

Report on
Contamination Assessment

T21-2072 Wurrumiyanga subdivision
Wurrumiyanga, Bathurst Island, NT

Prepared for
Department of Infrastructure Planning & Logistics (NT)

Project 209497.00
December 2023

Integrated Practical Solutions



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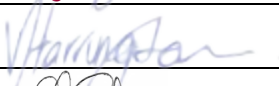
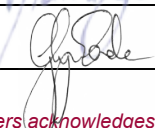
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The undersigned, on behalf of Douglas Partners Pty Ltd, confirm that this document and all attached drawings, logs and test results have been checked and reviewed for errors, omissions and inaccuracies.

	Signature	Date
Author		07/12/2023
Reviewer		07/12/2023

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 Contamination Assessment

T21-2072 Wurrumiyanga subdivision

Wurrumiyanga, Bathurst Island, NT

1. Introduction

This report presents the results of a site contamination assessment conducted by Douglas Partners Pty Ltd (DP) for the proposed residential subdivision located at the community at Wurrumiyanga, Bathurst Island, NT. 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 conducted in general accordance with DP' proposal 209497.00.P.001.Rev0 dated 20 September 2023.

The objective of this contamination assessment is to provide factual information regarding the contamination testing which was completed as part of the geotechnical investigation for the project. The geotechnical report has been issued under separate cover.

The following key guidelines were consulted in the preparation of this report:

- NEPC *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [the 'NEPM']* (NEPC, 2013); and
- NSW EPA *Guidelines for Consultants Reporting on Contaminated Land* (NSW EPA, 2020).

This report must be read in conjunction with all the provided appendices.

2. Scope of Work

The scope of work comprised:

- Review of published geological mapping;
- Development of a preliminary Conceptual Site Model (CSM) based on observations made during the field work completed for the geotechnical investigation;
- Soil samples were collected from test pits excavated for the geotechnical investigation, which comprised the excavation of 43 test pits;
- Several duplicate soil samples for each test pit were collected and screened in the field with a calibrated photo-ionisation detector (PID) to assess for the presence of volatile organic compounds (VOC);

- Five soil samples were analysed at a national association of testing authority (NATA) accredited laboratory for the following:
 - o Metals / metalloids (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc);
 - o Total recoverable hydrocarbons (TRH);
 - o Benzene, toluene, ethylbenzene and xylenes (BTEX);
 - o Polyaromatic hydrocarbons (PAH);
 - o Organochlorine Pesticides (OCP);
 - o Organophosphorus Pesticides (OPP);
 - o Polychlorinated biphenyls (PCB);
 - o Asbestos identification (absence/presence); and
- Preparation of this site contamination assessment report.

3. 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.

The proposed new residential subdivision site is 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 southwest of the site. The site location and layout is shown on Drawings 1 and 2, provided in Appendix A.

At the time of field work, in August 2023 (i.e., late dry season) the site was undeveloped with moderately dense bushland comprising semi-mature to mature eucalyptus trees, with some evidence of historical clearing in the northern part of the site. It appeared a fire had recently passed through parts of the site and so tall grasses had been burnt. A relatively small amount of surface litter including steel parts and bottles was encountered on site. The site is generally flat, with a very gentle downward grade to the east and grading down towards the south of the site. Several gravel roads cross the site and a swimming rockhole is present on the western edge of the site. Site Photographs are provided in Appendix A.

4. Site Setting

4.1 Geology

The Melville Island 1:250 000 Geological Series map (Sheet SC 52-16) indicates that 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.

4.2 Historical Aerial Photos

A selection of limited historical Aerial Photographs sourced from the Northern Territory Archives Centre (NTAC) as well as historical satellite imagery sourced from Google Earth indicates that the site has been covered by bushland with only some clearing and dirt tracks being observed.

The air strip to the southwest has been present since before 1977. Two above-ground storage tanks, possibly fuel or water, have been located adjacent to the airstrip since between 1977 and 2003. The adjacent residential development to the northeast was constructed between 1977 and 1991 and was expanded between 2003 and 2019. Two laydown areas, one just north of the site, and one along airport road between the site and the air strip, appear to have been constructed between 2003 and 2019.

Historical aerial images are labelled and provided in Appendix A.

4.3 Land Units

Land units mapped beneath the site are relatively flat plains and drainage systems with sandy loams to light to medium clays, described as moderately to poorly drained and subject to inundation and waterlogging.

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.

4.4 Surface Water and Groundwater

Surface levels recorded at the test pit locations, using a d GPS unit accurate to +/- 0.1 m were between 13.9 m and 17.7 m AHD. Relatively shallow groundwater is likely, given the recorded surface levels although groundwater was not encountered during the investigation.

A swimming hole is present on the western boundary of the site and Taradiri Creek is present some 500 m south of the site, flowing into the Timor Sea located approximately 1.3 km south-east of the site.

Previous field work in Wurrumiyanga and the above review of site setting suggests that the site is likely subject to some level of seasonal waterlogging. For more details please refer to the geotechnical report (209497.00.R.001.Rev0 dated November 2023).

5. Preliminary Conceptual Site Model

A conceptual site model (CSM) is a theoretical representation of site-related information regarding contamination sources, receptors and exposure pathways between those sources and receptors. The CSM provides the framework for identifying how the site may become contaminated and how potential receptors may be exposed to contamination either in the present or the future i.e., it enables an assessment of the potential source – pathway – receptor linkages (complete pathways).

5.1 Potential Sources

Based on the observations made during the field work completed for the geotechnical investigation, the following potential sources of contamination and associated contaminants of potential concern (CoPC) have been identified.

- S1: Surficial Dumping. Surficial dumping of waste including scrap metal and various household rubbish.

CoPC associated with S1 are various but could include metals, TRH, BTEX, PAH, PCB, OPP, OCP and asbestos.

5.2 Potential Receptors

The following potential human receptors have been identified:

- R1: Future construction and maintenance workers;
- R2: End users [residential land use];
- R3: Swimming hole users; and
- R4: Adjacent site users [residential land use].

The following potential environmental receptors have been identified:

- R5: Surface water [the swimming hole, Taradiri Creek and the Timor Sea];
- R6: Groundwater;
- R7: Terrestrial ecology; and
- R8: Aquatic ecology.

5.3 Potential Pathways

The following potential pathways have been identified:

- P1: Ingestion and dermal contact;
- P2: Inhalation of dust, asbestos fibres and / or vapours;
- P3: Surface water run-off;
- P4: Leaching of contaminants and vertical migration into groundwater;
- P5: Lateral migration of groundwater providing base flow to water bodies;
- P6: Contact with terrestrial and aquatic ecosystems.

5.4 Summary of Potentially Complete Exposure Pathways

A 'source–pathway–receptor' approach has been used to assess the potential risks of harm being caused to human or environmental receptors from contamination sources on or in the vicinity of the site, via exposure pathways (potential complete pathways). The possible pathways (P1 to P6) between the above source S1 and receptors (R1 to R8) are provided in Table 2, below.

Table 2: Summary of Potentially Complete Exposure Pathways

Source and CoPC	Transport Pathway	Receptor	Risk Management Action
S1: Surficial Dumping CoPC: metals, TRH, BTEX, PAH, PCB, OPP, OCP and asbestos	P1: Ingestion and dermal contact; P2: Inhalation of dust, asbestos fibres and / or vapours; P3: Surface water run-off; P4: Leaching of contaminants and vertical migration into groundwater; P5: Lateral migration of groundwater providing base flow to water bodies; and P6: Contact with terrestrial and aquatic ecosystems.	R1: Future construction and maintenance workers; R2: End users [residential land use]; R3: Swimming hole users; R4: Adjacent site users [residential land use]; R5: Surface water; R6: Groundwater; R7: Terrestrial ecology; and R8: Aquatic ecology.	An intrusive soil investigation is recommended to assess possible site contamination. The findings of the soil investigation will inform the requirement for a groundwater investigation.

6. Field Work Methods

Soil samples were collected and tested from the test pits completed for the geotechnical investigation. Additional soil samples were collected with hand tools during a subsequent site visit.

Field work for the proposed subdivision was undertaken from 8 August through 14 August 2023 and comprised excavation of 43 test pits (TP01 to TP43) to depths of between 1.7 m and 2.4 m, using a 3 tonne excavator fitted with a 250 mm wide rock-toothed bucket. The subsurface conditions encountered in the test pits were logged, sampled and photographed by an experienced geotechnical engineer from DP. Upon completion, each test pit was backfilled with excavated spoil and lightly compacted by tamping with the excavator bucket.

Each test pit location was selected by the client and positioned in the field by DP's engineer. The coordinates at each test pit location were measured in metres east and north (UTM, Zone 52L) relative to MGA94 Zone 52 using a handheld GPS, which has an accuracy of about ± 5 m, and are shown on the test pit logs provided in Appendix B.

Jar soil samples for chemical analysis were collected from the shallow surface soils at representative locations across the site.

Between one and three duplicate soil samples were collected in bags for each test pit and screened in the field with a calibrated photo-ionisation detector (PID) to assess for the presence of volatile organic compounds (VOC).

The site was revisited on 22 November 2023 to allow for sampling of soil layers which had previously been analysed and been found to be high in chromium. Locations TP28, TP33 and TP42 were revisited and a geotechnical engineer from Douglas Partners used hand tools to excavate fresh soil adjacent to the previous test pit locations down to depths of 0.2 m or 0.4 m, dependant on the previously sampled depths.

7. Site Assessment Criteria

The site assessment criteria (SAC) applied in the current investigation are informed by the proposed land use and the CSM (Section 5) which identified human and environmental receptors to potential contamination on the site. Analytical results are assessed (as a Tier 1 assessment) against the SAC comprising primarily the investigation and screening levels presented in Schedule B1 of NEPC (2013).

The investigation and screening levels applied in the current investigation comprise levels adopted for a generic residential land use scenario. The derivation of the SAC is provided in Appendix B and the adopted SAC are listed on the summary analytical results tables provided in Appendix C.

8. Results

8.1 Field Work Results

The subsurface conditions encountered during field work comprised a natural soil profile of topsoil overlying colluvial soils, then residual soils. No fill or stockpiles of soil were noted during field work. All soils tested were clay dominant with varying amounts of sand, silt and gravel.

Ground conditions encountered in the test pits are summarised below, and detailed logs are provided in Appendix B, together with notes on descriptive terms.

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 comprised 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 comprising 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.

There was no obvious evidence of anthropogenic materials or visual or olfactory indicators (e.g., staining or odours) to suggest the presence of contamination within the soils observed in the investigation.

Between one and three duplicate soil samples for each test pit were screened in the field with a calibrated PID to assess for the presence of volatile organic compounds (VOC). The results indicated that the sub-surface conditions were generally absent of VOC with all recorded values of less than 1 ppm.

Groundwater inflow was not encountered in any of the test pits during the investigation. It should be noted that groundwater levels will vary between seasons, depending upon the amount of rainfall and the permeability of the subsurface soils and any bedrock at the site.

8.2 Laboratory Analytical Results

The results of laboratory analysis are summarised in Tables C1 and C2 in Appendix C, along with the laboratory certificate of analysis, chain of custody and sample receipt advice. The analytical results for TRH, BTEX, PAH, PCB, OCP and OPP were below the laboratory limit of detection. Metals concentrations were predominantly below the adopted SAC, except for total chromium, which was above the adopted health investigation level. The health investigation level for hexavalent chromium (CrVI) is usually adopted in the SAC as a conservative level for total chromium, however there is no limit on chromium III and chromium IV, from a human health perspective.

CrVI is usually associated with industrial processes such as chrome plating, working with stainless steel, copper chrome arsenate in timber preservation, some pigments in paints and some dyes used in the textile industry. Given the setting of this site and the potential sources of contamination present, CrVI is unlikely. It is most likely the chromium represents a naturally occurring chromium III or chromium IV concentration in the soils (similar to iron concentrating in ferricrete, colloquially termed coffee rock in the Darwin Region).

As discussed in Section 6, the site was revisited on 22 November 2023 and samples were taken from soil layers which had been analysed and found to contain chromium concentration above 100mg/kg. These additional samples were analysed for metals and for CrVI. Metals concentrations varied slightly from the original samples but were generally comparable and CrVI concentrations were below the laboratory's practical quantitation limit (PQL).

One intra-laboratory replicate, labelled R1, was collected from test pit 42 and analysed as an internal check of the reproducibility within the laboratory (Envirolab), and as a measure of consistency of sampling techniques. Results are shown in Tables C1 and C2, in Appendix C. The relative percentage difference (RPD), i.e., the percentage difference between the primary sample and the replicate sample, was below 30 % for all analytes except for chromium, which had an RPD of 43%. This may have been the result of the mixed composition of the soil, being a sandy gravel with clay.

Based on the limited sampling and testing conducted, no gross contamination was reported in any of the samples analysed and the site appears to be suitable for the proposed development from a contamination perspective and a groundwater investigation is not considered to be required.

There is considered to be a relatively low potential for contamination-related unexpected finds to occur at the site during the proposed development works. Unexpected finds would typically be able to be identified by visual or olfactory indicators and could include:

- Waste materials in fill, including building and demolition waste;
- Fibre cement fragments (e.g., asbestos containing material);
- Stained fill/soil;
- Odorous soils (e.g., hydrocarbon odours); and/or
- Ash, slag and/or coal wash.

The following should be implemented in the event of an unexpected find:

- All work in the immediate vicinity should cease and temporary barricades should be erected to isolate the area;
- A suitably qualified contaminated land consultant (e.g., Douglas Partners) should be engaged to inspect the find and provide advice on the appropriate course of action; and
- Recommended actions should be implemented and validated to demonstrate that there are no unacceptable risks to the receptors.

9. References

NEPC. (2013). *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM]*. Australian Government Publishing Services Canberra: National Environment Protection Council.

NSW EPA. (2020). *Guidelines for Consultants Reporting on Contaminated Land*. Contaminated Land Guidelines: NSW Environment Protection Authority.

209497.00.Rev0. (November 2023). *Report on Geotechnical Investigation, T21-2072 Wurrumiyanga Subdivision, Wurrumiyanga, Bathurst Island*. Douglas Partners

Safework NSW. Accessed 27/11/2023 *Chromium Technical Fact Sheet*.

<https://www.safework.nsw.gov.au/resource-library/hazardous-chemicals/chromium-technical-fact-sheet>.

CDC. Accessed 27/11/2023. *Hexavalent Chromium*.

<https://www.cdc.gov/niosh/topics/hexchrom/default.html>

10. Limitations

Douglas Partners (DP) has prepared this report for the T21-2072 Wurrumiyanga Subdivision project at Wurrumiyanga, Bathurst Island, NT in accordance with DP's proposal dated 20 September 2023 and commissioned by Service Order CD2094/22 dated 16 December 2021 from the Northern Territory (NT) Department of Infrastructure Planning & Logistics (DIPL). 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/or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after DP's field testing has been completed.

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

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

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

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

Douglas Partners Pty Ltd

Appendix A

About This Report
Drawings
Site Photographs
Historical Aerial Images

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

This report is the property of Douglas Partners Pty Ltd. The report may only be used for the purpose for which it was commissioned and in accordance with the Conditions of Engagement for the commission supplied at the time of proposal. Unauthorised use of this report in any form whatsoever is prohibited.

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

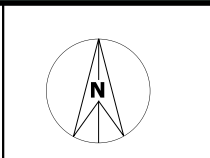
The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

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 .



CLIENT: DIPL (NT)	
OFFICE: Darwin	DRAWN BY: Raj Kumar Lama
SCALE: as shown	DATE: 03/11/2023

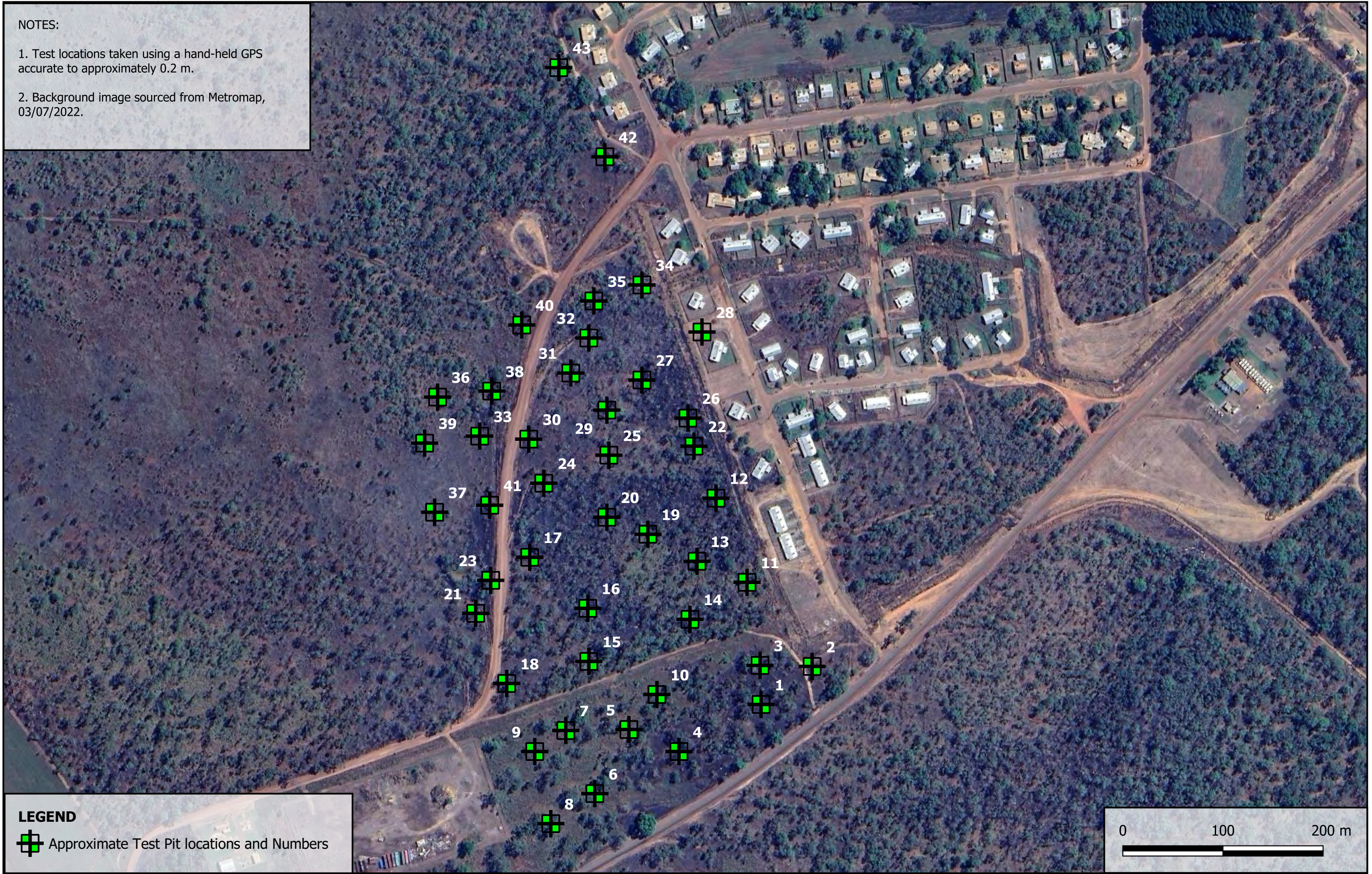
SUBDIVISION LOCATION PLAN
 T21-2072 Wurrumiyanga Subdivision
 Wurrumiyanga, Bathurst Island.




