ENVIRONMENTAL INVESTIGATION SERVICES

REPORT

TO

CADENCE PROPERTY GROUP PTY LTD

ON

REMEDIATION ACTION PLAN

FOR

PROPOSED WAREHOUSE DEVELOPMENT

AT

128 ANDREWS ROAD, PENRITH, NSW

4 FEBRUARY 2019 **REF: E31675KRrpt-RAP**

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EXECUTIVE SUMMARY

Cadence Property Group Pty Ltd ('the client') commissioned Environmental Investigation Services (EIS)[1] to prepare a Remediation Action Plan (RAP) for the proposed warehouse development at 128 Andrews Road, Penrith, NSW. The site location is shown on Figure 1 and the RAP applies to the site boundaries as shown on Figure 2.

EIS understand that the client has lodged a Development Application (DA) for the proposed development to Penrith City Council (Ref: DA 18/1114). The council issued a request for information (RFI) document on 9 January 2019, following a preliminary assessment of the DA. One of the requirements of the RFI (Clause 3a) included the issuance of a RAP for the removal and/or relocation of contaminated soils on site.

The goal of the remediation is to reduce the potential ecological risks associated with the presence of heavy metals in the surficial soil in the western section of the site to an acceptable level, and to confirm that potential risks associated with a localised area of hydrocarbon impact remains low and acceptable as a result of the proposed earthworks on site. The primary aim of the remediation is to reduce the risks posed by the identified site contamination to an acceptable level. The objectives of the RAP are to:

- Provide a methodology to remediate and validate the site;
- Provide a contingency plan for the remediation works;
- Outline site management procedures to be implemented during remediation work; and
- Provide an unexpected finds protocol to be implemented during the works.

The contaminants of concern requiring remediation include, copper, chromium, nickel, zinc and total recoverable hydrocarbons (TRH F3). Remediation is required to address ecological risks. Contamination-related human health risks have not been identified. The contamination is present in fill and surficial soils in the south-western section and western end of the site. The proposed remediation includes excavation of the surficial soil/fill in the remediation area and re-location/placement of the material beneath the proposed pavement/hardstand and warehouse. This can easily be tied into the proposed earthworks.

EIS are of the opinion that the remediation goal can be achieved provided this RAP is implemented accordingly. A validation report should be prepared on completion of remediation activities and should be submitted to the consent authority.

The conclusions and recommendations should be read in conjunction with the limitations presented in the body of the report.

[1] Environmental consulting division of Jeffery & Katauskas Pty Ltd (J&K)

TABLE OF CONTENTS

1	INTRODUCTION		1
	1.1	Proposed Development Details	1
	1.2	Objectives	1
	1.3	Scope of Work	2
2	SITE INFORMATION		3
	2.1	Site Identification	3
	2.2	Site Description	3
	2.3	Summary of Geology and Hydrogeology	4
	2.4	Summary of Site History	5
	2.5	Summary of Investigation Results	7
	2.6	Conceptual Site Model (Site Characterisation)	8
3	REMEDIATION EXTENT		10
4	REMEDIATION OPTIONS		11
	4.1	Soil Remediation	11
	4.2	Consideration of Remediation Options	12
5	REMEDIATION DETAILS		14
	5.1	Sequence of Works	14
	5.2	Remediation of Contaminated Fill/Soil	14
	5.3	Remediation Documentation	16
	5.4	Soil Disposal - Volume and Disposal Analysis (If Applicable)	16
6	VALIDATION PLAN		17
	6.1	Validation Sampling and Documentation	17
	6.2	Validation Assessment Criteria and Data Assessment	18
	6.3	Validation Report	18
	6.4	Data Quality	19
7	CONTINGENCY PLAN		20
	7.1	Unexpected Finds	20
	7.2	Soil Vapour Contamination	20
	7.3	Continual Soil Validation Failure	21
	7.4	Disposal of Hazardous Waste	21
8	SITE MANAGEMENT PLAN FOR REMEDIATION WORKS		22
	8.1	Interim Site Management	22
	8.2	Project Contacts	22
	8.3	Security	22
	8.4	Timing and Sequencing of Remediation Works	22
	8.5	Site Soil and Water Management Plan	23
	8.6	Noise and Vibration Control Plan	23
	8.7	Dust Control Plan	23
	8.8	Odour Control Plan	24
	8.9	Health and Safety Plan	25
	8.10	Waste Management	25
	8.11	Incident Management Contingency	25
	8.12	Hours of Operation	25
9	CONCLUSION		26
	9.1	Remediation Category	26
	9.2	Regulatory Requirements	27
10	LIMITATIONS		28

List of In-Text Tables

Important Information About this Report

TABLE OF CONTENTS

REPORT FIGURES:

Figure 1: Site Location Plan
Figure 2: Sample Location Plan
Figure 3: Stockpile Sample Location Plan
Figure 4: Soil Contamination Plan
Figure 5: Proposed Cut and Fill Earthworks
Figure 6: Remediation Area

APPENDICES:

Appendix A: Copy of Borehole Logs
Appendix B: Remediation Category Confirmation Letter

