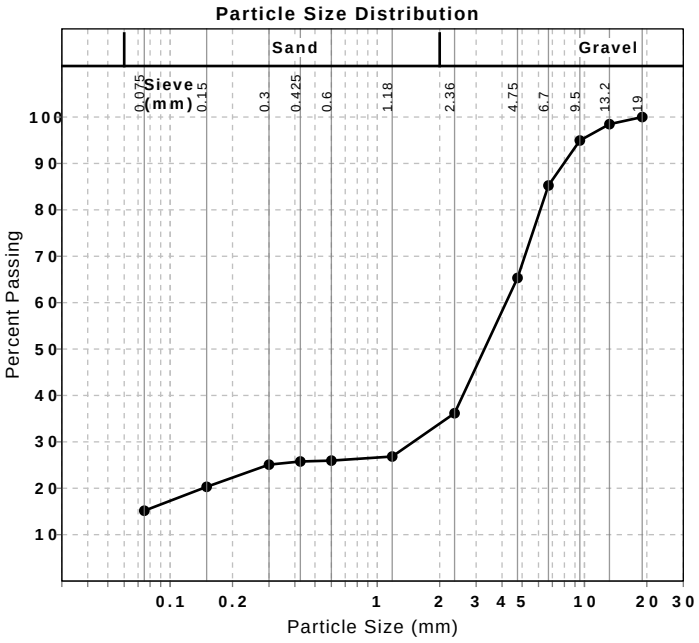
**Report Number:** **209497.00-3**
**Issue Number:** 2 - *This version supersedes all previous issues*
**Reissue Reason:** *CBR added*
**Date Issued:** 25/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5321
**Sample Number:** DW-5321N
**Date Sampled:** 16/08/2023
**Dates Tested:** 07/09/2023 - 06/10/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP74 , Depth: 0.2 - 0.4m**
**Material:** Natural

| Particle Size Distribution (AS1289 3.6.1) | | | |
|---|---|---|---|
| Sieve | Passed % | Passing Limits | |
| 19 mm | **100** | | |
| 13.2 mm | **98** | | |
| 9.5 mm | **95** | | |
| 6.7 mm | **85** | | |
| 4.75 mm | **65** | | |
| 2.36 mm | **36** | | |
| 1.18 mm | **27** | | |
| 0.6 mm | **26** | | |
| 0.425 mm | **26** | | |
| 0.3 mm | **25** | | |
| 0.15 mm | **20** | | |
| 0.075 mm | **15** | | |

| Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1) | | Min | Max |
|---|---|---|---|
| Sample History | Air Dried | | |
| Preparation Method | Wet Sieve | | |
| Liquid Limit (%) | 34 | | |
| Plastic Limit (%) | 20 | | |
| **Plasticity Index (%)** | **14** | | |

| Linear Shrinkage (AS1289 3.4.1) | | Min | Max |
|---|---|---|---|
| Moisture Condition Determined By | AS 1289.3.1.2 | | |
| Linear Shrinkage (%) | **5.0** | | |
| Cracking Crumbling Curling | Cracking | | |

| Moisture Content (AS 1289 2.1.1) | | Min | Max |
|---|---|---|---|
| Moisture Content (%) | 4.6 | | |



# Material Test Report

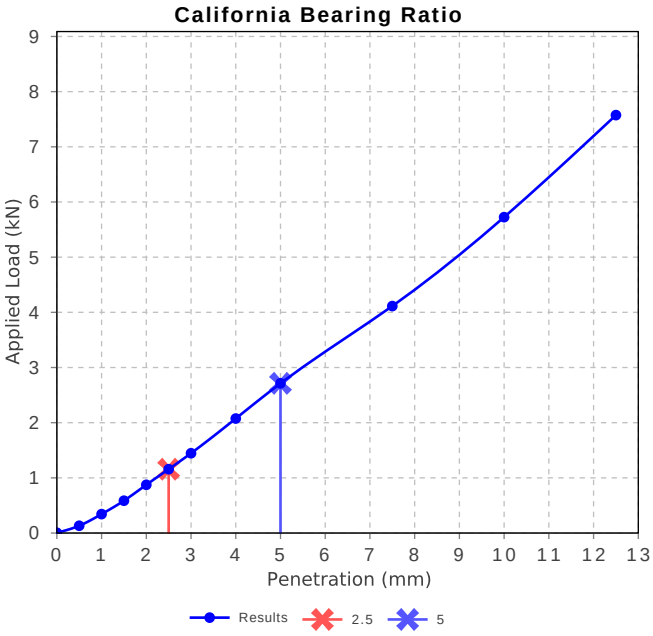
Douglas Partners
Geotechnics / Environment / Groundwater
Douglas Partners Pty Ltd
Darwin Laboratory
Unit 2/14 Caryota Circuit Coconut Grove NT 0810
Phone: (08) 8948 6800
Email: Sunil.Sukhdeo@douglaspartners.com.au

Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Sunil Sukhdeo
Laboratory Manager
Laboratory Accreditation Number: 828

**Report Number:** **209497.00-3**
**Issue Number:** 2 - *This version supersedes all previous issues*
**Reissue Reason:** *CBR added*
**Date Issued:** 25/10/2023
**Client:** Department of Infrastructure Planning & Logistics (NT)
PO Box 61, Palmerston NT 0831
**Project Number:** 209497.00
**Project Name:** T21-2072 Wurrumiyanga subdivision
**Project Location:** Wurrumiyanga, Bathurst Island NT
**Work Request:** 5321
**Sample Number:** DW-5321N
**Date Sampled:** 16/08/2023
**Dates Tested:** 07/09/2023 - 03/10/2023
**Sampling Method:** Sampled by Engineering Department
*The results apply to the sample as received*
**Sample Location:** **TP74 , Depth: 0.2 - 0.4m**
**Material:** Natural

| California Bearing Ratio (AS 1289 6.1.1 & 2.1.1) | | Min | Max |
|---|---|---|---|
| CBR taken at | 5 mm | | |
| CBR % | **14** | | |
| Method of Compactive Effort | Modified | | |
| Method used to Determine MDD | AS 1289 5.2.1 & 2.1.1 | | |
| Method used to Determine Plasticity | Visual Assessment | | |
| Maximum Dry Density (t/m$^3$) | 2.35 | | |
| Optimum Moisture Content (%) | 8.5 | | |
| Laboratory Density Ratio (%) | 100.0 | | |
| Laboratory Moisture Ratio (%) | 100.0 | | |
| Dry Density after Soaking (t/m$^3$) | 2.33 | | |
| Field Moisture Content (%) | 4.6 | | |
| Moisture Content at Placement (%) | 8.6 | | |
| Moisture Content Top 30mm (%) | 10.5 | | |
| Moisture Content Rest of Sample (%) | 9.8 | | |
| Mass Surcharge (kg) | 4.5 | | |
| Soaking Period (days) | 4 | | |
| Curing Hours (h) | 72.0 | | |
| Swell (%) | 0.5 | | |
| Oversize Material (mm) | 19 | | |
| Oversize Material Included | Excluded | | |
| Oversize Material (%) | 0.0 | | |



**Envirolab Services (WA) Pty Ltd trading as MPL Laboratories**
**ABN 53 140 099 207**
16-18 Hayden Court Myaree WA 6154
ph +61 8 9317 2505 fax +61 8 9317 4163
lab@mpl.com.au
www.mpl.com.au

# Certificate of Analysis PEI0272

## Client Details

| | |
|---|---|
| **Client** | Douglas Partners Pty Ltd (Darwin) |
| **Contact** | Stephen Jackson |
| **Address** | 2/14 Caryota Court, COCONUT GROVE, NT, 0810 |

## Sample Details

| | |
|---|---|
| **Your Reference** | 209497.00 |
| **Number of Samples** | 10 Soil |
| **Date Samples Received** | 05/09/2023 |
| **Date Samples Registered** | 05/09/2023 |

## Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

## Report Details

| | |
|---|---|
| **Date Results Requested by** | 12/09/2023 |
| **Date of Issue** | 12/09/2023 |


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

## Authorisation Details

| | |
|---|---|
| **Results Approved By** | Heram Halim, Operations Manager |
| **Laboratory Manager** | Michael Kubiak |