PROJECT: 209497.00
DRAWING No: 1
REVISION: Rev 0

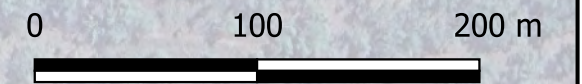
NOTES:

- 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



CLIENT: DIPL (NT)

OFFICE: Darwin

SCALE: as shown

DRAWN BY: Raj Kumar Lama

DATE: 04/09/2023

TEST LOCATION PLAN

T21-2072 Wurrumiyanga Subdivision
Wurrumiyanga, Bathurst Island.



PROJECT: 209497.00

DRAWING No: 2

REVISION: Rev 0



Photo 1: Near Test Pit 34, showing natural bushland with minor surface rubbish, mostly comprising drinking bottles.



Photo 2: Near Test Pit 42, showing historically cleared bushland with minor surface rubbish, mostly comprising steel, and evidence of recent fire.


	Project No. 209497.00	Site Photographs
	Date: See Photos	Client: DIPL (NT)



Photo 3: Near Test Pit 5, showing natural bushland, no obvious surface rubbish.



Photo 4: Near Test Pit 20, showing natural bushland, no obvious surface rubbish.



Project No.
209497.00

Date:
See Photos

Site Photographs

Client: DIPL (NT)



Photo 5: Near Test Pit 41, showing airport road, which runs through the site and natural bush either side, minor litter.



Photo 6: Near Test Pit 2, looking south-west towards Kerinauia Drive showing dirt track.


	Project No. 209497.00	Site Photographs
	Date: See Photos	Client: DIPL (NT)



Image 1: Overlay of Historical Aerial Frame from 22/07/1977 (Frame 456) showing the site outline. The site is a bush site with minor clearing and dirt tracks.



Image 2: Overlay of Historical Aerial Frame from 16/07/1991 (Frame 052) showing the site outline. The site is a bush site with minor clearing and dirt tracks.



 Douglas Partners Geotechnics Environment Groundwater	Project No. 209497.00	Site Photographs
	Date: See Captions	Client: DIPL (NT)



Image 3: Historical Satellite Image from Google Earth 15/06/2003 showing the site outline.
The site is a bush site with minor dirt tracks.



Image 4: Historical Satellite Image from Google Earth 25/04/2019 showing the site outline.
The site is a bush site with minor dirt tracks.

 Douglas Partners Geotechnics Environment Groundwater	Project No. 209497.00	Site Photographs
	Date: See Captions	Client: DIPL (NT)

Appendix B

Logs
Notes on Descriptive Terms
Site Assessment Criteria

Appendix B

Site Assessment Criteria

B1.0 Soils

B1.1 Health Investigation and Screening Levels

The generic health investigation levels (HIL) and health screening levels (HSL) for residential land use are considered to be appropriate for the assessment of human health risk via all relevant pathways of exposure associated with contamination at the site. The adopted soil HIL and HSL for the contaminants of concern are presented in Tables B1 and B2.

Table B1: Health Investigation Levels (mg/kg)

Contaminant	HIL-A
Metals	
Arsenic	100
Cadmium	20
Chromium (VI)	100
Copper	6000
Lead	300
Mercury (inorganic)	40
Nickel	400
Zinc	7400
PAH	
B(a)P TEQ	3
Total PAH	300
OCP	
DDT+DDE+DDD	240
Aldrin and dieldrin	6
Chlordane	50
Endosulfan	270
Endrin	10
Heptachlor	6
HCB	10
Methoxychlor	300
OPP	
Chlorpyrifos	160
PCB	
PCB	1

Table B2: Health Screening Levels (mg/kg)

Contaminant	HSL-A&B	HSL-A&B	HSL-A&B	HSL-A&B
Silt (LL<50%)	0 m to <1 m	1 m to <2 m	2 m to <4 m	4 m+
Benzene	0.6	0.7	1	2
Toluene	390	NL	NL	NL
Ethylbenzene	NL	NL	NL	NL
Xylenes	95	210	NL	NL
Naphthalene	4	NL	NL	NL
TRH F1	40	65	100	190
TRH F2	230	NL	NL	NL

Notes: TRH F1 is TRH C₆-C₁₀ minus BTEX

TRH F2 is TRH >C₁₀-C₁₆ minus naphthalene

The soil saturation concentration (C_{sat}) is defined as the soil concentration at which the porewater phase cannot dissolve any more of an individual chemical. The soil vapour that is in equilibrium with the porewater will be at its maximum. If the derived soil HSL exceeds C_{sat}, a soil vapour source concentration for a petroleum mixture could not exceed a level that would result in the maximum allowable vapour risk for the given scenario. For these scenarios, no HSL is presented for these chemicals and the HSL is shown as 'not limiting' or 'NL'

The HSL for direct contact derived from CRC CARE (2011) are presented in Table B3, below.

Table B3: Health Screening Levels for Direct Contact (mg/kg)

Contaminant	DC HSL-A	DC HSL-IMW
Benzene	100	1100
Toluene	14 000	120 000
Ethylbenzene	4500	85 000
Xylenes	12 000	130 000
Naphthalene	1400	29 000
TRH F1	4400	82 000
TRH F2	3300	62 000
TRH F3	4500	85 000
TRH F4	6300	120 000

Notes: TRH F1 is TRH C₆-C₁₀ minus BTEX

TRH F2 is TRH >C₁₀-C₁₆ minus naphthalene

IMW intrusive maintenance worker

B1.2 Asbestos

A detailed asbestos assessment was not considered to be warranted at this stage. However, due to the history of widespread use of ACM products across Australia, ACM can be encountered unexpectedly and sporadically at a site. Therefore, the presence or absence of asbestos at a limit of reporting of 0.1 g/kg (AS:4964) has been adopted for this assessment as an initial screen.

B1.3 Management Limits

In addition to appropriate consideration and application of the HSL and ESL, there are additional considerations which reflect the nature and properties of petroleum hydrocarbons, including:

- Formation of observable light non-aqueous phase liquids (LNAPL);
- Fire and explosion hazards;
- Effects on buried infrastructure eg: penetration of, or damage to, in-ground services.

The adopted management limits are presented in Table B4, below.

Table B4: Management Limits (mg/kg)

Contaminant	Soil Type	ML-A-B-C
TRH F1	Fine	800
TRH F2	Fine	1000
TRH F3	Fine	3500
TRH F4	Fine	10 000

Notes: TRH F1 is TRH C₆-C₁₀ including BTEX
 TRH F2 is TRH >C₁₀-C₁₆ including naphthalene
 ML-A-B-C residential, parkland and public open space

B1.4 Environmental Investigation Limits

Table B5: Environmental Investigation Limits (mg/kg dry soil)

Contaminant	Land Use	EIL	Inputs and Assumptions
Chromium III	Urban Residential and Public Open Space	400	CEC assumed to be 5 cmol/kg % Clay used = 50% based on Atterberg limit testing pH = 5.8
Copper		130	
Nickel		30	
Zinc		180	
Lead		1100	NA
Arsenic		100	NA
DDT		180	NA
Naphthalene		170	NA

B2.0 References

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NEPC. (2013). *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM]*. Australian Government Publishing Services Canberra: National Environment Protection Council.

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Douglas Partners Pty Ltd

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				Water	Dynamic Penetrometer Test (blows per 100mm)
				Type	Depth	Sample	Results & Comments		
	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.							
	0.3	Sandy CLAY CL: Medium plasticity, yellow-brown, fine to coarse grained sand, with fine to coarse sub-rounded to rounded gravel, w<PL, hard, colluvial. - red-brown mottled yellow-brown from 0.4 m depth.		B			VOC = 0		
	0.5								
	0.9	Silty CLAY CL: 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 CL: 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		
	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
B	Bulk sample	P	Piston sample
BLK	Block sample	U	Tube sample (x mm dia.)
C	Core drilling	W	Water sample
D	Disturbed sample	>	Water seep
E	Environmental sample	≡	Water level
		PLD	Photo ionisation detector (ppm)
		PL(A)	Point load axial test Is(50) (MPa)
		PL(D)	Point load diametral test Is(50) (MPa)
		pp	Pocket penetrometer (kPa)
		S	Standard penetration test
		V	Shear vane (kPa)

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				Water	Dynamic Penetrometer Test (blows per 100mm)				
				Type	Depth	Sample	Results & Comments		5	10	15	20	
	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. - dense from 0.7 m depth.		B	0.3		VOC = 0						
	0.9	Silty CLAY CI: Medium plasticity clay, red-brown mottled grey-brown, with fine to coarse grained sand, w=PL, very stiff, residual.											
	1.6	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						
	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
B	Bulk sample	P	Piston sample
BLK	Block sample	U	Tube sample (x mm dia.)
C	Core drilling	W	Water sample
D	Disturbed sample	>	Water seep
E	Environmental sample	≡	Water level
		PID	Photo ionisation detector (ppm)
		PL(A)	Point load axial test Is(50) (MPa)
		PL(D)	Point load diametral test Is(50) (MPa)
		pp	Pocket penetrometer (kPa)
		S	Standard penetration test
		V	Shear vane (kPa)

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				Water	Dynamic Penetrometer Test (blows per 100mm)
				Type	Depth	Sample	Results & Comments		
	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.							
	0.4	Sandy CLAY CL: Medium plasticity, yellow-brown, fine to coarse grained sand, with fine to coarse sub-rounded to rounded gravel, w<PL, hard, colluvial. - red-brown mottled yellow-brown from 0.4 m depth.		B	0.4		VOC = 0		
	0.6								
	0.8	Silty CLAY CL: 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		
	1.5								
	1.7	Silty CLAY CL: 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.							



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

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				Water	Dynamic Penetrometer Test (blows per 100mm)
				Type	Depth	Sample	Results & Comments		
	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		
	0.8	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. - hard from 0.4 m depth.		D U	0.4 0.5		VOC = 0		
	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. - grey-brown mottled red-brown at 1.8 m depth.		D	1.0				
	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
B	Bulk sample	P	Piston sample
BLK	Block sample	U	Tube sample (x mm dia.)
C	Core drilling	W	Water sample
D	Disturbed sample	W	Water seep
E	Environmental sample	W	Water level
		PID	Photo ionisation detector (ppm)
		PL(A)	Point load axial test Is(50) (MPa)
		PL(D)	Point load diametral test Is(50) (MPa)
		pp	Pocket penetrometer (kPa)
		S	Standard penetration test
		V	Shear vane (kPa)

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				Water	Dynamic Penetrometer Test (blows per 100mm)
				Type	Depth	Sample	Results & Comments		
-1.6 -1 -1.2 -2 -2.25	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.	[Pattern]	D	0.1		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. - very dense from 0.6 m depth.		B	0.3		VOC = 0		
	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. - very stiff from 1.3 m depth.	[Pattern]						
	1.5	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. - hard from 2.1 m depth.		D	1.7		VOC = 0		
	2.25	Pit discontinued at 2.25m 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
B	Bulk sample	P	Piston sample
BLK	Block sample	U	Tube sample (x mm dia.)
C	Core drilling	W	Water sample
D	Disturbed sample	W	Water seep
E	Environmental sample	W	Water level
		PL(D)	Point load axial test Is(50) (MPa)
		PL(D)	Point load diametral test Is(50) (MPa)
		pp	Pocket penetrometer (kPa)
		S	Standard penetration test
		V	Shear vane (kPa)
		PI(D)	Photo ionisation detector (ppm)

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				Water	Dynamic Penetrometer Test (blows per 100mm)				
				Type	Depth	Sample	Results & Comments		5	10	15	20	
17.1	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.	[Hatched pattern]	B	0.2		VOC = 0						
		Silty CLAY CL: 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. - red-brown mottled yellow-brown from 0.5 m depth.			0.4								
16.0	1.0	Silty CLAY CL: 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.	[Hatched pattern]	D	1.3		VOC = 0						
		- hard from 2.0 m depth.											
15.0	2.2	Pit discontinued at 2.2m 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: 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
B	Bulk sample	P	Piston sample
BLK	Block sample	U	Tube sample (x mm dia.)
C	Core drilling	W	Water sample
D	Disturbed sample	W	Water seep
E	Environmental sample	W	Water level
		PID	Photo ionisation detector (ppm)
		PL(A)	Point load axial test Is(50) (MPa)
		PL(D)	Point load diametral test Is(50) (MPa)
		pp	Pocket penetrometer (kPa)
		S	Standard penetration test
		S	Shear vane (kPa)

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				Water	Dynamic Penetrometer Test (blows per 100mm)				
				Type	Depth	Sample	Results & Comments		5	10	15	20	
	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.	[Diagonal hatching]	B	0.3		VOC = 0						
	1.1	Sandy CLAY CL: 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.			0.5								
	1.1	Silty CLAY CL-Cl: 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.	[Vertical hatching]	D	1.8		VOC = 0						
	2.4	- grey-brown mottled orange-brown, yellow-brown from 1.6 m depth Pit discontinued at 2.4m 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
B	Bulk sample	P	Piston sample
BLK	Block sample	U	Tube sample (x mm dia.)
C	Core drilling	W	Water sample
D	Disturbed sample	>	Water seep
E	Environmental sample	≡	Water level
		PID	Photo ionisation detector (ppm)
		PL(A)	Point load axial test Is(50) (MPa)
		PL(D)	Point load diametral test Is(50) (MPa)
		pp	Pocket penetrometer (kPa)
		S	Standard penetration test
		V	Shear vane (kPa)



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				Water	Dynamic Penetrometer Test (blows per 100mm)
				Type	Depth	Sample	Results & Comments		
	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.							
	0.6	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		
	1.1	Silty CLAY Cl: 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		
	2.0	Pit discontinued at 2.0m 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: 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
B	Bulk sample	P	Piston sample
BLK	Block sample	U	Tube sample (x mm dia.)
C	Core drilling	W	Water sample
D	Disturbed sample	>	Water seep
E	Environmental sample	≡	Water level
		PID	Photo ionisation detector (ppm)
		PL(A)	Point load axial test Is(50) (MPa)
		PL(D)	Point load diametral test Is(50) (MPa)
		pp	Pocket penetrometer (kPa)
		S	Standard penetration test
		V	Shear vane (kPa)

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				Water	Dynamic Penetrometer Test (blows per 100mm)
				Type	Depth	Sample	Results & Comments		
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.	[Diagonal hatching]	D	0.3		VOC = 0	[Penetrometer graph]	
1	0.9	Sandy CLAY CL: 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.	[Diagonal hatching]	D	1.2		VOC = 0	[Penetrometer graph]	
16	2.15	Silty CLAY CL: Medium plasticity clay, red-brown mottled grey-brown, with fine to coarse grained sand, trace fine to medium gravel, w<PL, very stiff, residual. - grey-brown mottled orange-brown, yellow-brown from 1.8 m depth	[Diagonal hatching]					[Penetrometer graph]	
		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
B	Bulk sample	P	Piston sample
BLK	Block sample	U	Tube sample (x mm dia.)
C	Core drilling	W	Water sample
D	Disturbed sample	>	Water seep
E	Environmental sample	≡	Water level
		PLD	Photo ionisation detector (ppm)
		PL(A)	Point load axial test Is(50) (MPa)
		PL(D)	Point load diametral test Is(50) (MPa)
		pp	Pocket penetrometer (kPa)
		S	Standard penetration test
		V	Shear vane (kPa)

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				Water	Dynamic Penetrometer Test (blows per 100mm)				
				Type	Depth	Sample	Results & Comments		5	10	15	20	
	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.											
	0.8	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						
	1.0	Sandy CLAY Cl: Medium plasticity, red-brown mottled grey-brown, fine to coarse grained sand, with fine to medium gravel, w<PL, hard to very stiff, residual. - very stiff from 1.4 m depth.		D	1.0		VOC = 0						
	1.8												
	2.0	Silty CLAY Cl: Medium plasticity, red-brown mottled grey-brown, with fine to coarse grained sand, trace fine to medium gravel, w<PL, hard, residual. 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
B	Bulk sample	P	Piston sample
BLK	Block sample	U	Tube sample (x mm dia.)
C	Core drilling	W	Water sample
D	Disturbed sample	W	Water seep
E	Environmental sample	W	Water level
		PID	Photo ionisation detector (ppm)
		PL(A)	Point load axial test Is(50) (MPa)
		PL(D)	Point load diametral test Is(50) (MPa)
		pp	Pocket penetrometer (kPa)
		S	Standard penetration test
		S	Shear vane (kPa)