ABBREVIATIONS

Asbestos Containing Material	**ACM**
Australian Height Datum	**AHD**
Acid Sulfate Soil	**ASS**
Below Ground Level	**bgl**
Benzene, Toluene, Ethylbenzene, Xylene	**BTEX**
Conceptual Site Model	**CSM**
Data Quality Indicator	**DQI**
Data Quality Objective	**DQO**
Ecological Investigation Level	**EIL**
Ecological Screening Level	**ESL**
Environmental Management Plan	**EMP**
Environmental Protection Agency	**EPA**
Environmental Site Assessment	**ESA**
Local Government Authority	**LGA**
Map Grid of Australia	**MGA**
National Environmental Protection Measure	**NEPM**
Organochlorine Pesticides	**OCP**
Organophosphate Pesticides	**OPP**
Polycyclic Aromatic Hydrocarbons	**PAH**
Photo-ionisation Detector	**PID**
Practical Quantitation Limit	**PQL**
Quality Assurance	**QA**
Quality Control	**QC**
Remediation Action Plan	**RAP**
Request for Information	**RFI**
Toxicity Characteristic Leaching Procedure	**TCLP**
Total Recoverable Hydrocarbons	**TRH**
United States Environmental Protection Agency	**USEPA**
Underground Storage Tank	**UST**
Unexpected Finds Protocol	**UFP**
Virgin Excavated Natural Material	**VENM**
Validation Assessment Criteria	**VAC**
Volatile Organic Compounds	**VOC**
Work Health and Safety	**WHS**

1 INTRODUCTION

Cadence Property Group Pty Ltd ('the client') commissioned Environmental Investigation Services (EIS)[2] to prepare a Remediation Action Plan (RAP) for the proposed warehouse development at 128 Andrews Road, Penrith, NSW. The site location is shown on Figure 1 and the RAP is applicable to the site boundaries as shown on Figure 2.

EIS understand that a Development Application (DA) has been lodged with Penrith City Council (Ref: DA 18/1114). The council issued a request for information (RFI) document on 9 January 2019, following a preliminary assessment of the DA. One of the requirements of the RFI (Clause 3a) included the issuance of a RAP for the removal and/or relocation of contaminated soils on site.

EIS previously completed a Stage 1/Stage 2 Environmental Site Assessment (ESA) and Preliminary Salinity Assessment[3], and an Addendum Letter Report – Additional Data Gap Investigation[4] for the site. A summary of key information applicable to this RAP is presented in Section 2.

This RAP includes a methodology to remediate and validate the site. A contingency plan for remediation is included together with site management procedures and an unexpected finds protocol (UFP).

1.1 Proposed Development Details

The proposed development includes a 50,000m^2 warehouse to be constructed within the 85,000m^2 site. The warehouse will be accessed by pavements adjacent to the warehouse, and by a driveway constructed off Andrews Road to the east and north-east of the site. It is understood that the development will be constructed at approximately the existing surface level, with some cut and fill earthworks of up to approximately 1.5m.

The majority of the western area of the site will be excavated for the construction of a "treatment basin". The client has advised that the vegetation across the site is to be slashed/removed and the root affected surficial soils will preferably be mixed with other appropriate materials before being compacted to meet the earthworks/geotechnical specification. In the event that this is not achievable, it has been assumed that some root affected soils may be disposed off-site.

1.2 Objectives

The remediation goal is to reduce the potential ecological risks associated with the presence of heavy metals in the surficial soil in the western section of the site to an acceptable level, and to confirm that potential risks associated with a localised area of hydrocarbon impact remains low and acceptable as

[2] Environmental consulting division of Jeffery & Katauskas Pty Ltd (J&K)

[3] EIS Report Reference E31675KRrpt Rev1, dated 30 October 2018 (referred to as the Stage 1/Stage 2 ESA)

[4] EIS Report Reference E31675KRadd rev1, dated 20 November 2018 (referred to as the Additional Data Gap Investigation)

a result of the proposed earthworks on site. The primary aim of the remediation is to reduce the risks posed by the identified site contamination to an acceptable level.

The objectives of the RAP are to:

- Provide a methodology to remediate and validate the site;
- Provide a contingency plan for the remediation works;
- Outline site management procedures to be implemented during remediation work; and
- Provide an unexpected finds protocol to be implemented during the works.

1.3 Scope of Work

The RAP was prepared generally in accordance with an EIS proposal (Ref: EP48782P) of 22 January 2019 and written acceptance from the client dated 23 January 2019. The scope of work included the following:

- Review of the EIS Stage1/Stage2 ESA and the Additional Data Gap Investigation reports;
- Review of the proposed development details; and
- Preparation of a RAP.

The RAP has been prepared with reference to the Guidelines for Consultants Reporting on Contaminated Sites (2011)[5], the National Environmental Protection (Assessment of Site Contamination) Measure 1999 as amended (2013)[6], SEPP55 and other guidelines made under or with regards to the CLM Act 1997.

[5] NSW Office of Environment and Heritage (OEH), (2011). *Guidelines for Consultants Reporting on Contaminated Sites*

[6] National Environment Protection Council (NEPC), (2013). *National Environmental Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013).* (referred to as NEPM 2013)

2 SITE INFORMATION

2.1 Site Identification

Table 2-1: Site Identification

Current Site Owner:	Tradelink Pty Limited and Vicary Pty Limited.
Site Address:	128 Andrews Road, Penrith.
Lot & Deposited Plan:	Part Lot 20 DP1216618, Lot 21 DP1216618, Part Lot 3 DP747153 and Part Lot 13 DP217705.
Current Land Use:	Vacant land.
Proposed Land Use:	Warehouse (industrial) and associated pavements, driveways and basins.
Local Government Authority (LGA):	Penrith City Council.
Current Zoning:	IN1 – General Industrial.
Site Area (m^2):	Approximately 85,000.
RL (AHD in m) (approx.):	20 – 25
Geographical Location (decimal degrees) (approx.):	Latitude: -33.735836 Longitude:150.699299

2.2 Site Description

The site is located in a predominantly commercial/industrial area of Penrith and is bound by commercial/industrial properties to the north, west and south and by vacant land and an industrial property to the east. The site is located approximately 500m to the south and south-east of the Penrith Lakes.