# Certificate of Analysis PEI0272

## Samples in this Report

| Envirolab ID | Sample ID | Depth | Matrix | Date Sampled | Date Received |
|---|---|---|---|---|---|
| PEI0272-01 | TP04 | 1.00Meters | Soil | 12/08/2023 | 05/09/2023 |
| PEI0272-02 | TP12 | 0.20Meters | Soil | 09/08/2023 | 05/09/2023 |
| PEI0272-03 | TP17 | 0.20Meters | Soil | 09/08/2023 | 05/09/2023 |
| PEI0272-04 | TP20 | 0.20Meters | Soil | 09/08/2023 | 05/09/2023 |
| PEI0272-05 | TP27 | 0.20Meters | Soil | 10/08/2023 | 05/09/2023 |
| PEI0272-06 | TP28 | 0.20Meters | Soil | 10/08/2023 | 05/09/2023 |
| PEI0272-07 | TP31 | 0.20Meters | Soil | 10/08/2023 | 05/09/2023 |
| PEI0272-08 | TP33 | 1.00Meters | Soil | 11/08/2023 | 05/09/2023 |
| PEI0272-09 | TP40 | 0.20Meters | Soil | 11/08/2023 | 05/09/2023 |
| PEI0272-10 | TP42 | 1.30Meters | Soil | 14/08/2023 | 05/09/2023 |

# Certificate of Analysis PEI0272

## Inorganics - General Physical Parameters (Soil)

| Envirolab ID | Units | PQL | PEI0272-01 | PEI0272-02 | PEI0272-03 | PEI0272-04 | PEI0272-05 |
|---|---|---|---|---|---|---|---|
| Your Reference | | | TP04 | TP12 | TP17 | TP20 | TP27 |
| Date Sampled | | | 12/08/2023 | 09/08/2023 | 09/08/2023 | 09/08/2023 | 10/08/2023 |
| Depth | | | 1.00 | 0.20 | 0.20 | 0.20 | 0.20 |
| pH | pH units | | 6.4 | 5.9 | 6.0 | 6.0 | 6.0 |
| Electrical Conductivity | µS/cm | 2.0 | 8.2 | 6.3 | 5.9 | 5.3 | 6.9 |
| Resistivity* | ohm m | 1.0 | 1200 | 1600 | 1700 | 1900 | 1400 |

| Envirolab ID | Units | PQL | PEI0272-06 | PEI0272-07 | PEI0272-08 | PEI0272-09 | PEI0272-10 |
|---|---|---|---|---|---|---|---|
| Your Reference | | | TP28 | TP31 | TP33 | TP40 | TP42 |
| Date Sampled | | | 10/08/2023 | 10/08/2023 | 11/08/2023 | 11/08/2023 | 14/08/2023 |
| Depth | | | 0.20 | 0.20 | 1.00 | 0.20 | 1.30 |
| pH | pH units | | 6.3 | 5.8 | 6.2 | 5.9 | 6.1 |
| Electrical Conductivity | µS/cm | 2.0 | 14 | 6.8 | 6.4 | 8.9 | 6.2 |
| Resistivity* | ohm m | 1.0 | 710 | 1500 | 1600 | 1100 | 1600 |

# Certificate of Analysis PEI0272

## Inorganics - General Chemical Parameters (Soil)

| Envirolab ID | Units | PQL | PEI0272-01 | PEI0272-02 | PEI0272-03 | PEI0272-04 | PEI0272-05 |
|---|---|---|---|---|---|---|---|
| Your Reference | | | TP04 | TP12 | TP17 | TP20 | TP27 |
| Date Sampled | | | 12/08/2023 | 09/08/2023 | 09/08/2023 | 09/08/2023 | 10/08/2023 |
| Depth | | | 1.00 | 0.20 | 0.20 | 0.20 | 0.20 |
| Chloride | mg/kg | 10 | <10 | <10 | <10 | <10 | <10 |
| Sulfate | mg/kg | 10 | <10 | <10 | <10 | <10 | <10 |