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				Water	Dynamic Penetrometer Test (blows per 100mm)
				Type	Depth	Sample	Results & Comments		
14.4	0.35	TOPSOIL - Gravelly Sandy CLAY CL: Low plasticity, yellow-brown, light-brown, fine to coarse grained sand and roots, w<PL, very stiff.	[Graphic Log: Diagonal hatching]	D	0.2		VOC = 0	[Penetrometer Test Graph: Shows blow counts increasing from ~5 at 0.2m to ~18 at 0.7m]	
		Silty CLAY C: 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		VOC = 0		
					0.7				
	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
B	Bulk sample	P	Piston sample
BLK	Block sample	U	Tube sample (x mm dia.)
C	Core drilling	W	Water sample
D	Disturbed sample	>	Water seep
E	Environmental sample	≡	Water level
		PLD	Photo ionisation detector (ppm)
		PL(A)	Point load axial test Is(50) (MPa)
		PL(D)	Point load diametral test Is(50) (MPa)
		pp	Pocket penetrometer (kPa)
		S	Standard penetration test
		V	Shear vane (kPa)

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				Water	Dynamic Penetrometer Test (blows per 100mm)					
				Type	Depth	Sample	Results & Comments		5	10	15	20		
	0.1	TOPSOIL - Sandy CLAY CL: Low plasticity, light-brown, fine to coarse grained sand, with roots, w<PL, stiff.												
	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. - very stiff from 0.3 m depth.		D	0.2		VOC = 0							
				D	0.3		VOC = 0							
				B	0.5									
					0.7									
	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. - 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
B	Bulk sample	P	Piston sample
BLK	Block sample	U	Tube sample (x mm dia.)
C	Core drilling	W	Water sample
D	Disturbed sample	>	Water seep
E	Environmental sample	≡	Water level
		PID	Photo ionisation detector (ppm)
		PL(A)	Point load axial test Is(50) (MPa)
		PL(D)	Point load diametral test Is(50) (MPa)
		pp	Pocket penetrometer (kPa)
		S	Standard penetration test
		V	Shear vane (kPa)

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				Water	Dynamic Penetrometer Test (blows per 100mm)				
				Type	Depth	Sample	Results & Comments		5	10	15	20	
	0.1	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						
	0.4	Gravelly Sandy CLAY Cl: 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	0.4		VOC = 0						
	0.6			B	0.6								
	0.8	Silty CLAY Cl: 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	0.8		VOC = 0						
	1.5	- hard and yellow brown-mottled grey-brown from 1.5 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
B	Bulk sample	P	Piston sample
BLK	Block sample	U	Tube sample (x mm dia.)
C	Core drilling	W	Water sample
D	Disturbed sample	>	Water seep
E	Environmental sample	≡	Water level
		PLD	Photo ionisation detector (ppm)
		PL(A)	Point load axial test Is(50) (MPa)
		PL(D)	Point load diametral test Is(50) (MPa)
		pp	Pocket penetrometer (kPa)
		S	Standard penetration test
		V	Shear vane (kPa)

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				Water	Dynamic Penetrometer Test (blows per 100mm)					
				Type	Depth	Sample	Results & Comments		5	10	15	20		
15.2	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							
14	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							
		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.			0.7									
	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.												



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

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				Water	Dynamic Penetrometer Test (blows per 100mm)				
				Type	Depth	Sample	Results & Comments		5	10	15	20	
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.	[Hatched pattern]	B	0.3		VOC = 0		1	5	10	15	20
		Sandy CLAY CL: 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. - hard from 0.4 m depth.											
16	1.0	Silty CLAY CL: Medium plasticity, red-brown mottled grey-brown, with fine to coarse grained sand, trace fine to medium gravel, w<PL, very stiff, residual.	[Vertical line pattern]	D	1.1		VOC = 0						
15	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
B	Bulk sample	P	Piston sample
BLK	Block sample	U	Tube sample (x mm dia.)
C	Core drilling	W	Water sample
D	Disturbed sample	>	Water seep
E	Environmental sample	≡	Water level
		PID	Photo ionisation detector (ppm)
		PL(A)	Point load axial test Is(50) (MPa)
		PL(D)	Point load diametral test Is(50) (MPa)
		pp	Pocket penetrometer (kPa)
		S	Standard penetration test
		V	Shear vane (kPa)

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				Water	Dynamic Penetrometer Test (blows per 100mm)				
				Type	Depth	Sample	Results & Comments		5	10	15	20	
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 CL: 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						
1	1.9	Silty CLAY CL: 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.											



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

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				Water	Dynamic Penetrometer Test (blows per 100mm)				
				Type	Depth	Sample	Results & Comments		5	10	15	20	
	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						
				M	0.4								
	0.7	Silty CLAY Cl: 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. - red-brown mottled yellow-brown from 0.3 m depth.		D	0.8		VOC = 0						
	1	Silty CLAY Cl: Medium plasticity, red-brown mottled grey-brown, with fine to coarse grained sand, trace fine to medium gravel, w<PL, very stiff, residual.											
	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
B	Bulk sample	P	Piston sample
BLK	Block sample	U	Tube sample (x mm dia.)
C	Core drilling	W	Water sample
D	Disturbed sample	>	Water seep
E	Environmental sample	≡	Water level
		PLD	Photo ionisation detector (ppm)
		PL(A)	Point load axial test Is(50) (MPa)
		PL(D)	Point load diametral test Is(50) (MPa)
		pp	Pocket penetrometer (kPa)
		S	Standard penetration test
		V	Shear vane (kPa)

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				Water	Dynamic Penetrometer Test (blows per 100mm)				
				Type	Depth	Sample	Results & Comments		5	10	15	20	
17	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.	[Diagonal hatching pattern]	B	0.3		VOC = 0	1	[DPT graph showing blow counts]	5	10	15	20
	0.3	Sandy CLAY CL: 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.											
	0.5	- hard from 0.5 m depth.											
	0.8	Silty CLAY CL: 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.											
16	1.0	- very stiff from 1.5 m depth.	[Diagonal hatching pattern]	D	1.0		VOC = 0	2	[DPT graph showing blow counts]	5	10	15	20
	1.5	- grey-brown mottled yellow-brown from 1.6 m depth.											
	1.9	- hard from 1.9 m depth.											
2.3	Pit discontinued at 2.3m 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
B	Bulk sample	P	Piston sample
BLK	Block sample	U	Tube sample (x mm dia.)
C	Core drilling	W	Water sample
D	Disturbed sample	>	Water seep
E	Environmental sample	≡	Water level
		PID	Photo ionisation detector (ppm)
		PL(A)	Point load axial test Is(50) (MPa)
		PL(D)	Point load diametral test Is(50) (MPa)
		pp	Pocket penetrometer (kPa)
		S	Standard penetration test
		V	Shear vane (kPa)

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				Water	Dynamic Penetrometer Test (blows per 100mm)					
				Type	Depth	Sample	Results & Comments		5	10	15	20		
15.2	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.												
	0.4	Sandy Gravelly CLAY C: Medium plasticity, yellow-brown, fine to coarse grained sand, fine to coarse sub-angular to sub-rounded gravel, w<PL, very stiff, colluvial.		B	0.4		VOC = 0							
	0.7	- yellow-brown mottled red-brown from 0.4 m depth. - 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	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
B	Bulk sample	P	Piston sample
BLK	Block sample	U	Tube sample (x mm dia.)
C	Core drilling	W	Water sample
D	Disturbed sample	>	Water seep
E	Environmental sample	≡	Water level
		PID	Photo ionisation detector (ppm)
		PL(A)	Point load axial test Is(50) (MPa)
		PL(D)	Point load diametral test Is(50) (MPa)
		pp	Pocket penetrometer (kPa)
		S	Standard penetration test
		V	Shear vane (kPa)

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				Water	Dynamic Penetrometer Test (blows per 100mm)				
				Type	Depth	Sample	Results & Comments		5	10	15	20	
15.1	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						
	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	0.3		VOC = 0						
		Silty CLAY Cl: 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. - very stiff from 0.9 m depth. - stiff from 1.3 m depth.		D	0.7		VOC = 0						
	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
B	Bulk sample	P	Piston sample
BLK	Block sample	U	Tube sample (x mm dia.)
C	Core drilling	W	Water sample
D	Disturbed sample	W	Water seep
E	Environmental sample	W	Water level
		PL(A)	Photo ionisation detector (ppm)
		PL(D)	Point load axial test Is(50) (MPa)
		PL(D)	Point load diametral test Is(50) (MPa)
		pp	Pocket penetrometer (kPa)
		S	Standard penetration test
		V	Shear vane (kPa)

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				Water	Dynamic Penetrometer Test (blows per 100mm)
				Type	Depth	Sample	Results & Comments		
	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.							
	0.4	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		
	1.2	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		
	2.0	- grey-brown mottled orange-brown, yellow-brown at 1.8 m depth. - hard from 2.1 m depth.							
	2.4	Pit discontinued at 2.4m 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
B	Bulk sample	P	Piston sample
BLK	Block sample	U	Tube sample (x mm dia.)
C	Core drilling	W	Water sample
D	Disturbed sample	W	Water seep
E	Environmental sample	W	Water level
		PL(D)	Point load axial test Is(50) (MPa)
		PL(D)	Point load diametral test Is(50) (MPa)
		pp	Pocket penetrometer (kPa)
		S	Standard penetration test
		V	Shear vane (kPa)

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				Water	Dynamic Penetrometer Test (blows per 100mm)				
				Type	Depth	Sample	Results & Comments		5	10	15	20	
14.1	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.		D	0.4		VOC = 0						
0.7	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.												
1.0	Silty CLAY Cl: 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.												
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
B	Bulk sample	P	Piston sample
BLK	Block sample	U	Tube sample (x mm dia.)
C	Core drilling	W	Water sample
D	Disturbed sample	>	Water seep
E	Environmental sample	≡	Water level
		PLD	Photo ionisation detector (ppm)
		PL(A)	Point load axial test Is(50) (MPa)
		PL(D)	Point load diametral test Is(50) (MPa)
		pp	Pocket penetrometer (kPa)
		S	Standard penetration test
		V	Shear vane (kPa)

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				Water	Dynamic Penetrometer Test (blows per 100mm)
				Type	Depth	Sample	Results & Comments		
	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		
	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		
	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.							
	2.0	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.							
	2.3	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
B	Bulk sample	P	Piston sample
BLK	Block sample	U	Tube sample (x mm dia.)
C	Core drilling	W	Water sample
D	Disturbed sample	>	Water seep
E	Environmental sample	≡	Water level
		PID	Photo ionisation detector (ppm)
		PL(A)	Point load axial test Is(50) (MPa)
		PL(D)	Point load diametral test Is(50) (MPa)
		pp	Pocket penetrometer (kPa)
		S	Standard penetration test
		V	Shear vane (kPa)

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				Water	Dynamic Penetrometer Test (blows per 100mm)				
				Type	Depth	Sample	Results & Comments		5	10	15	20	
	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			B	0.4		VOC = 0						
		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.			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. - very stiff from 1.2 m depth.											
	2	- hard and grey-brown mottled red-brown at 1.9 m depth		D	2.0		VOC = 0						
	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
B	Bulk sample	P	Piston sample
BLK	Block sample	U	Tube sample (x mm dia.)
C	Core drilling	W	Water sample
D	Disturbed sample	W	Water seep
E	Environmental sample	W	Water level
		PID	Photo ionisation detector (ppm)
		PL(A)	Point load axial test Is(50) (MPa)
		PL(D)	Point load diametral test Is(50) (MPa)
		pp	Pocket penetrometer (kPa)
		S	Standard penetration test
		V	Shear vane (kPa)

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				Water	Dynamic Penetrometer Test (blows per 100mm)				
				Type	Depth	Sample	Results & Comments		5	10	15	20	
15.0	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.	[Hatched pattern]	B	0.3		VOC = 0	1					
	0.7	Silty CLAY C: 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. - becoming red-brown mottled yellow-brown at 0.3 m depth.		B	0.5								
	1.2	Silty CLAY C: 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.		D	0.8		VOC = 0						
	1.9	- 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
B	Bulk sample	P	Piston sample
BLK	Block sample	U	Tube sample (x mm dia.)
C	Core drilling	W	Water sample
D	Disturbed sample	>	Water seep
E	Environmental sample	≡	Water level
		PLD	Photo ionisation detector (ppm)
		PL(A)	Point load axial test Is(50) (MPa)
		PL(D)	Point load diametral test Is(50) (MPa)
		pp	Pocket penetrometer (kPa)
		S	Standard penetration test
		V	Shear vane (kPa)



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				Water	Dynamic Penetrometer Test (blows per 100mm)					
				Type	Depth	Sample	Results & Comments		5	10	15	20		
14.1	0.1	TOPSOIL - Sandy CLAY CL: Low plasticity, light-brown, fine to coarse grained, with roots, w<PL, very stiff.	[Diagonal Hatching]	D	0.3		VOC = 0		1	[Penetration Test Graph]				
	0.9	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. - red-brown mottled yellow-brown from 0.4 m depth. - hard from 0.5 m depth.												
	1.9	- very stiff from 1.4 m depth. - grey-brown mottled red-brown from 1.8 m depth. 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
B	Bulk sample	P	Piston sample
BLK	Block sample	U	Tube sample (x mm dia.)
C	Core drilling	W	Water sample
D	Disturbed sample	W	Water seep
E	Environmental sample	W	Water level
		PID	Photo ionisation detector (ppm)
		PL(A)	Point load axial test Is(50) (MPa)
		PL(D)	Point load diametral test Is(50) (MPa)
		pp	Pocket penetrometer (kPa)
		S	Standard penetration test
		V	Shear vane (kPa)

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				Water	Dynamic Penetrometer Test (blows per 100mm)
				Type	Depth	Sample	Results & Comments		
14	0.2	TOPSOIL - Sandy CLAY CL: Low plasticity, light-brown, fine to coarse grained sand, with roots, w<PL, stiff.	[Symbol]	D	0.2		VOC = 0	[Graph]	
	0.3	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. - very dense from 0.4 m depth.		E	0.3				
	0.5		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. - grey-brown mottled red-brown from 1.2 m depth.	[Symbol]	D	1.4				
1.6	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
B	Bulk sample	P	Piston sample
BLK	Block sample	U	Tube sample (x mm dia.)
C	Core drilling	W	Water sample
D	Disturbed sample	W	Water seep
E	Environmental sample	W	Water level
		PL(D)	Point load diametral test Is(50) (MPa)
		pp	Pocket penetrometer (kPa)
		S	Standard penetration test
		V	Shear vane (kPa)

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				Water	Dynamic Penetrometer Test (blows per 100mm)			
				Type	Depth	Sample	Results & Comments		5	10	15	20
	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	0.2		VOC = 0					
	0.3			E	0.3							
	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.		B	0.5							
	1.0	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					
	2.0	- grey-brown mottled red-brown from 1.8 m depth. Pit discontinued at 2.0m 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
B	Bulk sample	P	Piston sample
BLK	Block sample	U	Tube sample (x mm dia.)
C	Core drilling	W	Water sample
D	Disturbed sample	W	Water seep
E	Environmental sample	W	Water level
		PL(D)	Point load diametral test Is(50) (MPa)
		pp	Pocket penetrometer (kPa)
		S	Standard penetration test
		V	Shear vane (kPa)
		PLD	Photo ionisation detector (ppm)
		PL(A)	Point load axial test Is(50) (MPa)

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				Water	Dynamic Penetrometer Test (blows per 100mm)					
				Type	Depth	Sample	Results & Comments		5	10	15	20		
	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							
	1	Silty CLAY CI: Medium plasticity, red-brown mottled grey-brown, low plasticity silt, w<PL, very stiff, residual.												
	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: 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
B	Bulk sample	P	Piston sample
BLK	Block sample	U	Tube sample (x mm dia.)
C	Core drilling	W	Water sample
D	Disturbed sample	>	Water seep
E	Environmental sample	≡	Water level
		PID	Photo ionisation detector (ppm)
		PL(A)	Point load axial test Is(50) (MPa)
		PL(D)	Point load diametral test Is(50) (MPa)
		pp	Pocket penetrometer (kPa)
		S	Standard penetration test
		V	Shear vane (kPa)

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				Water	Dynamic Penetrometer Test (blows per 100mm)
				Type	Depth	Sample	Results & Comments		
15	0.1	TOPSOIL - Sandy CLAY CL: Low plasticity, light-brown, fine to coarse grained sand, with roots, w<PL, hard.	[Pattern]	D	0.2		VOC = 0	[Graph]	
		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				
	0.7	Silty CLAY Cl: Medium plasticity, red-brown mottled grey-brown, with fine to coarse grained sand, trace fine to medium gravel, w<PL, very stiff, residual.	[Pattern]						
1									
1.8		- light-grey mottled red-brown from 1.8 m depth.	[Pattern]	D	1.8		VOC = 0		
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
B	Bulk sample	P	Piston sample
BLK	Block sample	U	Tube sample (x mm dia.)
C	Core drilling	W	Water sample
D	Disturbed sample	>	Water seep
E	Environmental sample	≡	Water level
		PID	Photo ionisation detector (ppm)
		PL(A)	Point load axial test Is(50) (MPa)
		PL(D)	Point load diametral test Is(50) (MPa)
		pp	Pocket penetrometer (kPa)
		S	Standard penetration test
		V	Shear vane (kPa)