The site is located in relatively level alluvial topography associated with the Nepean River floodplain. The site itself is also relatively level.

A walkover inspection of the site was undertaken by EIS on 25 July 2018 and during the site works between 20 and 24 August 2018 and 5, 6 and 12 November 2018, as documented in the Stage1/Stage2 ESA and the Additional Data Gap Investigation reports. Key observations from the inspections were as follows:

- The site was a vacant land. There were no buildings, structures or roads observed on site;

- The site had metal fencing on much of the northern boundary and part of the western and southern boundaries. Access to the site was via a locked gate at the northern boundary or via the un-fenced vacant block of land off Lambridge Place to the north-west of the site;
- At the western end of the site was a predominantly bare area showing some exposed soils. Signs of major erosion were not evident. Anthropogenic material such as solidified melted glass material, timber sheeting, metal stakes, plastic pipe pieces and other objects were observed scattered within the fill as well as on the surface, within the bare area. An overland swale was also located in this area and the soils around the swale and at the base of it appeared to be predominantly silty and soft, potentially due to the ongoing contact with water within the swale. The swale (overland drain) sloped towards stormwater pipes at the southern boundary. This drain appeared to be connected to stormwater pipes located at the western boundary as well. Water was observed ponding within a locally deeper excavation adjacent to the pipes and in other low points along the swale. A stormwater drain and culvert was also observed to the immediate north of the northern boundary of the site;
- No staining or odours were noted on the site surfaces. No indicators of underground storage tanks (USTs) or above ground storage tanks (ASTs) were observed. A piece of fibre cement pipe (subsequently confirmed to be asbestos containing material - ACM) was observed at the ground surface within the bare area (to the east of borehole BH181) in the western end of the site (this was later removed from site during the site works between 5, 6 and 12 November 2018);
- Up to five soil stockpiles were observed in the western end of the site, within the bare area. These were numbered SP1 to SP5 for reference for the purposes of the investigation and this RAP (Refer to Figures 2 and 3). A concrete pipe was observed within one of these stockpiles (SP5). These stockpiles were overgrown with weed and grass and some of them contained anthropogenic material i.e. concrete and brick fragments and ash;
- The site was predominantly overgrown with long grass, weeds and plants as tall as 0.5m-1.0m high, except within the bare area in the western end. A number of small trees were scattered across the site. The vegetation appeared to be very dry and brown, possibly due to the lack of rainfall during that period; and
- Some shipping containers with equipment in them, an oil drum store and a shed containing sodium hydroxide and potentially other chemicals were noted to the immediate north of the site, within an adjacent glass bottle manufacturing plant.

2.3 Summary of Geology and Hydrogeology

Regional geological maps reviewed for the Stage1/Stage2 ESA and the Additional Data Gap Investigation indicated that the site is underlain by Cranebrook Formation, which typically consists of gravel, sand, silt and clay.

The site is not located in an ASS risk area according to the risk maps prepared by the Department of Land and Water Conservation.

Fill was encountered at the surface in all boreholes, except in BH1 to BH5, that were drilled during the Stage 1/2 ESA and the Additional Data Gap Investigation at the site. The fill was also underlain by natural soil.

Fill extended to a maximum depth of approximately 1.1m below ground level (mbgl) and was found to contain igneous gravel, ironstone gravel, organic material, roots, root fibres, ash, clay fines and anthropogenic material (concrete and brick fragments). A copy of the borehole logs are attached in the appendices for reference purposes.

A search of registered groundwater bores was undertaken for the Stage 1/2 ESA and the search identified 144 registered bores within 2,000m of the site. The Stage 1/2 ESA included the installation of four groundwater wells in BH137, BH166, BH170 and BH181 to depths of approximately 2.8m to 4.0mbgl. Groundwater was not encountered in the wells during that investigation. Subsequently the Additional Data Gap Investigation included the installation of another four groundwater wells in BH201 to BH204 to depths of approximately 8.0m to 9.0mbgl. Groundwater was encountered in these wells at approximately 6.19m to 6.62mbgl during sampling on 12 November 2018.

Considering the proposed development cut and fill excavations at the site, groundwater is not likely to be encountered during the proposed excavation. The development proposal does not include extraction or use of groundwater.

Any surface water in the overland drain in the western section of the site is likely to be intercepted during the cut and fill earthworks on site.

2.4 Summary of Site History

The Stage 1/2 ESA included a review of the Section 10.7 certificate, Penrith City Council records, historical aerial photographs, Land Title records and other relevant historical information within a Lotsearch report, and dangerous goods records from SafeWork NSW. In summary:

- There were no SafeWork NSW records for the storage of dangerous goods at the site;
- The site has not been notified with regards to the Duty to Report Contamination under Section 60 of the CLM Act 1997. There was a record for a property named Crane Enfield Metals located to the immediate south-west of the site (adjoining part of the southern site boundary). There were other relevant records for an industrial site (located to the immediate west of the site) and fuel service stations;
- Licenses were also reported under the Protection of the Environment Operations (POEO) legislation for other activities at and in the vicinity of the site such as application of herbicides along waterways at the site (surrendered licence) and within 500m of the site, ceramic waste generation, glass production (container), recovery of general waste and waste storage of other types of waste, wood preservation, metal processing, metal waste generation, sewage treatment processing by large plants, chemical production waste generation, pharmaceutical and veterinary products production, crushing, grinding or separating, other land based extraction, concrete works, hazardous, industrial or group A waste generation or storage,

container reconditioning and non-thermal treatment of hazardous and other waste, and petroleum products and fuel production. Some of these activities are/were undertaken within properties located immediately adjacent of the site or within relatively close proximity of the site;