| Envirolab ID | Units | PQL | PEI0272-06 | PEI0272-07 | PEI0272-08 | PEI0272-09 | PEI0272-10 |
|---|---|---|---|---|---|---|---|
| Your Reference | | | TP28 | TP31 | TP33 | TP40 | TP42 |
| Date Sampled | | | 10/08/2023 | 10/08/2023 | 11/08/2023 | 11/08/2023 | 14/08/2023 |
| Depth | | | 0.20 | 0.20 | 1.00 | 0.20 | 1.30 |
| Chloride | mg/kg | 10 | <10 | <10 | <10 | <10 | <10 |
| Sulfate | mg/kg | 10 | <10 | <10 | <10 | <10 | <10 |

## Method Summary

| Method ID | Methodology Summary |
|---|---|
| INORG-001 | pH - Measured using pH meter and electrode based on APHA latest edition, Method 4500-H+. Please note that the results for water analyses are indicative only, as analysis can be completed outside of the APHA recommended holding times. Solids are reported from a 1:5 water extract unless otherwise specified. Alternatively, pH is determined in a 1:5 extract using 0.01M calcium chloride or a solid is extracted at a ratio of 1:2.5 ( AS1289.4.3.1), pH is measured in the extract. |
| INORG-002 | Conductivity and Salinity - measured using a conductivity cell at 25°C based on APHA latest edition Method 2510. Soil results reported from a 1:5 Soil:Water extract unless otherwise specified. Please note Resistivity is estimated by calculation and may not correlate with results otherwise obtained using the Resistivity current method (based on AS 1289.4.4.1), depending on the nature of the soil being analysed. |
| INORG-081 | Anions determined by Ion Chromatography. Waters samples are filtered on receipt prior to analysis. Solids are analysed from a water extract. Alternatively determined by colourimetry/turbidity using Discrete Analyser. |

## Result Definitions

| Identifier | Description |
|---|---|
| **NR** | Not reported |
| **NEPM** | National Environment Protection Measure |
| **NS** | Not specified |
| **LCS** | Laboratory Control Sample |
| **RPD** | Relative Percent Difference |
| **>** | Greater than |
| **<** | Less than |
| **PQL** | Practical Quantitation Limit |
| **INS** | Insufficient sample for this test |
| **NA** | Test not required |
| **NT** | Not tested |
| **DOL** | Samples rejected due to particulate overload (air filters only) |
| **RFD** | Samples rejected due to filter damage (air filters only) |
| **RUD** | Samples rejected due to uneven deposition (air filters only) |
| **##** | Indicates a laboratory acceptance criteria outlier, for further details, see Result Comments and/or QC Comments |

## Quality Control Definitions

**Blank**

This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, and is determined by processing solvents and reagents in exactly the same manner as for samples.

**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.

**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.

**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.

**Duplicate**

This is the complete duplicate analysis of a sample from the process batch. The sample selected should be one where the analyte concentration is easily measurable.

## 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.

General Acceptance Criteria (GAC) - Analyte specific criteria applies for some analytes and is reflected in QC recovery tables.

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 QAQC tables for details (available on request); <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; 60-140% for organics (+/-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 typically insufficient in order to satisfy laboratory QA/QC protocols.

## Miscellaneous Information

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. We have taken the sampling date as being the date received at the laboratory.

Two significant figures are reported for the majority of tests and with a high degree of confidence, for results <10*PQL, the second significant figure may be in doubt i.e. has a relatively high degree of uncertainty and is provided for information only.

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 or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS where sediment/solids are included by default.

Urine Analysis - The BEI values listed are taken from the 2022 edition of *TLVs and BEIs Threshold Limits by ACGIH*.

Air volume measurements are not covered by Envirolab's NATA accreditation.