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				Water	Dynamic Penetrometer Test (blows per 100mm)				
				Type	Depth	Sample	Results & Comments		5	10	15	20	
15.3	0.2	TOPSOIL - Sandy CLAY CL: Low plasticity, light-brown, fine to coarse grained sand, with roots, w<PL, very stiff.		D	0.2		VOC = 0						
15.3	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.		D	0.3				VOC = 0				
15.3		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. - very stiff from 0.7 m depth. - light-grey mottled red-brown from 1.0 m depth. - hard from 1.4 m depth.		B	0.5								
15.3						0.7							
15.3	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
B	Bulk sample	P	Piston sample
BLK	Block sample	U	Tube sample (x mm dia.)
C	Core drilling	W	Water sample
D	Disturbed sample	W	Water seep
E	Environmental sample	W	Water level
		PID	Photo ionisation detector (ppm)
		PL(A)	Point load axial test Is(50) (MPa)
		PL(D)	Point load diametral test Is(50) (MPa)
		pp	Pocket penetrometer (kPa)
		S	Standard penetration test
		S	Shear vane (kPa)

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				Water	Dynamic Penetrometer Test (blows per 100mm)
				Type	Depth	Sample	Results & Comments		
15.0	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.							
	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, hard, residual.		U	1.4				
	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
B	Bulk sample	P	Piston sample
BLK	Block sample	U	Tube sample (x mm dia.)
C	Core drilling	W	Water sample
D	Disturbed sample	>	Water seep
E	Environmental sample	≡	Water level
		PLD	Photo ionisation detector (ppm)
		PL(A)	Point load axial test Is(50) (MPa)
		PL(D)	Point load diametral test Is(50) (MPa)
		pp	Pocket penetrometer (kPa)
		S	Standard penetration test
		V	Shear vane (kPa)

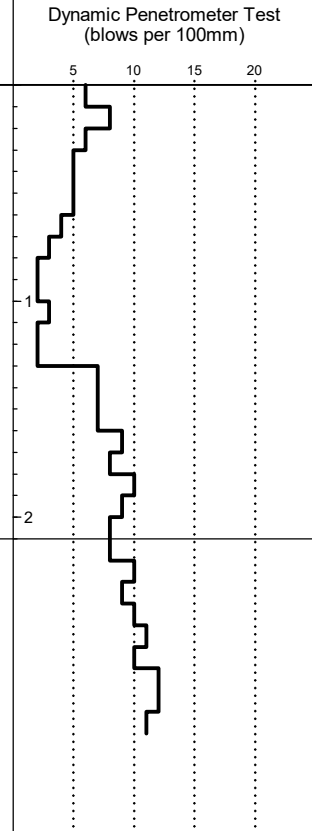
TEST PIT LOG

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				Water	Dynamic Penetrometer Test (blows per 100mm)				
				Type	Depth	Sample	Results & Comments		5	10	15	20	
	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.					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.		B E	0.3 0.4 0.5								
	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, stiff, residual.		D	1.0								
	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. - hard from 1.7 m depth.		D	1.6		VOC = 0						
	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
B	Bulk sample	P	Piston sample
BLK	Block sample	U	Tube sample (x mm dia.)
C	Core drilling	W	Water sample
D	Disturbed sample	W	Water seep
E	Environmental sample	W	Water level
		PID	Photo ionisation detector (ppm)
		PL(A)	Point load axial test Is(50) (MPa)
		PL(D)	Point load diametral test Is(50) (MPa)
		pp	Pocket penetrometer (kPa)
		S	Standard penetration test
		V	Shear vane (kPa)



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				Water	Dynamic Penetrometer Test (blows per 100mm)				
				Type	Depth	Sample	Results & Comments		5	10	15	20	
	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						
	0.3			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.											
	1.9	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: 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
B	Bulk sample	P	Piston sample
BLK	Block sample	U	Tube sample (x mm dia.)
C	Core drilling	W	Water sample
D	Disturbed sample	>	Water seep
E	Environmental sample	≡	Water level
		PID	Photo ionisation detector (ppm)
		PL(A)	Point load axial test Is(50) (MPa)
		PL(D)	Point load diametral test Is(50) (MPa)
		pp	Pocket penetrometer (kPa)
		S	Standard penetration test
		V	Shear vane (kPa)



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				Water	Dynamic Penetrometer Test (blows per 100mm)
				Type	Depth	Sample	Results & Comments		
	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		
	1.0	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							
	2.1	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
B	Bulk sample	P	Piston sample
BLK	Block sample	U	Tube sample (x mm dia.)
C	Core drilling	W	Water sample
D	Disturbed sample	>	Water seep
E	Environmental sample	≡	Water level
		PID	Photo ionisation detector (ppm)
		PL(A)	Point load axial test Is(50) (MPa)
		PL(D)	Point load diametral test Is(50) (MPa)
		pp	Pocket penetrometer (kPa)
		S	Standard penetration test
		V	Shear vane (kPa)

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				Water	Dynamic Penetrometer Test (blows per 100mm)
				Type	Depth	Sample	Results & Comments		
	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.	[Graphic Log: Topsoil]	B	0.2		VOC = 0	[Penetrometer Test: 0-0.7m]	
	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.		B	0.4				
	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. - grey-brown mottled red-brown from 1.7 m depth. - hard from 2.0 m depth.	[Graphic Log: Silty Clay]	D	1.0		VOC = 0	[Penetrometer Test: 1-2.4m]	
	2.4	Pit discontinued at 2.4m 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
B	Bulk sample	P	Piston sample
BLK	Block sample	U	Tube sample (x mm dia.)
C	Core drilling	W	Water sample
D	Disturbed sample	>	Water seep
E	Environmental sample	≡	Water level
		PLD	Photo ionisation detector (ppm)
		PL(A)	Point load axial test Is(50) (MPa)
		PL(D)	Point load diametral test Is(50) (MPa)
		pp	Pocket penetrometer (kPa)
		S	Standard penetration test
		V	Shear vane (kPa)

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				Water	Dynamic Penetrometer Test (blows per 100mm)				
				Type	Depth	Sample	Results & Comments		5	10	15	20	
	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.											
	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.		D	1.6		VOC = 0						
	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.											
	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
B	Bulk sample	P	Piston sample
BLK	Block sample	U	Tube sample (x mm dia.)
C	Core drilling	W	Water sample
D	Disturbed sample	W	Water seep
E	Environmental sample	W	Water level
		PL(D)	Photo ionisation detector (ppm)
		PL(A)	Point load axial test Is(50) (MPa)
		PL(D)	Point load diametral test Is(50) (MPa)
		pp	Pocket penetrometer (kPa)
		S	Standard penetration test
		V	Shear vane (kPa)

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				Water	Dynamic Penetrometer Test (blows per 100mm)				
				Type	Depth	Sample	Results & Comments		5	10	15	20	
	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.	[Graphic Log: Clayey Sandy GRAVEL GC]	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								
	1	Silty CLAY C: 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.	[Graphic Log: Silty CLAY C]	D	1.7		VOC = 0						
	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
B	Bulk sample	P	Piston sample
BLK	Block sample	U	Tube sample (x mm dia.)
C	Core drilling	W	Water sample
D	Disturbed sample	>	Water seep
E	Environmental sample	≡	Water level
		PID	Photo ionisation detector (ppm)
		PL(A)	Point load axial test Is(50) (MPa)
		PL(D)	Point load diametral test Is(50) (MPa)
		pp	Pocket penetrometer (kPa)
		S	Standard penetration test
		V	Shear vane (kPa)

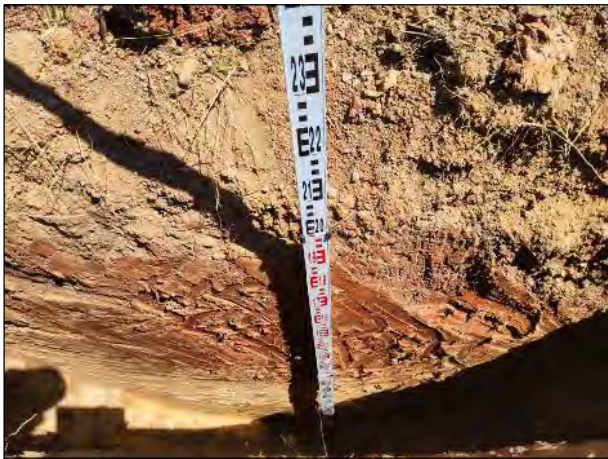
TEST PIT LOG

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				Water	Dynamic Penetrometer Test (blows per 100mm)
				Type	Depth	Sample	Results & Comments		
16.2	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.	[Graphic Log: Clayey Sandy GRAVEL GC]	D	0.2		VOC = 0	[Dynamic Penetrometer Test Graph]	
	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.	[Graphic Log: Silty CLAY CL-CI]						
	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.		D	1.5		VOC = 0		
	2	- hard from 1.8 m depth.							
14	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
B	Bulk sample	P	Piston sample
BLK	Block sample	U	Tube sample (x mm dia.)
C	Core drilling	W	Water sample
D	Disturbed sample	W	Water seep
E	Environmental sample	W	Water level
		PL(D)	Point load axial test Is(50) (MPa)
		PL(A)	Point load axial test Is(50) (MPa)
		pp	Pocket penetrometer (kPa)
		S	Standard penetration test
		V	Shear vane (kPa)
		PID	Photo ionisation detector (ppm)

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				Water	Dynamic Penetrometer Test (blows per 100mm)				
				Type	Depth	Sample	Results & Comments		5	10	15	20	
15.3	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.		DMD	0.2		VOC = 0						
	0.6	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, with roots to 0.3 m depth, moist, dense, colluvial.											
	1.0	Silty CLAY Cl: Medium plasticity, red-brown mottled grey-brown, with fine to coarse grained sand, trace fine to medium gravel, w<PL, very stiff, residual.											
	1.7	Pit discontinued at 1.7m 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
B	Bulk sample	P	Piston sample
BLK	Block sample	U	Tube sample (x mm dia.)
C	Core drilling	W	Water sample
D	Disturbed sample	>	Water seep
E	Environmental sample	≡	Water level
		PID	Photo ionisation detector (ppm)
		PL(A)	Point load axial test Is(50) (MPa)
		PL(D)	Point load diametral test Is(50) (MPa)
		pp	Pocket penetrometer (kPa)
		S	Standard penetration test
		V	Shear vane (kPa)

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				Water	Dynamic Penetrometer Test (blows per 100mm)				
				Type	Depth	Sample	Results & Comments		5	10	15	20	
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.											
1	1.7	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.											
15	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
B	Bulk sample	P	Piston sample
BLK	Block sample	U	Tube sample (x mm dia.)
C	Core drilling	W	Water sample
D	Disturbed sample	W	Water seep
E	Environmental sample	W	Water level
		PL(D)	Point load diametral test Is(50) (MPa)
		pp	Pocket penetrometer (kPa)
		S	Standard penetration test
		V	Shear vane (kPa)
		PID	Photo ionisation detector (ppm)

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				Water	Dynamic Penetrometer Test (blows per 100mm)				
				Type	Depth	Sample	Results & Comments		5	10	15	20	
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.	[Graphic Log: Clayey Sandy GRAVEL GC]	E	0.2		VOC = 0						
		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.		D	0.3								
1.2		Silty CLAY Cl: Medium plasticity, grey-brown mottled red-brown, with fine to coarse grained sand, trace fine to medium gravel, w<PL, estimated very hard, residual.	[Graphic Log: Silty CLAY Cl]	D	1.3		VOC = 0						
				D	1.4								
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
B	Bulk sample	P	Piston sample
BLK	Block sample	U	Tube sample (x mm dia.)
C	Core drilling	W	Water sample
D	Disturbed sample	W	Water seep
E	Environmental sample	W	Water level
		PID	Photo ionisation detector (ppm)
		PL(A)	Point load axial test Is(50) (MPa)
		PL(D)	Point load diametral test Is(50) (MPa)
		pp	Pocket penetrometer (kPa)
		S	Standard penetration test
		V	Shear vane (kPa)

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				Water	Dynamic Penetrometer Test (blows per 100mm)
				Type	Depth	Sample	Results & Comments		
12	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.	[Graphic Log: Clayey Sandy Gravel]	D	0.3		VOC = 0	[Dynamic Penetrometer Test Graph]	
		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. - very dense from 0.8 m depth.							
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.	[Graphic Log: Sandy Clayey Gravel]	D	1.3		VOC = 0		
2	2.0	Pit discontinued at 2.0m 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: 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
B	Bulk sample	P	Piston sample
BLK	Block sample	U	Tube sample (x mm dia.)
C	Core drilling	W	Water sample
D	Disturbed sample	W	Water seep
E	Environmental sample	W	Water level
		PID	Photo ionisation detector (ppm)
		PL(A)	Point load axial test Is(50) (MPa)
		PL(D)	Point load diametral test Is(50) (MPa)
		pp	Pocket penetrometer (kPa)
		S	Standard penetration test
		V	Shear vane (kPa)



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

Sampling Methods

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.	
				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.	
				SM	Silty sand, sand-silt mixtures.	
				SC	Clayey sands, sand-clay mixtures.	
				GRAVELLY SOILS		
				SANDY SOILS		

* 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.
			MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts.
			CH	Inorganic clays of high plasticity, fat clays.
		Liquid Limit greater than 50%	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).

Symbols & Abbreviations

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Introduction

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

Drilling or Excavation Methods

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

Water

▷	Water seep
▽	Water level

Sampling and Testing

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

Description of Defects in Rock

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

Defect Type

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

Orientation

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

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

Coating or Infilling Term

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

Coating Descriptor

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

Shape

cu	curved
ir	irregular
pl	planar
st	stepped
un	undulating

Roughness

po	polished
ro	rough
sl	slickensided
sm	smooth
vr	very rough





Other

fg	fragmented
bnd	band
qtz	quartz




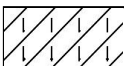




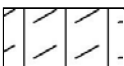
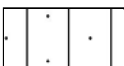

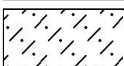
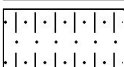

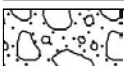
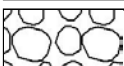

Symbols & Abbreviations

Graphic Symbols for Soil and Rock

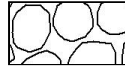


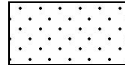
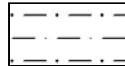

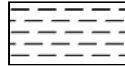


General

	Asphalt
	Road base
	Concrete
	Filling


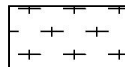
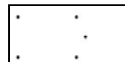
Soils

	Topsoil
	Peat
	Clay
	Silty clay
	Sandy clay
	Gravelly clay
	Shaly clay
	Silt
	Clayey silt
	Sandy silt
	Sand
	Clayey sand
	Silty sand
	Gravel
	Sandy gravel
	Cobbles, boulders
	Talus

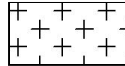
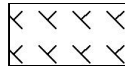
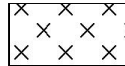
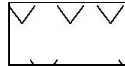
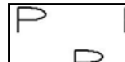
Sedimentary Rocks

	Boulder conglomerate
	Conglomerate
	Conglomeratic sandstone
	Sandstone
	Siltstone
	Laminite
	Mudstone, claystone, shale
	Coal
	Limestone

Metamorphic Rocks

	Slate, phyllite, schist
	Gneiss
	Quartzite

Igneous Rocks

	Granite
	Dolerite, basalt, andesite
	Dacite, epidote
	Tuff, breccia
	Porphyry

Appendix C

Tables C1 and C2
Laboratory Test Results
Chain of Custody Sheets

Table C1: Summary of Laboratory Results – Metals, TRH, BTEX, PAH

Sample ID	Depth	Sample Date	Metals									TRH						BTEX				PAH		
			Arsenic	Cadmium	Total Chromium	Hexavalent Chromium 6+	Copper	Lead	Mercury (inorganic)	Nickel	Zinc	TRH C6 - C10	TRH >C10-C16	F1 ((C6-C10)-BTEX)	F2 (>C10-C16 less Naphthalene)	F3 (>C16-C34)	F4 (>C34-C40)	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene ^b	Benzo(a)pyrene (BaP)	Benzo(a)pyrene TEQ
		PQL	4	0.4	1	1	1	1	1	0.1	1	1												
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
TP04	0.1 m	12/08/23	6.3	<0.4	38	-	2.8	12	<0.1	4.3	5.5	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.05	<0.5
			100 100	20 -	100 690	100	6000 110	300 1100	40 -	400 35	7400 300	- -	- 120	40 180	230 -	- 1300	- 5600	0.6 65	390 105	NL 125	95 45	4 170	- 0.7	3 -
TP20	0.2 m	09/08/23	19	<0.4	60	-	3.2	20	<0.1	5.4	3.4	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.05	<0.5
			100 100	20 -	100 690	100	6000 110	300 1100	40 -	400 35	7400 300	- -	- 120	40 180	230 -	- 1300	- 5600	0.6 65	390 105	NL 125	95 45	4 170	- 0.7	3 -
TP28	0.2 m	10/08/23	37	<0.4	150	-	1.6	22	<0.1	6.6	11	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.05	<0.5
			100 100	20 -	100 690	100	6000 110	300 1100	40 -	400 35	7400 300	- -	- 120	40 180	230 -	- 1300	- 5600	0.6 65	390 105	NL 125	95 45	4 170	- 0.7	3 -
TP28	0.2 m	22/11/23	13	<0.4	76	<1	2	11	<0.1	3	5	-	-	-	-	-	-	-	-	-	-	-	-	-
			100 100	20 -	690	100	6000 110	300 1100	40 -	400 35	7400 300	- -	- 120	40 180	230 -	- 1300	- 5600	0.6 65	390 105	NL 125	95 45	4 170	- 0.7	3 -
TP33	0.4 m	11/08/23	39	<0.4	250	-	1.1	20	<0.1	5.1	5.2	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.05	<0.5
			100 100	20 -	100 690	100	6000 110	300 1100	40 -	400 35	7400 300	- -	- 120	40 180	230 -	- 1300	- 5600	0.6 65	390 105	NL 125	95 45	4 170	- 0.7	3 -
TP33	0.4 m	22/11/23	19	<0.4	90	<1	2	13	<0.1	4	4	-	-	-	-	-	-	-	-	-	-	-	-	-
			100 100	20 -	690	100	6000 110	300 1100	40 -	400 35	7400 300	- -	- 120	40 180	230 -	- 1300	- 5600	0.6 65	390 105	NL 125	95 45	4 170	- 0.7	3 -
TP42	0.2 m	14/08/23	23	<0.4	140	-	<1	20	<0.1	5.4	6.5	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.05	<0.5
					100 100	20 -	100 690	100	6000 110	300 1100	40 -	400 35	7400 300	- -	- 120	40 180	230 -	- 1300	- 5600	0.6 65	390 105	NL 125	95 45	4 170
R1 (TP42)			31	<0.4	90	-	<1	22	<0.1	5.1	4.9	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.05	<0.5
			100 100	20 -	100 690	100	6000 110	300 1100	40 -	400 35	7400 300	- -	- 120	40 180	230 -	- 1300	- 5600	0.6 65	390 105	NL 125	95 45	4 170	- 0.7	3 -
TP42	0.2 m	22/11/23	15	<0.4	87	<1	3	16	<0.1	5	28	-	-	-	-	-	-	-	-	-	-	-	-	-
			100 100	20 -	690	100	6000 110	300 1100	40 -	400 35	7400 300	- -	- 120	40 180	230 -	- 1300	- 5600	0.6 65	390 105	NL 125	95 45	4 170	- 0.7	3 -