- Additional NSW EPA Records Information had indicated that the Crane Enfield Metals property located to the immediate south and south-west of the site is a remediation site, declared under the Contaminated Land Management Act 1997;
- Information obtained from the council records and Section 10.7 certificate indicated that previous environmental investigations had been undertaken at the western end of the site potentially between 1998 and 2000. Soil remediation was undertaken within the south-western end of the site after November 1998 under DA 985916. This was in accordance with a Remediation Plan prepared by AGC Woodward – Clyde Pty Ltd (Ref: 3405/0004, dated 17 September 1998). Riparian Landscaping Works (Nominated Integrated Development) may have been undertaken at the site in August 2014. A driveway construction and drainage works may also have been undertaken in August 2014 and included swapping part of the land within the site with the adjacent 13-15 Lambridge Place and 16-19 Lambridge Place, and boundary adjustment of the site with some of the adjacent lots. The land (Lot 21) appeared to have been surveyed in December 2014 and the landowner signed the Terms of Restrictions on the use of land in February 2016 and May 2017, as the area was identified as the flood flow conveyance corridor for the 0.5% Annual Exceedance Probability Flood event as shown in plans by Worley Parsons, entitled “Figure A4 – Predicted Flood Levels at the Peak of the 200-year Recurrence Flood for Post-Developed Site Conditions’’, reference 301015-03461-IPLEX Development FIA;
- The site was used for agricultural (grazing and/or farmland) activities prior to 1961. Land titles indicated the property was owned by various farmers during this time. The aerial photographs also showed a vacant land with ploughing furrows and potentially used for grazing and/or market garden or crop farming purposes, including a creek or drainage channel in the western end of the site, part of which may have also been used as a stock dam prior to 1970. This drainage channel was in approximately the same location of the existing (2019) overland drain; and
- The site was then vacant land from 1961 onwards. Land titles indicated the property was owned by a retired timber merchant, after which was acquired by G.E. Crane and Sons Limited, later known as Crane Distribution Limited and Tradelink Pty Limited after 1961. A small strip of land at the north-western boundary came under ownership of Vicary Pty Limited in 2017. The 1982 aerial photograph indicated that minor earthworks may have been undertaken at the site at the time. Remediation of fill soils had been undertaken in the western end of the site between 1998 and 2000. The contaminated fill in the south-western end had been excavated, treated on-site and then disposed off-site. The remediated area was then reinstated with imported fill and grassed. The 2002 aerial photograph showed that the site was grass covered with some trees and scattered vegetation at the time.

2.5 Summary of Investigation Results

The Stage 1/2 ESA included soil (including surface sample and stockpiles) and surface water sampling. Groundwater wells had been installed during the Stage 1/2 ESA but could not be sampled. A salinity assessment was also undertaken at the time. The Additional Data Gap Investigation included soil stockpile and groundwater sampling and analysis, and removal of a piece of ACM pipe from the site surface. The sampling locations are shown on Figures 2, 3A and 3B.

The sample spacing was approximately 45m between sampling locations on a grid, therefore the sample distribution was systematic. One of the sample locations (BH103) was placed within the proposed driveway location in the north-eastern section of the site. Some other boreholes were placed strategically and may not have been within the grid spacing. A fibre cement fragment (FCF) was also obtained from the surface fill material in BH189. The samples from the stockpiles were obtained from each side of the stockpile for adequate coverage.

The surface water sample location (SW1) was within the overland drain in close proximity to the pipe outlet at the southern boundary. This was to assess the quality of the water being discharged onto the site from the southern off-site property. The remaining northern and western parts of the overland drain were generally dry during the assessments, therefore another sample was not obtained at the western exit point to assess the quality of water leaving the site.

Soil samples were analysed for common suite of contaminants based on the site history, including: heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc); total recoverable hydrocarbons (TRHs); benzene, toluene, ethylbenzene and xylene (BTEX); polycyclic aromatic hydrocarbons (PAHs); organochlorine pesticides (OCPs); organophosphorus pesticides (OPPs); polychlorinated biphenyls (PCBs); and asbestos. Selected soil samples were also assessed for chromium VI, pH, cation exchange capacity (CEC), clay content and using the toxicity characteristic leaching procedure (TCLP) leachability analysis. The FCF samples were analysed for asbestos. Analysis results were compared to commercial/industrial (land use D) criteria based on NEPM (2013). The soil was also assessed against the ecological criteria for a 'commercial/industrial' setting.

The groundwater and surface water were analysed for: heavy metals; TRH; BTEX; PAHs; volatile organic compounds (VOCs); pH; electrical conductivity (EC); and hardness and/or ammonia and were assessed against human contact and ecological criteria.

In summary, some of the soil results were above the ecological criteria for a 'commercial/industrial' setting for chromium, copper, nickel, zinc and/or TRH F3. One result for TRH F3 also exceeded the Management Limit criteria. The exceedances were in the south-western section and western end of the site. Exceedances of the site assessment criteria are shown on Figures 4 and 5.

The FCF sample (MPF1) collected in the surficial fill at BH189 was analysed and found not to contain asbestos. The pipe fragment (F2) recovered from the site surface during the Additional Data Gap Investigation was analysed and found to contain chrysotile asbestos. All of the stockpile results were below the health based and ecological criteria.

Copper and zinc were detected at concentrations above the ecological criteria in the surface water and were considered to pose an ecological risk to receptors in off-site water bodies. No contaminants were identified in the groundwater samples.