# Data Quality Assessment Summary PEI0272

## Client Details

| | |
|---|---|
| **Client** | Douglas Partners Pty Ltd (Darwin) |
| **Your Reference** | 209497.00 |
| **Date Issued** | 12/09/2023 |

## Recommended Holding Time Compliance

Recommended holding time exceedances exist - See detailed list below

## Quality Control and QC Frequency

| QC Type | Compliant | Details |
|---|---|---|
| Blank | Yes | No Outliers |
| LCS | Yes | No Outliers |
| Duplicates | Yes | No Outliers |
| Matrix Spike | Yes | No Outliers |
| Surrogates / Extracted Internal Standards | Yes | No Outliers |
| QC Frequency | Yes | No Outliers |

Surrogates/Extracted Internal Standards, Duplicates and/or Matrix Spikes are not always relevant/applicable to certain analyses and matrices. Therefore, said QC measures are deemed compliant in these situations by default. See Laboratory Acceptance Criteria for more information

# Data Quality Assessment Summary PEI0272

## Recommended Holding Time Compliance

| Analysis | Sample Number(s) | Date Sampled | Date Extracted | Date Analysed | Compliant |
|---|---|---|---|---|---|
| EC \| Soil | 2-4 | 09/08/2023 | 06/09/2023 | 08/09/2023 | No |
| | 5-7 | 10/08/2023 | 06/09/2023 | 08/09/2023 | No |
| | 8-9 | 11/08/2023 | 06/09/2023 | 08/09/2023 | No |
| | 1 | 12/08/2023 | 06/09/2023 | 08/09/2023 | No |
| | 10 | 14/08/2023 | 06/09/2023 | 08/09/2023 | No |
| pH \| Soil | 2-4 | 09/08/2023 | 06/09/2023 | 08/09/2023 | No |
| | 5-7 | 10/08/2023 | 06/09/2023 | 08/09/2023 | No |
| | 8-9 | 11/08/2023 | 06/09/2023 | 08/09/2023 | No |
| | 1 | 12/08/2023 | 06/09/2023 | 08/09/2023 | No |
| | 10 | 14/08/2023 | 06/09/2023 | 08/09/2023 | No |
| Resistivity - Est. \| Soil | 2-4 | 09/08/2023 | 06/09/2023 | 08/09/2023 | No |
| | 5-7 | 10/08/2023 | 06/09/2023 | 08/09/2023 | No |
| | 8-9 | 11/08/2023 | 06/09/2023 | 08/09/2023 | No |
| | 1 | 12/08/2023 | 06/09/2023 | 08/09/2023 | No |
| | 10 | 14/08/2023 | 06/09/2023 | 08/09/2023 | No |
| Chloride \| Soil | 2-4 | 09/08/2023 | 06/09/2023 | 11/09/2023 | Yes |
| | 5-7 | 10/08/2023 | 06/09/2023 | 11/09/2023 | Yes |
| | 8-9 | 11/08/2023 | 06/09/2023 | 11/09/2023 | Yes |
| | 1 | 12/08/2023 | 06/09/2023 | 11/09/2023 | Yes |
| | 10 | 14/08/2023 | 06/09/2023 | 11/09/2023 | Yes |
| Sulfate \| Soil | 2-4 | 09/08/2023 | 06/09/2023 | 11/09/2023 | Yes |
| | 5-7 | 10/08/2023 | 06/09/2023 | 11/09/2023 | Yes |
| | 8-9 | 11/08/2023 | 06/09/2023 | 11/09/2023 | Yes |
| | 1 | 12/08/2023 | 06/09/2023 | 11/09/2023 | Yes |
| | 10 | 14/08/2023 | 06/09/2023 | 11/09/2023 | Yes |

# Quality Control PEI0272

## INORG-001 | Inorganics - General Physical Parameters (Soil) | Batch BEI0610

| Analyte | Units | PQL | Blank | DUP1 BEI0610-DUP1# Samp \| QC \| RPD % | DUP2 PEI0272-10 Samp \| QC \| RPD % | LCS % |
|---|---|---|---|---|---|---|
| pH | pH units | | 6.6 | 5.2 \| 5.2 \| 1.15 | 6.1 \| 5.9 \| 2.50 | 102 |
| Electrical Conductivity | µS/cm | 2.0 | <2.0 | 36.4 \| 36.5 \| 0.274 | 6.20 \| 6.10 \| 1.63 | 103 |
| Resistivity | ohm m | 1.0 | <1.0 | 275 \| 274 \| 0.277 | 1610 \| 1640 \| 1.63 | [NA] |