Lab result

■ HIL/HSL exceedance
 ■ EIL/ESL exceedance
 ■ HIL/HSL and EIL/ESL exceedance
 ■ ML exceedance
 ■ ML and HIL/HSL or EIL/ESL exceedance

■ Indicates that asbestos has been detected by the lab, refer to the lab report
 ■ DC exceedance
 HSL 0-<1 Exceedance

Bold = Lab detections - = Not tested or No HIL/HSL/EIL/ESL (as applicable) or Not applicable NL = Non limiting AD = Asbestos detected NAD = No Asbestos detected

HIL = Health investigation level HSL = Health screening level (excluding DC) EIL = Ecological investigation level ESL = Ecological screening level ML = Management Limit DC = Direct Contact HSL

- Notes:**
- a QA/QC replicate of sample listed directly below the primary sample
 - b Reported naphthalene laboratory result obtained from BTEXN suite
 - c EIL criteria applies to DDT only

Site Assessment Criteria (SAC):

Refer to the SAC section of report for information of SAC sources and rationale. Summary information as follows:

SAC based on generic land use thresholds for Residential A with garden/accessible soil

- HIL A Residential with garden / accessible soil (NEPC, 2013/ HEPA, 2020 (PFAS))
- HSL A/B Residential / Low - High Density (vapour intrusion) (NEPC, 2013)
- DC HSL A Direct contact HSL A Residential (Low density) (direct contact) (CRC CARE, 2011)
- EIL/ESL UR/POS Urban Residential and Public Open Space (NEPC, 2013)
- ML R/P/POS Residential, Parkland and Public Open Space (NEPC, 2013)

Table C2: Summary of Laboratory Results – OCP, OPP, PCB

Sample ID	Depth	Sample Date	OCP									OPP	PCB							
			DDT+DDE+DDD ^c	Aldrin & Dieldrin	alpha-chlordane	Endrin	Total Endosulfan	Heptachlor	Hexachlorobenzene	Methoxychlor	Chlorpyrifos	Arochlor 1016	Total PCB	Arochlor 1221	Arochlor 1232	Arochlor 1242	Arochlor 1248	Arochlor 1254	Arochlor 1260	
		PQL																		
TP04	0.1 m	12/08/23	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
			240 180	6 -	- -	10 -	270 -	6 -	10 -	300 -	160 -	- -	1 -	- -	- -	- -	- -	- -	- -	- -
TP20	0.2 m	09/08/23	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
			240 180	6 -	- -	10 -	270 -	6 -	10 -	300 -	160 -	- -	1 -	- -	- -	- -	- -	- -	- -	- -
TP28	0.2 m	10/08/23	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
			240 180	6 -	- -	10 -	270 -	6 -	10 -	300 -	160 -	- -	1 -	- -	- -	- -	- -	- -	- -	- -
TP28	0.2 m	22/11/23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			240 180	6 -	- -	10 -	270 -	6 -	10 -	300 -	160 -	- -	1 -	- -	- -	- -	- -	- -	- -	- -
TP33	0.4 m	11/08/23	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
			240 180	6 -	- -	10 -	270 -	6 -	10 -	300 -	160 -	- -	1 -	- -	- -	- -	- -	- -	- -	- -
TP33	0.4 m	22/11/23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			240 180	6 -	- -	10 -	270 -	6 -	10 -	300 -	160 -	- -	1 -	- -	- -	- -	- -	- -	- -	- -
TP42	0.2 m	14/08/23	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
					240 180	6 -	- -	10 -	270 -	6 -	10 -	300 -	160 -	- -	1 -	- -	- -	- -	- -	- -
R1 (TP42)			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
			240 180	6 -	- -	10 -	270 -	6 -	10 -	300 -	160 -	- -	1 -	- -	- -	- -	- -	- -	- -	- -
TP42	0.2 m	22/11/23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			240 180	6 -	- -	10 -	270 -	6 -	10 -	300 -	160 -	- -	1 -	- -	- -	- -	- -	- -	- -	- -

Lab result

HIL/HSL value EIL/ESL value

■ HIL/HSL exceedance ■ EIL/ESL exceedance ■ HIL/HSL and EIL/ESL exceedance ■ ML exceedance ■ ML and HIL/HSL or EIL/ESL exceedance
■ Indicates that asbestos has been detected by the lab, refer to the lab report ■ DC exceedance HSL 0-<1 Exceedance

Bold = Lab detections - = Not tested or No HIL/HSL/EIL/ESL (as applicable) or Not applicable NL = Non limiting AD = Asbestos detected NAD = No Asbestos detected
 HIL = Health investigation level HSL = Health screening level (excluding DC) EIL = Ecological investigation level ESL = Ecological screening level ML = Management Limit DC = Direct Contact HSL

- Notes:**
- a QA/QC replicate of sample listed directly below the primary sample
 - b Reported naphthalene laboratory result obtained from BTEXN suite
 - c EIL criteria applies to DDT only

Site Assessment Criteria (SAC):

Refer to the SAC section of report for information of SAC sources and rationale. Summary information as follows:

SAC based on generic land use thresholds for Residential A with garden/accessible soil

- HIL A Residential with garden / accessible soil (NEPC, 2013/ HEPA, 2020 (PFAS))
- HSL A/B Residential / Low - High Density (vapour intrusion) (NEPC, 2013)
- DC HSL A Direct contact HSL A Residential (Low density) (direct contact) (CRC CARE, 2011)
- EIL/ESL UR/POS Urban Residential and Public Open Space (NEPC, 2013)
- ML R/P/POS Residential, Parkland and Public Open Space (NEPC, 2013)

Project No: 209497.00	Suburb: Wurrumiyanga, Bathurst Island	To: Envirolab Services
Project Manager: Stephen Jackson	Order Number:	Sampler: R.L
Email: Stephen.Jackson@douglaspartners.com.au		Attn: Gwenda Hayes
Turnaround time: <input checked="" type="checkbox"/> Standard <input type="checkbox"/> 72 hour <input type="checkbox"/> 48 hour <input type="checkbox"/> 24 hour <input type="checkbox"/> Same day		(08)89671201 GHayes@envirolab.com.au

Prior Storage: Fridge Freezer Esky Shelf **Do samples contain 'potential' HBM?** No Yes (If YES, then handle, transport and store in accordance with FPM HAZID)

Lab ID	Sample ID			Date Sampled	Sample Type	Container Type	Analytes										Notes/ Preservation/ Additional Requirements			
	Location / Other ID	Depth From	Depth To		S - soil W - water M - Material	G - glass P - plastic	Waste Classification 13a													
1	TP04	0.1		12/08/23	S	G/P	x													
2	TP20	0.2		9/08/23	S	G/P	x													
3	TP28	0.2		10/08/23	S	G/P	x													
4	TP42	0.2		14/08/23	S	G/P	x													
5	R1	-		-	S	G/P	x													
6	TP33	0.4		11/08/23	S	G/P	x													

Envirolab Laboratories

Job No. - **PEH1247**

Date Rec - **18 AUG 2023**

Time Rec - **11:10**

Rec. By - **[Signature]**

TAT Req - SAME 1/2/3/STD

Temp (cool) ambient **9°C**

Cooling - Ice / Ice pack / None

Security Seal - Yes / No

Metals to analyse:

Number of samples in container: **Transported to laboratory by:** Envirolab Down

Send results to: Douglas Partners Pty Ltd **17/8/23 11°C T118 - Ice Bricks.**

Address: **Phone:**

Relinquished by: **Date:** 17/8/23 **Signed:** [Signature]

LAB RECEIPT

Lab Ref. No:

Received by: [Signature]

Date & Time: 18/8/23

Signed: [Signature]



Certificate of Analysis PEH1247

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 - Wurrumiyanga, Bathurst Island
Number of Samples	6 Soil
Date Samples Received	18/08/2023
Date Samples Registered	18/08/2023

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	28/08/2023
Date of Issue	28/08/2023

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Authorisation Details

Asbestos Approved By	Analysed by Asbestos Approved Analyst: Lalanee Rupasinghe Analysed by Asbestos Approved Analyst: Shirleen Goh Authorised by Asbestos Approved Signatory: Thomas Edwards
Results Approved By	Heram Halim, Operations Manager Thomas Edwards, OHL Supervisor Travis Carey, Organics Supervisor
Laboratory Manager	Michael Kubiak

Certificate of Analysis PEH1247

Samples in this Report

Envirolab ID	Sample ID	Depth	Matrix	Date Sampled	Date Received
PEH1247-01	TP04	0.10	Soil	12/08/2023	18/08/2023
PEH1247-02	TP20	0.20	Soil	09/08/2023	18/08/2023
PEH1247-03	TP28	0.20	Soil	10/08/2023	18/08/2023
PEH1247-04	TP42	0.20	Soil	14/08/2023	18/08/2023
PEH1247-05	R1		Soil	18/08/2023	18/08/2023
PEH1247-06	TP33	0.40	Soil	11/08/2023	18/08/2023

Certificate of Analysis PEH1247

Volatile TRH and BTEX (Soil)

Envirolab ID Your Reference Date Sampled Depth	Units	PQL	PEH1247-01 TP04 12/08/2023 0.10	PEH1247-02 TP20 09/08/2023 0.20	PEH1247-03 TP28 10/08/2023 0.20	PEH1247-04 TP42 14/08/2023 0.20	PEH1247-05 R1 18/08/2023
TRH C6-C9	mg/kg	25	<25	<25	<25	<25	<25
TRH C6-C10	mg/kg	25	<25	<25	<25	<25	<25
TRH C6-C10 less BTEX (F1)	mg/kg	25	<25	<25	<25	<25	<25
Methyl tert butyl ether (MTBE)	mg/kg	0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Benzene	mg/kg	0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Toluene	mg/kg	0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Ethylbenzene	mg/kg	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
meta+para Xylene	mg/kg	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
ortho-Xylene	mg/kg	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Total Xylene	mg/kg	3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Naphthalene (value used in F2 calc)	mg/kg	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
<i>Surrogate aaa-Trifluorotoluene</i>	%		<i>95.9</i>	<i>100</i>	<i>80.6</i>	<i>101</i>	<i>97.3</i>

Envirolab ID Your Reference Date Sampled Depth	Units	PQL	PEH1247-06 TP33 11/08/2023 0.40
TRH C6-C9	mg/kg	25	<25
TRH C6-C10	mg/kg	25	<25
TRH C6-C10 less BTEX (F1)	mg/kg	25	<25
Methyl tert butyl ether (MTBE)	mg/kg	0.50	<0.50
Benzene	mg/kg	0.20	<0.20
Toluene	mg/kg	0.50	<0.50
Ethylbenzene	mg/kg	1.0	<1.0
meta+para Xylene	mg/kg	2.0	<2.0
ortho-Xylene	mg/kg	1.0	<1.0
Total Xylene	mg/kg	3.0	<3.0
Naphthalene (value used in F2 calc)	mg/kg	1.0	<1.0
<i>Surrogate aaa-Trifluorotoluene</i>	%		<i>109</i>

Certificate of Analysis PEH1247

Semi-volatile TRH (Soil)

Envirolab ID	Units	PQL	PEH1247-01	PEH1247-02	PEH1247-03	PEH1247-04	PEH1247-05
Your Reference			TP04	TP20	TP28	TP42	R1
Date Sampled			12/08/2023	09/08/2023	10/08/2023	14/08/2023	18/08/2023
Depth			0.10	0.20	0.20	0.20	
TRH C10-C14	mg/kg	50	<50	<50	<50	<50	<50
TRH C15-C28	mg/kg	100	<100	<100	<100	<100	<100
TRH C29-C36	mg/kg	100	<100	<100	<100	<100	<100
Total +ve TRH C10-C36	mg/kg	50	<50	<50	<50	<50	<50
TRH >C10-C16	mg/kg	50	<50	<50	<50	<50	<50
TRH >C10-C16 less Naphthalene F2	mg/kg	50	<50	<50	<50	<50	<50
TRH >C16-C34 (F3)	mg/kg	100	<100	<100	<100	<100	<100
TRH >C34-C40 (F4)	mg/kg	100	<100	<100	<100	<100	<100
Total +ve TRH >C10-C40	mg/kg	50	<50	<50	<50	<50	<50
<i>Surrogate o-Terphenyl</i>	%		<i>99.9</i>	<i>100</i>	<i>95.8</i>	<i>96.4</i>	<i>95.6</i>

Envirolab ID	Units	PQL	PEH1247-06
Your Reference			TP33
Date Sampled			11/08/2023
Depth			0.40
TRH C10-C14	mg/kg	50	<50
TRH C15-C28	mg/kg	100	<100
TRH C29-C36	mg/kg	100	<100
Total +ve TRH C10-C36	mg/kg	50	<50
TRH >C10-C16	mg/kg	50	<50
TRH >C10-C16 less Naphthalene F2	mg/kg	50	<50
TRH >C16-C34 (F3)	mg/kg	100	<100
TRH >C34-C40 (F4)	mg/kg	100	<100
Total +ve TRH >C10-C40	mg/kg	50	<50
<i>Surrogate o-Terphenyl</i>	%		<i>95.4</i>

Certificate of Analysis PEH1247

Polycyclic Aromatic Hydrocarbons (Soil)

Envirolab ID	Units	PQL	PEH1247-01	PEH1247-02	PEH1247-03	PEH1247-04	PEH1247-05
Your Reference			TP04	TP20	TP28	TP42	R1
Date Sampled			12/08/2023	09/08/2023	10/08/2023	14/08/2023	18/08/2023
Depth			0.10	0.20	0.20	0.20	
Naphthalene	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Acenaphthylene	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Acenaphthene	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Fluorene	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Phenanthrene	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Anthracene	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Fluoranthene	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Pyrene	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Benzo(a)anthracene	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Chrysene	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Benzo(b,j,k)fluoranthene	mg/kg	0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Benzo(a)pyrene	mg/kg	0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Indeno(1,2,3-c,d)pyrene	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Dibenzo(a,h)anthracene	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Benzo(g,h,i)perylene	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Total +ve PAH	mg/kg	0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Benzo(a)pyrene TEQ calc zero	mg/kg	0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Benzo(a)pyrene TEQ calc Half	mg/kg	0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Benzo(a)pyrene TEQ calc PQL	mg/kg	0.50	<0.50	<0.50	<0.50	<0.50	<0.50
<i>Surrogate p-Terphenyl-D14</i>	%		<i>85.7</i>	<i>87.6</i>	<i>84.1</i>	<i>80.5</i>	<i>83.6</i>

Envirolab ID	Units	PQL	PEH1247-06
Your Reference			TP33
Date Sampled			11/08/2023
Depth			0.40
Naphthalene	mg/kg	0.10	<0.10
Acenaphthylene	mg/kg	0.10	<0.10
Acenaphthene	mg/kg	0.10	<0.10
Fluorene	mg/kg	0.10	<0.10
Phenanthrene	mg/kg	0.10	<0.10
Anthracene	mg/kg	0.10	<0.10
Fluoranthene	mg/kg	0.10	<0.10
Pyrene	mg/kg	0.10	<0.10
Benzo(a)anthracene	mg/kg	0.10	<0.10
Chrysene	mg/kg	0.10	<0.10
Benzo(b,j,k)fluoranthene	mg/kg	0.20	<0.20
Benzo(a)pyrene	mg/kg	0.050	<0.050
Indeno(1,2,3-c,d)pyrene	mg/kg	0.10	<0.10
Dibenzo(a,h)anthracene	mg/kg	0.10	<0.10
Benzo(g,h,i)perylene	mg/kg	0.10	<0.10
Total +ve PAH	mg/kg	0.050	<0.050
Benzo(a)pyrene TEQ calc zero	mg/kg	0.50	<0.50
Benzo(a)pyrene TEQ calc Half	mg/kg	0.50	<0.50
Benzo(a)pyrene TEQ calc PQL	mg/kg	0.50	<0.50
<i>Surrogate p-Terphenyl-D14</i>	%		<i>85.6</i>

Certificate of Analysis PEH1247

Organochlorine Pesticides (Soil)