Soil vapour sampling and/or analysis of other solvents was outside the scope of the assessments. However, there was no recorded on-site use of solvents and the groundwater results did not indicate any potential impacts from solvents from on-site or from adjacent land.

For the purpose of the RAP, EIS have undertaken further review of the data quality presented in the Stage 1/2 ESA and the Additional Data Gap Investigation reports and note the following:

- One water trip spike for BTEX was analysed during the Additional Data Gap Investigation. The results ranged from 104% to 109% recovery and were found to be acceptable;
- Duplicates and trip blank samples were collected. Several duplicate samples reported relative percentage difference (RPD) non-conformances for several heavy metal compounds, some TRH fractions and several PAHs compounds. This was attributed to sample heterogeneity and the difficulties associated with obtaining homogenous duplicate samples of heterogenous matrices. The results for the trip blank samples analysed for BTEX were all below the laboratory practical quantitation limit (PQL);
- One field rinsate was analysed for BTEX during the Stage 1/2 ESA. The results were all less than the PQLs, therefore cross contamination between samples that may have significance for data validity did not occur; and
- Based on the data quality control assessment presented in the Stage 1/2 ESA report and in the Additional Data Gap Investigation report, the data are considered to be adequately precise, accurate, representative, comparable and complete for interpretive purposes. The data are considered to be adequate to facilitate preparation of this RAP.

2.6 Conceptual Site Model (Site Characterisation)

The CSM is based on information presented in the site assessments.

Table 2-2: CSM

Contaminant source(s) and contaminants of concern	The primary contamination source is considered to be surface soil/fill in the western section of the site. The TRH impacts at location SS1 may be associated with a surface spill. The contaminants of concern in the context of remediation include copper, chromium, nickel, zinc and TRH F3.
Affected media	Soil/fill is the affected medium. Surface water in the drainage line in the western site area has not been considered further under this RAP as the drainage will be altered via construction of the basin. The relocation of the surficial soil via this process

	(and via the remediation) is considered to be adequate to address the previously identified heavy metals in the surface water in this area.
Receptor identification	The primary receptors include terrestrial organisms and plants within unpaved areas (including within the basin and in any proposed landscaped areas).
Exposure pathways	The potential exposure pathways for ecological receptors include primary/direct contact and ingestion. This exposure pathway would be significantly mitigated in areas beneath the proposed warehouse and hardstand.

3 REMEDIATION EXTENT

The horizontal extent of remediation is shown on Figure 6 (referred to herein as the remediation area). The vertical extent of remediation is to a minimum depth of 0.2m, or to the proposed depth of cut (whichever is greater).

The horizontal extent of remediation was established to capture the areas not covered/overlain by the proposed warehouse and pavements, and where exceedances of the ecological and Management Limit assessment criteria were identified during the previous EIS investigations. The vertical extent was established to tie into the proposed earthworks and to capture the impacted soil that was limited to the top 0.2m based on the previous analysis. The SS1 location already falls within the hardstand area so there is considered to be no need to extend the remediation area northward to capture this sampling point.

4 REMEDIATION OPTIONS

4.1 Soil Remediation

The NSW EPA follows the hierarchy set out in NEPM 2013 for the remediation of contaminated sites. The preferred order for soil remediation and management is as follows:

1. On-site treatment of soil so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level;
2. Off-site treatment of excavated material so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level, after which the soil is returned to the site;

Or if the above are not practicable:

3. Consolidation and isolation of the soil by on-site by containment within a properly designed barrier; and
4. Removal of contaminated material to an approved site or facility, followed where necessary by replacement with clean material; or
5. Where the assessment indicates that remediation would have no net environmental benefit or would have a net adverse environmental effect, implementation of an appropriate management strategy.

For simplicity herein, the above hierarchy are respectively referred to as Option 1, Option 2, Option 3 etc.

The Guidelines for the NSW Site Auditor Scheme, 3rd Edition (2017)[7] provides the following additional requirements to be taken into consideration:

- Remediation should not proceed in the event that it is likely to cause a greater adverse effect than leaving the site undisturbed; and
- Where there are large quantities of soil with low levels of contamination, alternative strategies should be considered or developed.

[7] NSW EPA (2017). *Guidelines for the NSW Site Auditor Scheme, 3rd ed.* (referred to as Site Auditor Guidelines 2017)

4.2 Consideration of Remediation Options

The tables below discusses a range of remediation options:

Table 5-1: Consideration of Remediation Options

Option	Discussion	Applicability
Option 1 On-site treatment of contaminated soil	On-site treatment provides a mechanism to reuse the processed material in some instances. Some of the treatment options include: Bioremediation: Addition of oxygen and nutrient compounds to accelerate the natural process of organic compound decay within the environment. Soils require excavation and stockpiling prior to treatment. Not suitable for all contaminants. Soil Washing: Soil is stripped of contaminants via a leaching process and the concentrated contaminated liquid product retained for disposal or additional treatment. Air Sparging and Extraction: Air is forced through the contaminated soil to volatilise organic contaminants. The air is then extracted and captured for treatment leaving reduced contaminant concentrations within the sub-strata. Thermal Desorption: Contaminated soils are heated within an incinerator to volatilise or combust the contaminants. Contaminants are either broken down to water and carbon dioxide or alternatively trapped within an air filtration system. Licenses are necessary for specific individual waste streams due to the potential for air pollution and the formation of harmful by-products during treatment processes. Physical Removal of Bonded Asbestos Materials: Fill impacted by non-friable asbestos containing materials (such as fibre cement) can be treated on-site via picking.	Not applicable for this project.