# The QC reported was not specifically part of this workorder but formed part of the QC process batch.

## INORG-081 | Inorganics - General Chemical Parameters (Soil) | Batch BEI0611

| Analyte | Units | PQL | Blank | DUP1 BEI0611-DUP1# Samp \| QC \| RPD % | DUP2 PEI0272-09 Samp \| QC \| RPD % | LCS % | Spike % BEI0611-MS1# |
|---|---|---|---|---|---|---|---|
| Chloride | mg/kg | 10 | <10 | 38.6 \| 33.8 \| 13.3 | <10 \| <10 \| [NA] | 92.1 | 105 |
| Sulfate | mg/kg | 10 | <10 | 17.4 \| 17.0 \| 2.41 | <10 \| <10 \| [NA] | 94.5 | 102 |

# The QC reported was not specifically part of this workorder but formed part of the QC process batch.

# CHAIN OF CUSTODY - Client

## ENVIROLAB GROUP - National phone number 1300 42 43 44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| | |
|---|---|
| **Client:** Douglas Partners Pty Ltd | **Client Project Name / Number / Site etc (ie report title):** 209497.00 |
| **Contact Person:** Raj Kumar Lama | |
| **Project Mgr:** Stephen Jackson | **PO No.:** 209497.00 |
| **Sampler:** Raj Kumar Lama | **Envirolab Quote No. :** C5 National |
| **Address:** Unit 2, 14 Caryota Ct, Coconut Grove, 0810 | **Date results required:** Standard |
| | **Or choose:** standard<br>*Note: Inform lab in advance if urgent turnaround is required - surcharges apply* |
| **Phone:** 08 8948 6800 **Mob:** | **Report format:** esdat / equis / |
| **Email:** darwin.admin@douglaspartners.com.au<br>stephen.jackson@douglaspartners.com.au<br>RajKumar.Lama@douglaspartners.com.au | **Lab Comments:** |

| Sample information | | | | | Tests Required | Comments |
|---|---|---|---|---|---|---|
| Envirolab Sample ID | Client Sample ID or information | Depth (m) | Date sampled | Type of sample | Soil Aggressivity (pH, sulfate, chloride, resistivity) | Provide as much information about the sample as you can |
| 1 | TP04 | 1 | 12/08/2023 | Disturbed | X | Natural |
| 2 | TP12 | 0.2 | 9/08/2023 | Disturbed | X | Natural |
| 3 | TP17 | 0.2 | 9/08/2023 | Disturbed | X | Natural |
| 4 | TP20 | 0.2 | 9/08/2023 | Disturbed | X | Natural |
| 5 | TP27 | 0.2 | 10/08/2023 | Disturbed | X | Natural |
| 6 | TP28 | 0.2 | 10/08/2023 | Disturbed | X | Natural |
| 7 | TP31 | 0.2 | 10/08/2023 | Disturbed | X | Natural |
| 8 | TP33 | 1 | 11/08/2023 | Disturbed | X | Natural |
| 9 | TP40 | 0.2 | 11/08/2023 | Disturbed | X | Natural |
| 10 | TP42 | 1.3 | 14/08/2023 | Disturbed | X | Natural |

mpl Laboratories ENVIROLAB GROUP
Job No.- PE10272.
Date Rec - 05 SEP 2023
Time Rec - 8:50
Rec By - GM
TAT Req - SAME 1 / 2 / 3 / STD
Temp - cool / ambient
Cooling - Ice / Ice pack / None
Security Seal - Yes / No

| | | | |
|---|---|---|---|
| **Relinquished by (Company):** | Douglas Partners Pty Ltd | **Received by (Company):** | |
| **Print Name:** | Raj Kumar Lama | **Print Name:** | Gwenda Hay |
| **Date & Time:** | 04/09/2023 | **Date & Time:** | 4/9/23 11:08 |
| **Signature:** | | **Signature:** | |

***Lab use only:***
**Samples Received:** Cool or Ambient (circle one)
**Temperature Received at:** 11 **(if applicable)**
**Transported by:** Hand delivered / courier

20°C T120.

*White - Lab copy / Blue - Client copy / Pink - Retain in Book*