Envirolab ID Your Reference Date Sampled Depth	Units	PQL	PEH1247-01 TP04 12/08/2023 0.10	PEH1247-02 TP20 09/08/2023 0.20	PEH1247-03 TP28 10/08/2023 0.20	PEH1247-04 TP42 14/08/2023 0.20	PEH1247-05 R1 18/08/2023
alpha-BHC	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Hexachlorobenzene	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
beta-BHC	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
gamma-BHC	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
delta-BHC	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Heptachlor	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Aldrin	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Heptachlor epoxide	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
trans-Chlordane	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
cis-Chlordane	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Endosulfan I	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
4,4'-DDE	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Dieldrin	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Endrin	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
4,4'-DDD	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Endosulfan II	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Endrin aldehyde	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
4,4'-DDT	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Endosulfan sulfate	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Endrin ketone	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Methoxychlor	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Mirex	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Total +ve OCP	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
<i>Surrogate 2-Chlorophenol-D4</i>	%		<i>92.7</i>	<i>93.7</i>	<i>94.0</i>	<i>89.8</i>	<i>91.8</i>

Envirolab ID Your Reference Date Sampled Depth	Units	PQL	PEH1247-06 TP33 11/08/2023 0.40
alpha-BHC	mg/kg	0.10	<0.10
Hexachlorobenzene	mg/kg	0.10	<0.10
beta-BHC	mg/kg	0.10	<0.10
gamma-BHC	mg/kg	0.10	<0.10
delta-BHC	mg/kg	0.10	<0.10
Heptachlor	mg/kg	0.10	<0.10
Aldrin	mg/kg	0.10	<0.10
Heptachlor epoxide	mg/kg	0.10	<0.10
trans-Chlordane	mg/kg	0.10	<0.10
cis-Chlordane	mg/kg	0.10	<0.10
Endosulfan I	mg/kg	0.10	<0.10
4,4'-DDE	mg/kg	0.10	<0.10
Dieldrin	mg/kg	0.10	<0.10
Endrin	mg/kg	0.10	<0.10
4,4'-DDD	mg/kg	0.10	<0.10
Endosulfan II	mg/kg	0.10	<0.10
Endrin aldehyde	mg/kg	0.10	<0.10

Certificate of Analysis PEH1247

Organochlorine Pesticides (Soil)

Envirolab ID	Units	PQL	PEH1247-06
Your Reference			TP33
Date Sampled			11/08/2023
Depth			0.40
4,4'-DDT	mg/kg	0.10	<0.10
Endosulfan sulfate	mg/kg	0.10	<0.10
Endrin ketone	mg/kg	0.10	<0.10
Methoxychlor	mg/kg	0.10	<0.10
Mirex	mg/kg	0.10	<0.10
Total +ve OCP	mg/kg	0.10	<0.10
Surrogate 2-Chlorophenol-D4	%		91.8

Certificate of Analysis PEH1247

Organophosphorus Pesticides (Soil)

Envirolab ID Your Reference Date Sampled Depth	Units	PQL	PEH1247-01 TP04 12/08/2023 0.10	PEH1247-02 TP20 09/08/2023 0.20	PEH1247-03 TP28 10/08/2023 0.20	PEH1247-04 TP42 14/08/2023 0.20	PEH1247-05 R1 18/08/2023
Dichlorvos	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Dimethoate	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Diazinon	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Chlorpyrifos-methyl	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Ronnel	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Fenitrothion	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Malathion	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Chlorpyrifos	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Parathion	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Bromophos-ethyl	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Ethion	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Coumaphos	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Disulfoton	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Fenamiphos	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Fenthion	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Methidathion	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Mevinphos	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Parathion-methyl	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Phorate	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Phosalone	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Azinphos-methyl	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
<i>Surrogate 2-Chlorophenol-D4</i>	%		<i>92.7</i>	<i>93.7</i>	<i>94.0</i>	<i>89.8</i>	<i>91.8</i>

Envirolab ID Your Reference Date Sampled Depth	Units	PQL	PEH1247-06 TP33 11/08/2023 0.40
Dichlorvos	mg/kg	0.10	<0.10
Dimethoate	mg/kg	0.10	<0.10
Diazinon	mg/kg	0.10	<0.10
Chlorpyrifos-methyl	mg/kg	0.10	<0.10
Ronnel	mg/kg	0.10	<0.10
Fenitrothion	mg/kg	0.10	<0.10
Malathion	mg/kg	0.10	<0.10
Chlorpyrifos	mg/kg	0.10	<0.10
Parathion	mg/kg	0.10	<0.10
Bromophos-ethyl	mg/kg	0.10	<0.10
Ethion	mg/kg	0.10	<0.10
Coumaphos	mg/kg	0.10	<0.10
Disulfoton	mg/kg	0.10	<0.10
Fenamiphos	mg/kg	0.10	<0.10
Fenthion	mg/kg	0.10	<0.10
Methidathion	mg/kg	0.10	<0.10
Mevinphos	mg/kg	0.10	<0.10
Parathion-methyl	mg/kg	0.10	<0.10
Phorate	mg/kg	0.10	<0.10

Certificate of Analysis PEH1247

Organophosphorus Pesticides (Soil)

Envirolab ID	Units	PQL	PEH1247-06
Your Reference			TP33
Date Sampled			11/08/2023
Depth			0.40
Phosalone	mg/kg	0.10	<0.10
Azinphos-methyl	mg/kg	0.10	<0.10
Surrogate 2-Chlorophenol-D4	%		91.8

Certificate of Analysis PEH1247

Polychlorinated Biphenyls (Soil)

Envirolab ID	Units	PQL	PEH1247-01	PEH1247-02	PEH1247-03	PEH1247-04	PEH1247-05
Your Reference			TP04	TP20	TP28	TP42	R1
Date Sampled			12/08/2023	09/08/2023	10/08/2023	14/08/2023	18/08/2023
Depth			0.10	0.20	0.20	0.20	
Aroclor 1016	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Aroclor 1221	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Aroclor 1232	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Aroclor 1242	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Aroclor 1248	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Aroclor 1254	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Aroclor 1260	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Total +ve PCB (1016-1260)	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
<i>Surrogate 2-Fluorobiphenyl</i>	%		94.6	97.1	95.6	91.3	93.5

Envirolab ID	Units	PQL	PEH1247-06
Your Reference			TP33
Date Sampled			11/08/2023
Depth			0.40
Aroclor 1016	mg/kg	0.10	<0.10
Aroclor 1221	mg/kg	0.10	<0.10
Aroclor 1232	mg/kg	0.10	<0.10
Aroclor 1242	mg/kg	0.10	<0.10
Aroclor 1248	mg/kg	0.10	<0.10
Aroclor 1254	mg/kg	0.10	<0.10
Aroclor 1260	mg/kg	0.10	<0.10
Total +ve PCB (1016-1260)	mg/kg	0.10	<0.10
<i>Surrogate 2-Fluorobiphenyl</i>	%		94.6

Certificate of Analysis PEH1247

Acid Extractable Metals (Soil)

Envirolab ID	Units	PQL	PEH1247-01	PEH1247-02	PEH1247-03	PEH1247-04	PEH1247-05
Your Reference			TP04	TP20	TP28	TP42	R1
Date Sampled			12/08/2023	09/08/2023	10/08/2023	14/08/2023	18/08/2023
Depth			0.10	0.20	0.20	0.20	
Arsenic	mg/kg	4.0	6.3	19	37	23	31
Cadmium	mg/kg	0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Chromium	mg/kg	1.0	38	60	150	140	90
Copper	mg/kg	1.0	2.8	3.2	1.6	<1.0	<1.0
Mercury	mg/kg	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nickel	mg/kg	1.0	4.3	5.4	6.6	5.4	5.1
Lead	mg/kg	1.0	12	20	22	20	22
Zinc	mg/kg	1.0	5.5	3.4	11	6.5	4.9

Envirolab ID	Units	PQL	PEH1247-06
Your Reference			TP33
Date Sampled			11/08/2023
Depth			0.40
Arsenic	mg/kg	4.0	39
Cadmium	mg/kg	0.40	<0.40
Chromium	mg/kg	1.0	250
Copper	mg/kg	1.0	1.1
Mercury	mg/kg	0.10	<0.10
Nickel	mg/kg	1.0	5.1
Lead	mg/kg	1.0	20
Zinc	mg/kg	1.0	5.2

Certificate of Analysis PEH1247

Inorganics - Moisture (Soil)

Envirolab ID	Units	PQL	PEH1247-01	PEH1247-02	PEH1247-03	PEH1247-04	PEH1247-05
Your Reference			TP04	TP20	TP28	TP42	R1
Date Sampled			12/08/2023	09/08/2023	10/08/2023	14/08/2023	18/08/2023
Depth			0.10	0.20	0.20	0.20	

Moisture	%	0.10	7.0	10	10	8.8	10
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Envirolab ID	Units	PQL	PEH1247-06
Your Reference			TP33
Date Sampled			11/08/2023
Depth			0.40

Moisture	%	0.10	11
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Certificate of Analysis PEH1247

TCLP Extraction (Soil)

Envirolab ID	Units	PQL	PEH1247-01	PEH1247-02	PEH1247-03	PEH1247-04	PEH1247-05
Your Reference			TP04	TP20	TP28	TP42	R1
Date Sampled			12/08/2023	09/08/2023	10/08/2023	14/08/2023	18/08/2023
Depth			0.10	0.20	0.20	0.20	

pH of final leachate	pH units		5.4	5.4	5.4	5.4	5.4
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Envirolab ID	Units	PQL	PEH1247-06
Your Reference			TP33
Date Sampled			11/08/2023
Depth			0.40

pH of final leachate	pH units		5.4
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Certificate of Analysis PEH1247

TCLP Metals (Soil)

Envirolab ID	Units	PQL	PEH1247-01	PEH1247-02	PEH1247-03	PEH1247-04	PEH1247-05
Your Reference			TP04	TP20	TP28	TP42	R1
Date Sampled			12/08/2023	09/08/2023	10/08/2023	14/08/2023	18/08/2023
Depth			0.10	0.20	0.20	0.20	
Arsenic	mg/L	0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Cadmium	mg/L	0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Chromium	mg/L	0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Copper	mg/L	0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Mercury	mg/L	0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Nickel	mg/L	0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Lead	mg/L	0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Zinc	mg/L	0.020	<0.020	<0.020	<0.020	<0.020	<0.020

Envirolab ID	Units	PQL	PEH1247-06
Your Reference			TP33
Date Sampled			11/08/2023
Depth			0.40
Arsenic	mg/L	0.050	<0.050
Cadmium	mg/L	0.010	<0.010
Chromium	mg/L	0.010	<0.010
Copper	mg/L	0.010	<0.010
Mercury	mg/L	0.000050	<0.000050
Nickel	mg/L	0.020	<0.020
Lead	mg/L	0.030	<0.030
Zinc	mg/L	0.020	<0.020

Certificate of Analysis PEH1247

TCLP Polycyclic Aromatic Hydrocarbons (Soil)

Envirolab ID Your Reference Date Sampled Depth	Units	PQL	PEH1247-01 TP04 12/08/2023 0.10	PEH1247-02 TP20 09/08/2023 0.20	PEH1247-03 TP28 10/08/2023 0.20	PEH1247-04 TP42 14/08/2023 0.20	PEH1247-05 R1 18/08/2023
Naphthalene	mg/L	0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Acenaphthylene	mg/L	0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Acenaphthene	mg/L	0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Fluorene	mg/L	0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Phenanthrene	mg/L	0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Anthracene	mg/L	0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Fluoranthene	mg/L	0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Pyrene	mg/L	0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Benzo(a)anthracene	mg/L	0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Chrysene	mg/L	0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Benzo(b,j,k)fluoranthene	mg/L	0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Benzo(a)pyrene	mg/L	0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Indeno(1,2,3-c,d)pyrene	mg/L	0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Dibenzo(a,h)anthracene	mg/L	0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Benzo(g,h,i)perylene	mg/L	0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
<i>Surrogate p-Terphenyl-D14</i>	%		<i>106</i>	<i>98.8</i>	<i>102</i>	<i>89.5</i>	<i>105</i>

Envirolab ID Your Reference Date Sampled Depth	Units	PQL	PEH1247-06 TP33 11/08/2023 0.40
Naphthalene	mg/L	0.00010	<0.00010
Acenaphthylene	mg/L	0.00010	<0.00010
Acenaphthene	mg/L	0.00010	<0.00010
Fluorene	mg/L	0.00010	<0.00010
Phenanthrene	mg/L	0.00010	<0.00010
Anthracene	mg/L	0.00010	<0.00010
Fluoranthene	mg/L	0.00010	<0.00010
Pyrene	mg/L	0.00010	<0.00010
Benzo(a)anthracene	mg/L	0.00010	<0.00010
Chrysene	mg/L	0.00010	<0.00010
Benzo(b,j,k)fluoranthene	mg/L	0.00020	<0.00020
Benzo(a)pyrene	mg/L	0.00010	<0.00010
Indeno(1,2,3-c,d)pyrene	mg/L	0.00010	<0.00010
Dibenzo(a,h)anthracene	mg/L	0.00010	<0.00010
Benzo(g,h,i)perylene	mg/L	0.00010	<0.00010
<i>Surrogate p-Terphenyl-D14</i>	%		<i>97.5</i>

Certificate of Analysis PEH1247

Asbestos ID in Soil

Client ID	Envirolab ID	Description	Result
TP04 0.10	PEH1247-01	950g Soil	No Asbestos Detected >0.1g/kg No trace fibres detected Organic fibres detected FA and AF Est. <0.001% w/w
TP20 0.20	PEH1247-02	9050g Soil	No Asbestos Detected >0.1g/kg No trace fibres detected Organic fibres detected FA and AF Est. <0.001% w/w
TP28 0.20	PEH1247-03	930g Soil	No Asbestos Detected >0.1g/kg No trace fibres detected Organic fibres detected Synthetic Mineral Fibres detected FA and AF Est. <0.001% w/w
TP42 0.20	PEH1247-04	690g Soil	No Asbestos Detected >0.1g/kg No trace fibres detected Organic fibres detected FA and AF Est. <0.001% w/w
R1	PEH1247-05	700g Soil	No Asbestos Detected >0.1g/kg No trace fibres detected Organic fibres detected FA and AF Est. <0.001% w/w
TP33 0.40	PEH1247-06	1280g Soil	No Asbestos Detected >0.1g/kg No trace fibres detected Organic fibres detected FA and AF Est. <0.001% w/w

Certificate of Analysis PEH1247

Method Summary

Method ID	Methodology Summary
ASB-001_NEPM	<p>Asbestos ID - Identification of asbestos in soil samples using Polarised Light Microscopy and Dispersion Staining Techniques. Minimum 500mL soil sample was analysed as recommended by "National Environment Protection (Assessment of site contamination) Measure, Schedule B1 and "The Guidelines from the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia - May 2009" with a reporting limit of 0.1g/kg (0.01% w/w) as per Australian Standard AS4964-2004.</p> <p>Results reported denoted with * are outside our scope of NATA accreditation.</p> <p>NOTE #1 Total Asbestos g/kg was analysed and reported as per Australian Standard AS4964 (This is the sum of ACM >7mm, <7mm and FA/AF)</p> <p>NOTE#2 The screening level of 0.001% w/w asbestos in soil for FA and AF only applies where the FA and AF are able to be quantified by gravimetric procedures. This screening level is not applicable to free fibres.</p> <p>Estimation = Estimated asbestos weight</p> <p>Results reported with "--" is equivalent to no visible asbestos identified using Polarised Light microscopy and Dispersion Staining Techniques.</p>
INORG-004	<p>Toxicity Characteristic Leaching Procedure (TCLP) based upon AS 4439 and USEPA 1311. Additional information as required in AS4439.3 section 10 can be provided on request. Please note that the mass used may be scaled down from the default based on the sample mass available.</p>
INORG-008	<p>Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.</p>
METALS-020	<p>Determination of various metals by ICP-OES.</p>
METALS-020_TCLP	<p>Determination of various metals by ICP-OES following buffer determination as per USEPA 1311 and hence AS 4439.3. Extraction Fluid 1 refers to the pH 5.0 buffer and Extraction Fluid 2 is the pH 2.9 buffer.</p>
METALS-021	<p>Determination of Mercury by Cold Vapour AAS.</p>
METALS-021_TCLP	<p>Mercury by CV-AAS</p>
ORG-020	<p>Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).</p>
ORG-022	<p>Determination of semi-volatile organic compounds (SVOCs) by GC-MS. Water samples are extracted by LLE and soils using DCM/Acetone/Methanol.</p>
ORG-022_OC	<p>Determination of semi-volatile organic compounds (SVOCs) by GC-MS. Water samples are extracted by LLE and soils using DCM/Acetone/Methanol.</p>
ORG-022_PAH	<p>Determination of semi-volatile organic compounds (SVOCs) by GC-MS. Water samples are extracted by LLE and solids using DCM/Acetone/Methanol. For PAHs:- Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. 1. 'TEQ PQL' values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'TEQ zero' values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'TEQ half PQL' values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, for Total +ve calculations, the PQL is reflective of the lowest individual PQL and therefore, for example, "Total +ve PAHs" is simply a sum of the positive individual PAHs.</p>
ORG-022_TCLP	<p>Determination of semi-volatile organic compounds (SVOCs) by GC-MS. TCLP extracts of soils are extracted by LLE.</p>
ORG-023_F1_TOT	<p>Determination of volatile organic compounds (VOCs) by P&T-GC-MS. Water samples are analysed directly by purge and trap GC-MS. Solids are extracted with Methanol, diluted and analysed by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater. Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.</p>

Certificate of Analysis PEH1247

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.