Option	Discussion	Applicability
Option 2 Off-site treatment of contaminated soil	Contaminated soils are excavated, transported to an approved/ licensed treatment facility, treated to remove/stabilise the contaminants then returned to the subject site, transported to an alternative site or disposed to an approved landfill facility. This option provides for a relatively short program of on-site works, however there may be some delays if the material is to be returned to the site following treatment and regulatory requirements would need to be carefully considered. The cost per tonne for transport to and from the site and for treatment is considered to be relatively high. The material would also have to be assessed in terms of suitability for reuse as part of the proposed development works.	Not applicable for this project.
Option 3 Removal of contaminated material to an appropriate facility and reinstatement with clean material	Contaminated soils would be classified in accordance with NSW EPA guidelines for waste disposal, excavated and disposed of off-site to a licensed landfill. The material would have to meet the requirements for landfill disposal. Landfill gate fees (which may be significant) would apply in addition to transport costs.	A potential option for this project.
Option 4 Consolidation and isolation of impacted soil by cap and containment	This would include the placement of an impermeable barrier such as concrete, or a warning barrier and non-contaminated soil material, over the contaminated material and thereby reduce the ecological risks. This action may also reduce the transport of contamination via surface water movement, dust generation and potentially groundwater infiltration, however, environmental issues would need to be evaluated. The capping and/or containment must be appropriate for the specific contaminants of concern. An ongoing Environmental Management Plan (EMP) is not considered to be required as the contaminants do not pose a risk to human health under the proposed development scenario.	Considered to be the most appropriate and viable option for this project as the majority of the remediation area was already to be excavated as part of the earthworks plan.

5 REMEDIATION DETAILS

5.1 Sequence of Works

Prior to the commencement of remediation work, the site management plan for remediation works (see Section 8) should be reviewed and implemented by the remediation contractor. In summary, the sequence of works is likely to include the following:

1) Excavation of the remediation area;
2) Placement of the excavated material beneath the hardstand/warehouse in accordance with an appropriate earthworks specification (off-site disposal is to be applied in the event that the material cannot be placed beneath the warehouse/pavement); and
3) Validation of the excavation and placement.

Prior to the commencement of remediation, geotechnical advice should be sought with regards to the stability of any proposed excavations, adjacent structures/features and the re-use of the material as fill beneath the warehouse/hardstand. Geotechnical advice should also be sought regarding the requirements of any backfill material used for the reinstatement (temporary or otherwise) of the remediation area.

5.2 Remediation of Contaminated Fill/Soil

5.2.1 Rationale for Selection of Remedial Strategy

The most viable option for remediation of contaminated soil/fill is excavation and re-location/placement beneath the proposed warehouse/hardstand (Option 4). There will be excavation involved for the proposed development, including cut and fill earthworks (refer to Figure 5). The relocation of or additional fill in conjunction with this aspect of the development works will provide the shortest program for the remediation, with limited delays for validation and a negligible potential to implement any management/controls either throughout the works or for the proposed development.

Relocation of the contaminated soil/fill from the proposed basin and unpaved areas will also reduce the potential for migration of heavy metals via surface water or into groundwater.

5.2.2 Remediation Details

The specific remediation details for remediation of contaminated soil/fill in the remediation area are described in the following table:

Table 5-1: Remediation Details

Step	Procedure
1.	Engage the Validation Consultant: Prior to commencement of any works, a suitably qualified contaminated land consultant should be engaged as the validation consultant. The validation consultant should be provided with a copy of this RAP.
2.	Personal Protective Equipment (PPE) and Work Health and Safety (WHS): The minimum PPE required for the remediation includes the following: • Disposable gloves; • Eye protection; and • Hard hat, covered clothing and steel toed boots. Additional PPE may be required by the remediation contractor.
3.	Remediation Areas: Mark out the remediation area using star pickets or pegs. Refer to Figure 6.
4.	Address Stability/Geotechnical Issues: Geotechnical advice should be sought regarding the stability of the adjacent structures and/or adjacent areas prior to commencing the excavation (as required). Advice should also be sought regarding the geotechnical suitability of placing the remediated soil beneath the warehouse/hardstand.
5.	Removal and Re-location of fill/soil from the Remediation Area: The remediation area will be remediated as follows: • The soil/fill should be excavated down a minimum depth of 0.2m or to the required depth specified in the earthworks plan (whichever is deeper); • Place the excavated material beneath the proposed hardstand/warehouse areas in accordance with an appropriate earthworks specification. The material is to be placed no closer than 10m from the edge of the warehouse/hardstand; • Survey the area where the excavated material is placed in order to provide spatial information for inclusion in the validation report; • The validation consultant is to monitor the excavation and relocation of material from the remediation area to beneath the proposed hardstand/warehouse; • Any material not suitable (from a geotechnical perspective) for placement beneath the hardstand/warehouse is to be disposed off-site under the waste classification provided in the previous EIS reports. Submit an application to dispose of the fill (in accordance with the assigned waste classification) to a licensed landfill and obtain authorisation to dispose; • Following removal of the contaminated fill/soil, the excavation should be inspected to confirm there are no obvious indicators of contamination. Any unexpected conditions should be considered in the validation sampling program which should be adjusted accordingly; • Validate the excavation in accordance with Section 6; • Backfill the excavation (where required) with clean fill and compact to the geotechnical specification for the proposed development. It has been assumed that, where required,

Step	Procedure
	backfilling will occur using site-won natural soil. Any material sourced from off-site for the purpose of backfilling the remediation area (Figure 6) would need to be adequately validated by the validation consultant prior to importation; and • All documents including landfill dockets etc. should be retained and forwarded to the validation consultant for inclusion into the validation report.

5.3 Remediation Documentation

The remediation contractor must retain all documentation associated with the remediation, including but not limited to:

- Survey information of the placement location
- Soil disposal dockets (where relevant);
- Imported materials information;
- Photographs of remediation works; and
- Waste tracking documentation (where relevant).

Copies of the above documentation must be forwarded to the validation consultant on completion of the remediation for inclusion in the final validation report.

5.4 Soil Disposal - Volume and Disposal Analysis (If Applicable)

If off-site disposal of soil/fill from the remediation area is required, a soil volume analysis should be undertaken and reconciled with the quantities shown on the soil disposal dockets (if applicable). A review of the disposal facility's licence issued under the Protection of the Environment Operations (POEO) Act (1997)[8] should also be undertaken to confirm whether or not each facility is appropriately licensed to receive the waste.

[8] NSW Government, (1997)). *Protection of Environment Operations Act.* (referred to as POEO Act 1997)

6 VALIDATION PLAN

Validation is necessary to demonstrate that remedial measures described in this RAP have been successful. The sampling program for the validation is outlined in Section 6.1. This is the minimum requirement based on the remedial strategies provided. Additional validation sampling may be required based on observations made during remediation.

Observations will also be used as a validation tool. In particular visual and olfactory indicators such as odours and staining should be recorded.

6.1 Validation Sampling and Documentation

The table below outlines the validation requirements for the proposed development at the site.

Table 6-1: Validation Requirements

Aspect	Sampling	Analysis	Observations and Documentation
Remediation Area			
Excavation base	20m grid (one sample per 400m^2) or every 20m lineal at the base of the elongated area that extends along the southern boundary of the remediation area. Additional samples are to be collected targeting any potentially impacted areas identified during the visual/olfactory assessment.	Copper, chromium, nickel, zinc and TRH F3	Samples to be screened using PID. Observations of staining, odours or other unexpected finds to be recorded. Photographs to be taken. Disposal dockets to be retained (if applicable).
Excavation walls, only in the north-western section of the remediation area that adjoin the proposed landscaped/ unimproved areas (i.e. the areas of the site adjoining the remediation area that will not be paved/hardstand)	One sample per 20m lineal, targeting the top 0.2m of soil/fill (minimum of one sample per wall for wall lengths less than 20m). Additional samples are to be collected targeting any potentially impacted areas identified during the visual/olfactory assessment.	Copper, chromium, nickel, zinc and TRH F3	As above

Aspect	Sampling	Analysis	Observations and Documentation
Re-location/placement Area			
Re-location/ placement area	Not required	Not required	Placement area for the remediated soil/fill is to be documented via survey. This is to confirm that the material has not been placed less than 10m from the edge of the warehouse/hardstand footprint.

6.2 Validation Assessment Criteria and Data Assessment

The Validation Assessment Criteria (VAC) to be adopted for the validation assessment are as follows:

- Copper 308mg/kg;
- Chromium (total) 673mg/kg;
- Nickel 295mg/kg;
- Zinc 742mg/kg; and
- TRH F3 2,500mg/kg.

The VAC were established based on the site specific Ecological Investigation Levels (EILs) and Ecological Screening Levels (ESLs) derived during the Stage 1/Stage 2 ESA. These criteria are also suitably protective of human health under the proposed development scenario.

Data should be assessed as above or below the VAC. Statistical analysis should not be applied.

6.3 Validation Report

As part of the validation process, a validation report will be prepared by the validation consultant. The report will outline the remediation work undertaken and any deviations to the remediation strategy. The report will summarise the results of the validation assessment and will be prepared in accordance with the Guidelines for Consultants Reporting on Contaminated Sites (2011). The report will address the following key questions:

1) Was the remediation undertaken in accordance with the RAP?
2) Were there any deviations to the RAP? If so, what were they and did they affect the success of the remediation/validation?
3) Were there any unexpected finds during remediation, and were these adequately addressed?
4) Has the remediation area been successfully validated?
5) Has the remediation goal been achieved?

6.4 Data Quality

Appropriate QA/QC samples should be obtained during the validation and analysed for the contaminants of concern. As a minimum, QA/QC sampling should include duplicates (5% inter-laboratory and 5% intra-laboratory) and rinsate samples (of any re-usable sampling equipment). Trip spikes and blanks are not considered to be necessary as the contaminants of concern do not include volatile compounds.

Data Quality Objectives (DQOs) and Data Quality Indicators (DQIs) should be clearly outlined and assessed as part of the validation process. A framework for the DQO and DQI process is outlined below and should be reflected in the validation report.

DQOs should be established for the validation with regards to the seven-step process outlined in the Site Auditor Guidelines 2006 and with reference to USEPA documents Data Quality Objectives Processes for Hazardous Waste Site Investigations (2000) and Guidance on Systematic Planning Using the Data Quality Objectives Process (2006). The seven steps include the following:

- State the problem;
- Identify the decisions/goal of the study;
- Identify information inputs;
- Define the study boundary;
- Develop the analytical approach/decision rule;
- Specify the performance/acceptance criteria; and
- Optimise the design for obtaining the data.

DQIs are to be assessed based on field and laboratory considerations for precision, accuracy, representativeness, completeness and comparability.

7 CONTINGENCY PLAN

A review of the proposed remediation works has indicated that the greatest risk that may affect the success of the remediation is an unexpected find. A contingency plan for unexpected finds is outlined below, in conjunction with a selection of other contingencies that may apply to this project.

7.1 Unexpected Finds

Residual hazards that may exist would generally be expected to be detectable through visual or olfactory means. These types of hazards may include: underground tanks, asbestos in soil, and odorous or stained hydrocarbon impacted soils.