Certificate of Analysis PEH1247

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 PEH1247

Client Details

Client	Douglas Partners Pty Ltd (Darwin)
Your Reference	209497.00 - Wurrumiyanga, Bathurst Island
Date Issued	28/08/2023

Recommended Holding Time Compliance

No recommended holding time exceedances

Quality Control and QC Frequency

QC Type	Compliant	Details
Blank	Yes	No Outliers
LCS	Yes	No Outliers
Duplicates	No	Duplicate Outliers Exist - See detailed list below
Matrix Spike	No	Matrix Spike Outliers Exist - See detailed list below
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 PEH1247

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
VTRH&MBTEXN Soil	2	09/08/2023	22/08/2023	23/08/2023	Yes
	3	10/08/2023	22/08/2023	23/08/2023	Yes
	6	11/08/2023	22/08/2023	23/08/2023	Yes
	1	12/08/2023	22/08/2023	23/08/2023	Yes
	4	14/08/2023	22/08/2023	23/08/2023	Yes
	5	18/08/2023	22/08/2023	23/08/2023	Yes
STRH Soil	2	09/08/2023	22/08/2023	23/08/2023	Yes
	3	10/08/2023	22/08/2023	22/08/2023	Yes
	6	11/08/2023	22/08/2023	22/08/2023	Yes
	1	12/08/2023	22/08/2023	23/08/2023	Yes
	4	14/08/2023	22/08/2023	22/08/2023	Yes
	5	18/08/2023	22/08/2023	22/08/2023	Yes
PAH Soil	2	09/08/2023	22/08/2023	23/08/2023	Yes
	3	10/08/2023	22/08/2023	23/08/2023	Yes
	6	11/08/2023	22/08/2023	23/08/2023	Yes
	1	12/08/2023	22/08/2023	23/08/2023	Yes
	4	14/08/2023	22/08/2023	23/08/2023	Yes
	5	18/08/2023	22/08/2023	23/08/2023	Yes
OCP Soil	2	09/08/2023	22/08/2023	23/08/2023	Yes
	3	10/08/2023	22/08/2023	23/08/2023	Yes
	6	11/08/2023	22/08/2023	23/08/2023	Yes
	1	12/08/2023	22/08/2023	23/08/2023	Yes
	4	14/08/2023	22/08/2023	23/08/2023	Yes
	5	18/08/2023	22/08/2023	23/08/2023	Yes
OPP (21 list) Soil	2	09/08/2023	22/08/2023	23/08/2023	Yes
	3	10/08/2023	22/08/2023	23/08/2023	Yes
	6	11/08/2023	22/08/2023	23/08/2023	Yes
	1	12/08/2023	22/08/2023	23/08/2023	Yes
	4	14/08/2023	22/08/2023	23/08/2023	Yes
	5	18/08/2023	22/08/2023	23/08/2023	Yes
PCB Soil	2	09/08/2023	22/08/2023	23/08/2023	Yes
	3	10/08/2023	22/08/2023	23/08/2023	Yes
	6	11/08/2023	22/08/2023	23/08/2023	Yes
	1	12/08/2023	22/08/2023	23/08/2023	Yes
	4	14/08/2023	22/08/2023	23/08/2023	Yes
	5	18/08/2023	22/08/2023	23/08/2023	Yes
Metals Soil	2	09/08/2023	22/08/2023	24/08/2023	Yes
	3	10/08/2023	22/08/2023	24/08/2023	Yes
	6	11/08/2023	22/08/2023	24/08/2023	Yes
	1	12/08/2023	22/08/2023	24/08/2023	Yes
	4	14/08/2023	22/08/2023	24/08/2023	Yes
	5	18/08/2023	22/08/2023	24/08/2023	Yes
Metals-Hg Soil	2	09/08/2023	22/08/2023	25/08/2023	Yes
	3	10/08/2023	22/08/2023	25/08/2023	Yes

Data Quality Assessment Summary PEH1247

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
	6	11/08/2023	22/08/2023	25/08/2023	Yes
	1	12/08/2023	22/08/2023	25/08/2023	Yes
	4	14/08/2023	22/08/2023	25/08/2023	Yes
	5	18/08/2023	22/08/2023	25/08/2023	Yes
Moisture Soil	2	09/08/2023	22/08/2023	22/08/2023	Yes
	3	10/08/2023	22/08/2023	22/08/2023	Yes
	6	11/08/2023	22/08/2023	22/08/2023	Yes
	1	12/08/2023	22/08/2023	22/08/2023	Yes
	4	14/08/2023	22/08/2023	22/08/2023	Yes
	5	18/08/2023	22/08/2023	22/08/2023	Yes
Asbestos ID - NEPM Soil	2	09/08/2023	19/08/2023	21/08/2023	Yes
	3	10/08/2023	19/08/2023	21/08/2023	Yes
	6	11/08/2023	19/08/2023	21/08/2023	Yes
	1	12/08/2023	19/08/2023	21/08/2023	Yes
	4	14/08/2023	19/08/2023	21/08/2023	Yes
	5	18/08/2023	19/08/2023	21/08/2023	Yes
TCLP Extraction Soil	2	09/08/2023	22/08/2023	25/08/2023	Yes
	3	10/08/2023	22/08/2023	25/08/2023	Yes
	6	11/08/2023	22/08/2023	25/08/2023	Yes
	1	12/08/2023	22/08/2023	25/08/2023	Yes
	4	14/08/2023	22/08/2023	25/08/2023	Yes
	5	18/08/2023	22/08/2023	25/08/2023	Yes
TCLP Metals Soil	2	09/08/2023	24/08/2023	25/08/2023	Yes
	3	10/08/2023	24/08/2023	25/08/2023	Yes
	6	11/08/2023	24/08/2023	25/08/2023	Yes
	1	12/08/2023	24/08/2023	25/08/2023	Yes
	4	14/08/2023	24/08/2023	25/08/2023	Yes
	5	18/08/2023	24/08/2023	25/08/2023	Yes
TCLP Metals-Hg Soil	2	09/08/2023	24/08/2023	25/08/2023	Yes
	3	10/08/2023	24/08/2023	25/08/2023	Yes
	6	11/08/2023	24/08/2023	25/08/2023	Yes
	1	12/08/2023	24/08/2023	25/08/2023	Yes
	4	14/08/2023	24/08/2023	25/08/2023	Yes
	5	18/08/2023	24/08/2023	25/08/2023	Yes
PAH TCLP Soil	2	09/08/2023	23/08/2023	25/08/2023	Yes
	3	10/08/2023	23/08/2023	25/08/2023	Yes
	6	11/08/2023	23/08/2023	25/08/2023	Yes
	1	12/08/2023	23/08/2023	25/08/2023	Yes
	4	14/08/2023	23/08/2023	25/08/2023	Yes
	5	18/08/2023	23/08/2023	25/08/2023	Yes

Data Quality Assessment Summary PEH1247

Outliers: Duplicates

METALS-020 | Acid Extractable Metals (Soil) | Batch BEH2371

Sample ID	Duplicate ID	Analyte	% Limits	RPD
BEH2371-DUP2#	DUP2	Copper	40.00	114[5]
BEH2371-DUP2#	DUP2	Zinc	40.00	111[5]

Outliers: Matrix Spike

METALS-020 | Acid Extractable Metals (Soil) | Batch BEH2371

Sample ID	Analyte	% Limits	% Recovery
BEH2371-MS1#	Nickel	70 - 130	138

Quality Control PEH1247

ORG-023_F1_TOT | Volatile TRH and BTEX (Soil) | Batch BEH2374

Analyte	Units	PQL	Blank	DUP1		DUP2		LCS %	Spike %
				BEH2374-DUP1#	BEH2374-DUP2#	BEH2374-DUP2#	BEH2374-MS1#		
				Samp QC RPD %	Samp QC RPD %				
TRH C6-C9	mg/kg	25	<25	<125 <120 [NA] [2]	<25 <25 [NA]	97.8	93.6		
TRH C6-C10	mg/kg	25	<25	<125 <120 [NA] [2]	<25 <25 [NA]	96.2	94.8		
TRH C6-C10 less BTEX (F1)	mg/kg	25	<25	<125 <120 [NA] [2]	<25 <25 [NA]	[NA]	[NA]		
Methyl tert butyl ether (MTBE)	mg/kg	0.50	<0.50			[NA]	[NA]		
Benzene	mg/kg	0.20	<0.20	<1.0 <1.0 [NA] [2]	<0.20 <0.20 [NA]	95.8	103		
Toluene	mg/kg	0.50	<0.50	<2.5 <2.5 [NA] [2]	<0.50 <0.50 [NA]	94.6	103		
Ethylbenzene	mg/kg	1.0	<1.0	<5.0 <5.0 [NA] [2]	<1.0 <1.0 [NA]	96.7	105		
meta+para Xylene	mg/kg	2.0	<2.0	<10 <10 [NA] [2]	<2.0 <2.0 [NA]	93.2	102		
ortho-Xylene	mg/kg	1.0	<1.0	<5.0 <5.0 [NA] [2]	<1.0 <1.0 [NA]	96.2	106		
Total Xylene	mg/kg	3.0	<3.0	<15 <15 [NA] [2]	<3.0 <3.0 [NA]	[NA]	[NA]		
Naphthalene (value used in F2 calc)	mg/kg	1.0	<1.0	<5.0 <5.0 [NA] [2]	<1.0 <1.0 [NA]	[NA]	[NA]		
Surrogate <i>aaa-Trifluorotoluene</i>	%		112	78.1 / 104	101 / 111	99.3	92.6		

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

ORG-020 | Semi-volatile TRH (Soil) | Batch BEH2377

Analyte	Units	PQL	Blank	DUP1		DUP2		LCS %	Spike %
				BEH2377-DUP1#	BEH2377-DUP2#	BEH2377-DUP2#	BEH2377-MS1#		
				Samp QC RPD %	Samp QC RPD %				
TRH C10-C14	mg/kg	50	<50	415 457 9.52	<50 <50 [NA]	83.7	81.9		
TRH C15-C28	mg/kg	100	<100	7800 8630 10.2	<100 <100 [NA]	87.4	89.3		
TRH C29-C36	mg/kg	100	<100	3990 4760 17.6	<100 <100 [NA] [4]	75.7	83.3		
TRH >C10-C16	mg/kg	50	<50	923 1030 11.4	<50 <50 [NA]	84.2	82.8		
TRH >C16-C34 (F3)	mg/kg	100	<100	10300 11700 12.4	<100 <100 [NA] [4]	76.7	79.2		
TRH >C34-C40 (F4)	mg/kg	100	<100	3000 3820 24.1	<100 <100 [NA] [4]	84.7	87.5		
Surrogate <i>o-Terphenyl</i>	%		97.4	## ## [NA] [1]	95.1 / 96.6	95.1	86.1		

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

ORG-022_PAH | Polycyclic Aromatic Hydrocarbons (Soil) | Batch BEH2377

Analyte	Units	PQL	Blank	DUP1		DUP2		LCS %	Spike %
				BEH2377-DUP1#	BEH2377-DUP2#	BEH2377-DUP2#	BEH2377-MS2#		
				Samp QC RPD %	Samp QC RPD %				
Naphthalene	mg/kg	0.10	<0.10	<0.20 <0.20 [NA] [3]	<0.10 <0.10 [NA]	97.0	109		
Acenaphthylene	mg/kg	0.10	<0.10	<0.10 <0.10 [NA]	<0.10 <0.10 [NA]	[NA]	[NA]		
Acenaphthene	mg/kg	0.10	<0.10	<0.10 <0.10 [NA]	<0.10 <0.10 [NA]	93.3	102		
Fluorene	mg/kg	0.10	<0.10	<0.10 <0.10 [NA]	<0.10 <0.10 [NA]	100	108		
Phenanthrene	mg/kg	0.10	<0.10	<0.10 <0.10 [NA]	<0.10 <0.10 [NA]	96.7	106		
Anthracene	mg/kg	0.10	<0.10	<0.10 <0.10 [NA]	<0.10 <0.10 [NA]	[NA]	[NA]		
Fluoranthene	mg/kg	0.10	<0.10	<0.10 <0.10 [NA]	<0.10 <0.10 [NA]	95.3	108		
Pyrene	mg/kg	0.10	<0.10	0.208 0.211 1.10	<0.10 <0.10 [NA]	91.2	99.9		
Benzo(a)anthracene	mg/kg	0.10	<0.10	<0.10 <0.10 [NA]	<0.10 <0.10 [NA]	[NA]	[NA]		
Chrysene	mg/kg	0.10	<0.10	<0.10 <0.10 [NA]	<0.10 <0.10 [NA]	96.0	71.8		
Benzo(b,j,k)fluoranthene	mg/kg	0.20	<0.20	<0.20 <0.20 [NA]	<0.20 <0.20 [NA]	[NA]	[NA]		
Benzo(a)pyrene	mg/kg	0.050	<0.050	<0.050 <0.050 [NA]	<0.050 <0.050 [NA]	101	115		
Indeno(1,2,3-c,d)pyrene	mg/kg	0.10	<0.10	<0.10 <0.10 [NA]	<0.10 <0.10 [NA]	[NA]	[NA]		
Dibenzo(a,h)anthracene	mg/kg	0.10	<0.10	<0.10 <0.10 [NA]	<0.10 <0.10 [NA]	[NA]	[NA]		
Benzo(g,h,i)perylene	mg/kg	0.10	<0.10	<0.10 <0.10 [NA]	<0.10 <0.10 [NA]	[NA]	[NA]		
Surrogate <i>p-Terphenyl-D14</i>	%		89.2	98.3 / 96.7	84.5 / 85.5	88.7	80.2		

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

Quality Control PEH1247

ORG-022_OC | Organochlorine Pesticides (Soil) | Batch BEH2377

Analyte	Units	PQL	Blank	DUP1		DUP2		LCS %	Spike %
				BEH2377-DUP1#	BEH2377-DUP2#	BEH2377-DUP1#	BEH2377-DUP2#		
				Samp QC RPD %	Samp QC RPD %				
alpha-BHC	mg/kg	0.10	<0.10	<0.10	<0.10 [NA]	<0.10	<0.10 [NA]	95.0	102
Hexachlorobenzene	mg/kg	0.10	<0.10	<0.10	<0.10 [NA]	<0.10	<0.10 [NA]	[NA]	[NA]
beta-BHC	mg/kg	0.10	<0.10	<0.10	<0.10 [NA]	<0.10	<0.10 [NA]	89.9	95.3
gamma-BHC	mg/kg	0.10	<0.10	<0.10	<0.10 [NA]	<0.10	<0.10 [NA]	[NA]	[NA]
delta-BHC	mg/kg	0.10	<0.10	<0.10	<0.10 [NA]	<0.10	<0.10 [NA]	[NA]	[NA]
Heptachlor	mg/kg	0.10	<0.10	<0.10	<0.10 [NA]	<0.10	<0.10 [NA]	110	129
Aldrin	mg/kg	0.10	<0.10	<0.10	<0.10 [NA]	<0.10	<0.10 [NA]	91.8	111
Heptachlor epoxide	mg/kg	0.10	<0.10	<0.10	<0.10 [NA]	<0.10	<0.10 [NA]	90.1	106
trans-Chlordane	mg/kg	0.10	<0.10	<0.10	<0.10 [NA]	<0.10	<0.10 [NA]	[NA]	[NA]
cis-Chlordane	mg/kg	0.10	<0.10	<0.10	<0.10 [NA]	<0.10	<0.10 [NA]	[NA]	[NA]
Endosulfan I	mg/kg	0.10	<0.10	<0.10	<0.10 [NA]	<0.10	<0.10 [NA]	[NA]	[NA]
4,4'-DDE	mg/kg	0.10	<0.10	<0.10	<0.10 [NA]	<0.10	<0.10 [NA]	86.9	103
Dieldrin	mg/kg	0.10	<0.10	<0.10	<0.10 [NA]	<0.10	<0.10 [NA]	90.8	102
Endrin	mg/kg	0.10	<0.10	<0.10	<0.10 [NA]	<0.10	<0.10 [NA]	85.4	112
4,4'-DDD	mg/kg	0.10	<0.10	<0.10	<0.10 [NA]	<0.10	<0.10 [NA]	88.2	92.6
Endosulfan II	mg/kg	0.10	<0.10	<0.10	<0.10 [NA]	<0.10	<0.10 [NA]	[NA]	[NA]
Endrin aldehyde	mg/kg	0.10	<0.10	<0.10	<0.10 [NA]	<0.10	<0.10 [NA]	[NA]	[NA]
4,4'-DDT	mg/kg	0.10	<0.10	<0.10	<0.10 [NA]	<0.10	<0.10 [NA]	[NA]	[NA]
Endosulfan sulfate	mg/kg	0.10	<0.10	<0.10	<0.10 [NA]	<0.10	<0.10 [NA]	94.8	88.4
Endrin ketone	mg/kg	0.10	<0.10	<0.10	<0.10 [NA]	<0.10	<0.10 [NA]	[NA]	[NA]
Methoxychlor	mg/kg	0.10	<0.10	<0.10	<0.10 [NA]	<0.10	<0.10 [NA]	[NA]	[NA]
Mirex	mg/kg	0.10	<0.10	<0.10	<0.10 [NA]	<0.10	<0.10 [NA]	[NA]	[NA]
<i>Surrogate 2-Chlorophenol-D4</i>	%		92.6		91.7/93.6		93.3/95.1	95.9	85.9

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

ORG-022 | Organophosphorus Pesticides (Soil) | Batch BEH2377

Analyte	Units	PQL	Blank	DUP1		DUP2		LCS %	Spike %
				BEH2377-DUP1#	BEH2377-DUP2#	BEH2377-DUP1#	BEH2377-DUP2#		
				Samp QC RPD %	Samp QC RPD %				
Dichlorvos	mg/kg	0.10	<0.10	<0.10	<0.10 [NA]	<0.10	<0.10 [NA]	115	132
Dimethoate	mg/kg	0.10	<0.10	<0.10	<0.10 [NA]	<0.10	<0.10 [NA]	[NA]	[NA]
Diazinon	mg/kg	0.10	<0.10	<0.10	<0.10 [NA]	<0.10	<0.10 [NA]	[NA]	[NA]
Chlorpyrifos-methyl	mg/kg	0.10	<0.10	<0.10	<0.10 [NA]	<0.10	<0.10 [NA]	92.0	101
Ronnel	mg/kg	0.10	<0.10	<0.10	<0.10 [NA]	<0.10	<0.10 [NA]	91.3	92.6
Fenitrothion	mg/kg	0.10	<0.10	<0.10	<0.10 [NA]	<0.10	<0.10 [NA]	90.9	101
Malathion	mg/kg	0.10	<0.10	<0.10	<0.10 [NA]	<0.10	<0.10 [NA]	107	126
Chlorpyrifos	mg/kg	0.10	<0.10	<0.10	<0.10 [NA]	<0.10	<0.10 [NA]	88.0	103
Parathion	mg/kg	0.10	<0.10	<0.10	<0.10 [NA]	<0.10	<0.10 [NA]	93.4	132
Bromophos-ethyl	mg/kg	0.10	<0.10	<0.10	<0.10 [NA]	<0.10	<0.10 [NA]	[NA]	[NA]
Ethion	mg/kg	0.10	<0.10	<0.10	<0.10 [NA]	<0.10	<0.10 [NA]	90.9	112
Coumaphos	mg/kg	0.10	<0.10	<0.10	<0.10 [NA]	<0.10	<0.10 [NA]	[NA]	[NA]
Disulfoton	mg/kg	0.10	<0.10	<0.10	<0.10 [NA]	<0.10	<0.10 [NA]	[NA]	[NA]
Fenamiphos	mg/kg	0.10	<0.10	<0.10	<0.10 [NA]	<0.10	<0.10 [NA]	[NA]	[NA]
Fenthion	mg/kg	0.10	<0.10	<0.10	<0.10 [NA]	<0.10	<0.10 [NA]	[NA]	[NA]
Methidathion	mg/kg	0.10	<0.10	<0.10	<0.10 [NA]	<0.10	<0.10 [NA]	[NA]	[NA]
Mevinphos	mg/kg	0.10	<0.10	<0.10	<0.10 [NA]	<0.10	<0.10 [NA]	[NA]	[NA]
Parathion-methyl	mg/kg	0.10	<0.10	<0.10	<0.10 [NA]	<0.10	<0.10 [NA]	[NA]	[NA]
Phorate	mg/kg	0.10	<0.10	<0.10	<0.10 [NA]	<0.10	<0.10 [NA]	[NA]	[NA]
Phosalone	mg/kg	0.10	<0.10	<0.10	<0.10 [NA]	<0.10	<0.10 [NA]	[NA]	[NA]
Azinphos-methyl	mg/kg	0.10	<0.10	<0.10	<0.10 [NA]	<0.10	<0.10 [NA]	[NA]	[NA]
<i>Surrogate 2-Chlorophenol-D4</i>	%		92.6		91.7/93.6		93.3/95.1	95.9	85.9

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

Quality Control PEH1247

ORG-022 | Polychlorinated Biphenyls (Soil) | Batch BEH2377

Analyte	Units	PQL	Blank	DUP1	DUP2	LCS %	Spike %
				BEH2377-DUP1# Samp QC RPD %	BEH2377-DUP2# Samp QC RPD %		
Aroclor 1016	mg/kg	0.10	<0.10	<0.10 <0.10 [NA]	<0.10 <0.10 [NA]	[NA]	[NA]
Aroclor 1221	mg/kg	0.10	<0.10	<0.10 <0.10 [NA]	<0.10 <0.10 [NA]	[NA]	[NA]
Aroclor 1232	mg/kg	0.10	<0.10	<0.10 <0.10 [NA]	<0.10 <0.10 [NA]	[NA]	[NA]
Aroclor 1242	mg/kg	0.10	<0.10	<0.10 <0.10 [NA]	<0.10 <0.10 [NA]	[NA]	[NA]
Aroclor 1248	mg/kg	0.10	<0.10	<0.10 <0.10 [NA]	<0.10 <0.10 [NA]	[NA]	[NA]
Aroclor 1254	mg/kg	0.10	<0.10	<0.10 <0.10 [NA]	<0.10 <0.10 [NA]	[NA]	[NA]
Aroclor 1260	mg/kg	0.10	<0.10	<0.10 <0.10 [NA]	<0.10 <0.10 [NA]	[NA]	[NA]
PCB C28	mg/kg			0.00 0.00 [NA]	0.00 0.00 [NA]	[NA]	[NA]
PCB C52	mg/kg			0.00 0.00 [NA]	0.00 0.00 [NA]	[NA]	[NA]
PCB C103	mg/kg			0.00 0.00 [NA]	0.00 0.00 [NA]	95.7	115
PCB C101	mg/kg			0.00 0.00 [NA]	0.00 0.00 [NA]	[NA]	[NA]
PCB C118	mg/kg			0.00 0.00 [NA]	0.00 0.00 [NA]	[NA]	[NA]
PCB C153	mg/kg			0.00 0.00 [NA]	0.00 0.00 [NA]	[NA]	[NA]
PCB C138	mg/kg			0.00 0.00 [NA]	0.00 0.00 [NA]	[NA]	[NA]
PCB C180	mg/kg			0.00 0.00 [NA]	0.00 0.00 [NA]	[NA]	[NA]
Surrogate 2-Fluorobiphenyl	%		95.3	87.9 90.0	92.9 93.8	95.6	90.5

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

METALS-020 | Acid Extractable Metals (Soil) | Batch BEH2371

Analyte	Units	PQL	Blank	DUP1	DUP2	LCS %	Spike %
				BEH2371-DUP1# Samp QC RPD %	BEH2371-DUP2# Samp QC RPD %		
Arsenic	mg/kg	4.0	<4.0	65.0 67.8 4.24	4.02 4.54 12.1	107	88.0
Cadmium	mg/kg	0.40	<0.40	<0.40 <0.40 [NA]	<0.40 <0.40 [NA]	110	80.9
Chromium	mg/kg	1.0	<1.0	58.5 54.4 7.25	7.25 8.88 20.3	102	93.8
Copper	mg/kg	1.0	<1.0	76.8 75.6 1.52	8.87 32.4 114 [5]	102	127
Lead	mg/kg	1.0	<1.0	20.0 17.5 13.2	1.83 2.46 29.5	105	79.2
Mercury	mg/kg	0.10	<0.10	<0.10 <0.10 [NA]	<0.10 <0.10 [NA]	[NA]	96.0
Nickel	mg/kg	1.0	<1.0	52.1 57.4 9.71	<1.0 <1.0 [NA]	104	138
Zinc	mg/kg	1.0	<1.0	225 202 10.7	4.67 16.3 111 [5]	107	79.9

Analyte	Units	PQL	Blank	DUP3	DUP4	LCS %
				BEH2371-DUP3# Samp QC RPD %	BEH2371-DUP4# Samp QC RPD %	
Arsenic	mg/kg	4		65.0 76.3 16.0	4.02 4.19 3.99	[NA]
Cadmium	mg/kg	0.4		<0.40 <0.40 [NA]	<0.40 <0.40 [NA]	[NA]
Chromium	mg/kg	1		58.5 61.7 5.27	7.25 6.99 3.66	[NA]
Copper	mg/kg	1		76.8 66.8 13.9	8.87 12.6 34.8	[NA]
Lead	mg/kg	1		20.0 18.0 10.4	1.83 2.20 18.4	[NA]
Mercury	mg/kg	0.1		<0.10 <0.10 [NA]	<0.10 <0.10 [NA]	[NA]
Nickel	mg/kg	1		52.1 64.5 21.2	<1.0 <1.0 [NA]	[NA]
Zinc	mg/kg	1		225 218 3.43	4.67 6.89 38.4	[NA]

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

INORG-008 | Inorganics - Moisture (Soil) | Batch BEH2363

Analyte	Units	PQL	Blank	DUP1	DUP2	LCS %
				BEH2363-DUP1# Samp QC RPD %	BEH2363-DUP2# Samp QC RPD %	
Moisture	%	0.1		9.72 9.87 1.53	2.06 1.96 4.98	[NA]

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

INORG-004 | TCLP Extraction (Soil) | Batch BEH2368

Analyte	Units	PQL	Blank	DUP1	LCS %
				PEH1247-01 Samp QC RPD %	
pH of final leachate	pH units		5.69	5.36 5.37 0.186	102

Quality Control PEH1247

METALS-021_TCLP | TCLP Metals (Soil) | Batch BEH2718

Analyte	Units	PQL	Blank	DUP1		DUP2		LCS %	Spike %
				PEH1247-03		PEH1247-03			
				Samp	QC RPD %	Samp	QC RPD %		
Mercury	mg/L	0.000050	<0.000050	<0.000050	<0.000050 [NA]	<0.000050	<0.000050 [NA]	87.6	86.4

METALS-020_TCLP | TCLP Metals (Soil) | Batch BEH2719

Analyte	Units	PQL	Blank	DUP1		DUP2		LCS %	Spike %
				PEH1247-03		PEH1247-03			
				Samp	QC RPD %	Samp	QC RPD %		
Arsenic	mg/L	0.050	<0.050	<0.050	<0.050 [NA]	<0.050	<0.050 [NA]	107	111
Cadmium	mg/L	0.010	<0.010	<0.010	<0.010 [NA]	<0.010	<0.010 [NA]	96.7	99.5
Chromium	mg/L	0.010	<0.010	<0.010	<0.010 [NA]	<0.010	<0.010 [NA]	108	110
Copper	mg/L	0.010	<0.010	<0.010	<0.010 [NA]	<0.010	<0.010 [NA]	115	120
Lead	mg/L	0.030	<0.030	<0.030	<0.030 [NA]	<0.030	<0.030 [NA]	102	105
Nickel	mg/L	0.020	<0.020	<0.020	<0.020 [NA]	<0.020	<0.020 [NA]	102	105
Zinc	mg/L	0.020	<0.020	<0.020	<0.020 [NA]	<0.020	<0.020 [NA]	104	106

ORG-022_TCLP | TCLP Polycyclic Aromatic Hydrocarbons (Soil) | Batch BEH2483

Analyte	Units	PQL	Blank	DUP1		LCS %	Spike %
				PEH1247-01			
				Samp	QC RPD %		
Naphthalene	mg/L	0.00010	<0.00010	<0.00010	<0.00010 [NA]	87.2	75.9
Acenaphthylene	mg/L	0.00010	<0.00010	<0.00010	<0.00010 [NA]	[NA]	[NA]
Acenaphthene	mg/L	0.00010	<0.00010	<0.00010	<0.00010 [NA]	[NA]	[NA]
Fluorene	mg/L	0.00010	<0.00010	<0.00010	<0.00010 [NA]	93.0	89.9
Phenanthrene	mg/L	0.00010	<0.00010	<0.00010	<0.00010 [NA]	91.9	91.6
Anthracene	mg/L	0.00010	<0.00010	<0.00010	<0.00010 [NA]	[NA]	[NA]
Fluoranthene	mg/L	0.00010	<0.00010	<0.00010	<0.00010 [NA]	95.6	96.3
Pyrene	mg/L	0.00010	<0.00010	<0.00010	<0.00010 [NA]	93.8	95.7
Benzo(a)anthracene	mg/L	0.00010	<0.00010	<0.00010	<0.00010 [NA]	[NA]	[NA]
Chrysene	mg/L	0.00010	<0.00010	<0.00010	<0.00010 [NA]	83.4	85.9
Benzo(b,j,k)fluoranthene	mg/L	0.00020	<0.00020	<0.00020	<0.00020 [NA]	[NA]	[NA]
Benzo(a)pyrene	mg/L	0.00010	<0.00010	<0.00010	<0.00010 [NA]	87.6	93.8
Indeno(1,2,3-c,d)pyrene	mg/L	0.00010	<0.00010	<0.00010	<0.00010 [NA]	[NA]	[NA]
Dibenzo(a,h)anthracene	mg/L	0.00010	<0.00010	<0.00010	<0.00010 [NA]	[NA]	[NA]
Benzo(g,h,i)perylene	mg/L	0.00010	<0.00010	<0.00010	<0.00010 [NA]	[NA]	[NA]
Surrogate p-Terphenyl-D14	%		104		106 / 99.5	89.7	98.5

QC Comments

Identifier	Description
[1]	Surrogate recovery is outside routine acceptance criteria (60-140%) as a result of the high concentration of analyte(s) in the sample.
[2]	PQL(s) has/have been raised as the sample(s) was/were foamy and therefore required dilution.
[3]	PQL(s) has/have been raised due to interferences from analytes (other than those being tested) in sample.
[4]	Duplicate %RPD may be flagged as an outlier to routine laboratory acceptance, however, where one or both results are <10*PQL, the RPD acceptance criteria increases exponentially.
[5]	The laboratory duplicate RPD acceptance criteria has been exceeded. Sample heterogeneity suspected. 3 sets of data have been provided to help demonstrate the degree of non-homogeneity within the sample as well as assessing the analytical precision.

CERTIFICATE OF ANALYSIS 338576

Client Details

Client	Douglas Partners NT
Attention	Vanessa Harrington, Stephen Jackson
Address	PO Box 36858, Winnellie, NT, 0821

Sample Details

Your Reference	<u>209497.00, Warrumiyanga, Bathurst Island</u>
Number of Samples	3 Soil
Date samples received	24/11/2023
Date completed instructions received	24/11/2023

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	28/11/2023
Date of Issue	28/11/2023
NATA Accreditation Number 2901. This document shall not be reproduced except in full.	
Accredited for compliance with ISO/IEC 17025 - Testing. Tests not covered by NATA are denoted with *	

Results Approved By

Diego Bigolin, Inorganics Supervisor
 Loren Bardwell, Development Chemist
 Tim Toll, Chemist (FAS)

Authorised By

Nancy Zhang, Laboratory Manager

Acid Extractable metals in soil				
Our Reference		338576-1	338576-2	338576-3
Your Reference	UNITS	TP28	TP42	TP33
Depth		0.2	0.2	0.4
Date Sampled		22/11/2023	22/11/2023	22/11/2023
Type of sample		Soil	Soil	Soil
Date prepared	-	27/11/2023	27/11/2023	27/11/2023
Date analysed	-	28/11/2023	28/11/2023	28/11/2023
Arsenic	mg/kg	13	15	19
Cadmium	mg/kg	<0.4	<0.4	<0.4
Chromium	mg/kg	76	87	90
Copper	mg/kg	2	3	2
Lead	mg/kg	11	16	13
Mercury	mg/kg	<0.1	<0.1	<0.1
Nickel	mg/kg	3	5	4
Zinc	mg/kg	5	28	4

Misc Soil - Inorg				
Our Reference		338576-1	338576-2	338576-3
Your Reference	UNITS	TP28	TP42	TP33
Depth		0.2	0.2	0.4
Date Sampled		22/11/2023	22/11/2023	22/11/2023
Type of sample		Soil	Soil	Soil
Date prepared	-	27/11/2023	27/11/2023	27/11/2023
Date analysed	-	27/11/2023	27/11/2023	27/11/2023
Hexavalent Chromium, Cr ⁶⁺	mg/kg	<1	<1	<1

Moisture				
Our Reference		338576-1	338576-2	338576-3
Your Reference	UNITS	TP28	TP42	TP33
Depth		0.2	0.2	0.4
Date Sampled		22/11/2023	22/11/2023	22/11/2023
Type of sample		Soil	Soil	Soil
Date prepared	-	27/11/2023	27/11/2023	27/11/2023
Date analysed	-	28/11/2023	28/11/2023	28/11/2023
Moisture	%	3.3	6.1	13

Method ID	Methodology Summary
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Inorg-118	<p>Hexavalent Chromium (Cr6+) - determined firstly by separation using ion chromatography followed by the colourimetric analytical finish.</p> <p>Water samples are ideally field filtered into alkali preserved containers prior to receipt for dissolved Cr6+ analysis. Unfiltered water samples into alkali preserved containers (or pH adjusted to pH 8-9 on receipt) can be classified as Total (unfiltered) Cr6+.</p> <p>Please note, for 'Total/Unfiltered' Trivalent Chromium in waters [calculated], these results may be exaggerated due to the digestive limitation of 'Total/Unfiltered' Hexavalent Chromium in NaOH at pH 8-9 compared to more comprehensive digestion for Total Chromium using the mineral acids HNO3 and HCl.</p> <p>Solid (includes soils, filters, paints, swabs for example) samples are extracted in a buffered catalysed solution prior to the analytical finish above. Water extractable options are available (e.g. as an option for filters) on request.</p> <p>Impingers may need pH adjusting to pH 8-9 prior to IC-colourimetric analytical finish.</p>
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.

Client Reference: 209497.00, Warrumiyanga, Bathurst Island

QUALITY CONTROL: Acid Extractable metals in soil				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	[NT]
Date prepared	-			27/11/2023	[NT]	[NT]	[NT]	[NT]	27/11/2023	[NT]
Date analysed	-			28/11/2023	[NT]	[NT]	[NT]	[NT]	28/11/2023	[NT]
Arsenic	mg/kg	4	Metals-020	<4	[NT]	[NT]	[NT]	[NT]	104	[NT]
Cadmium	mg/kg	0.4	Metals-020	<0.4	[NT]	[NT]	[NT]	[NT]	100	[NT]
Chromium	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	104	[NT]
Copper	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Lead	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	104	[NT]
Mercury	mg/kg	0.1	Metals-021	<0.1	[NT]	[NT]	[NT]	[NT]	107	[NT]
Nickel	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Zinc	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	101	[NT]

Client Reference: 209497.00, Warrumiyanga, Bathurst Island

QUALITY CONTROL: Misc Soil - Inorg				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-6	338576-2
Date prepared	-			27/11/2023	1	27/11/2023	27/11/2023		27/11/2023	27/11/2023
Date analysed	-			27/11/2023	1	27/11/2023	27/11/2023		27/11/2023	27/11/2023
Hexavalent Chromium, Cr ⁶⁺	mg/kg	1	Inorg-118	<1	1	<1	<1	0	94	104

Result Definitions

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

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.
Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.	
The recommended maximums for analytes in urine are taken from "2018 TLVs and BEIs", as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.	
Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2	

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

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