The procedure to be followed in the event of an unexpected find is presented below:

- In the event of an unexpected find, all work in the immediate vicinity should cease and the client should be contacted immediately;
- Temporary barricades should be erected to isolate the area from access to the public and workers;
- In the event potential asbestos material is encountered, a qualified occupational hygienist and/or asbestos consultant should be contacted (preferably the validation consultant will have an in-house hygienist or asbestos assessor);
- The client should engage a qualified environmental consultant to attend the site and assess the extent of remediation that may be required and/or adequately characterise the contamination in order to allow for cap and containment of the material. If the find occurs during the remediation, the validation consultant is to undertake the work;
- In the event remediation is required, the procedures outlined within this report should be adopted where appropriate, alternatively an addendum RAP should be prepared;
- An additional sampling and analytical rationale should be established by the consultant and should be implemented with reference to the relevant guideline documents; and
- Appropriate validation sampling should be undertaken and the results should be included in the validation report.

7.2 Soil Vapour Contamination

In the event that potential soil vapour contamination is identified or is suspected during any inspection, additional soil vapour sampling using active soil vapour sampling techniques (and potentially additional groundwater sampling) may be required.

A Tier 2 human health risk assessment may be appropriate to establish the risk to the receptors under the proposed development scenario. This would need to be considered by the validation consultant in conjunction with the other project stakeholders.

7.3 Continual Soil Validation Failure

In the event of a soil validation failure when validating the removal of soil/fill from the remediation area, the excavation should be extended in the direction of the failure (in consultation with the validation consultant) and the area re-validated.

7.4 Disposal of Hazardous Waste

Hazardous waste has not been identified at the site to date. In the event of an unexpected find that triggers a need for off-site disposal of soil, any material classed as 'Hazardous Waste' under the Waste Classification Guidelines may require further assessment and stabilisation prior to off-site disposal. Disposal approval may also be required from the receiving facility.

8 SITE MANAGEMENT PLAN FOR REMEDIATION WORKS

The information outlined in this section of the RAP is for the remediation work only. The client should contact the local consent authority (council or certifier) for specific site management requirements for the overall development of the site.

8.1 Interim Site Management

No significant interim site management measures are considered necessary at this stage. The vegetation will be required to be slashed/removed and some of the soil stockpiles will be relocated prior to the commencement of the remediation works.

8.2 Project Contacts

Emergency procedures and contact telephone numbers should be displayed in a prominent position at the development area entrance gate and within the main working areas. The contact details of key project personnel are summarised below.

Table 8-1: Project Contacts

Task	Company	Contact Details
Project Manager	Cadence Property Group (Mitchell Kent)	(03) 9999 0929
Remediation Contractor	To be appointed	-
Environmental Consultant	EIS (at the time of the RAP preparation)	9888 5000
Certifier	To be appointed	-
NSW EPA	Pollution Line	131 555
Emergency Services	Ambulance, Police, Fire	000

8.3 Security

Prior to the commencement of site works, fencing should be installed as required to secure the site/ remediation area. Warning signs should be erected, which outline the PPE required for remediation work. All excavations should be clearly marked and secured to reduce the risk to site personnel from injury by falling into open excavations.

8.4 Timing and Sequencing of Remediation Works

All remedial works should be completed as part of the bulk earthworks prior to the commencement of construction works for the proposed development. In the event that remedial works are undertaken in conjunction with construction works for the development, all remediation areas should be clearly

marked and covered with builder's plastic (or similar) in order to reduce the dust generation, surface water run-off and/or exposure to receptors.

In the event of unexpected delays, builder's plastic (or similar) should be used to cover the remediation areas in order to reduce the dust generation, surface water run-off and/or exposure to receptors.

8.5 Site Soil and Water Management Plan

The contractor should prepare a detailed soil and water management plan prior to the commencement of site works. Silt fences should be used to control the surface water runoff at all appropriate locations of the site area. Reference should be made to the consent conditions for more details.

All stockpiled materials should be placed within an erosion containment boundary with silt fences and sandbags employed to limit sediment movement. No liquid waste or runoff should be discharged to the stormwater or sewerage system without the approval of the appropriate authorities.

8.6 Noise and Vibration Control Plan

The guidelines for minimisation of noise on construction sites outlined in AS-2460 (2002)[9] should be adopted. Other measures specified in the consent conditions should also be complied with. Noise producing machinery and equipment should only be operated between the hours approved by Council (refer to consent documents).

All practicable measures should be taken to reduce the generation of noise and vibration to within acceptable limits. In the event that short-term noisy operations are necessary, and where these are likely to affect residences, notifications should be provided to the relevant authorities and the residents by the project manager, specifying the expected duration of the noisy works.

8.7 Dust Control Plan

All practicable measures should be taken to reduce dust emanating from the site. Factors that contribute to dust production are:

- Wind over a cleared surface;
- Wind over stockpiled material; and
- Movement of machinery in unpaved areas.

Visible dust should not be present at the site boundary. Measures to minimise the potential for dust generation include:

- Use of water sprays on unsealed or exposed soil surfaces;
- Covering of stockpiled materials and excavation faces (particularly during extended periods of site inactivity and/or during windy conditions) or alternatively the erection of hessian fences around stockpiled soil or large exposed areas of soil;

[9] Australian Standard, (2002). *AS2460: Acoustics - Measurement of the Reverberation Time in Rooms.*

- Establishment of dust screens consisting of a 2m high shade cloth or similar material secured to a chain wire fence;
- Maintenance of dust control measures;
- Stopping work during strong winds; and
- Loading or unloading of dry soil as close as possible to stockpiles to prevent spreading of loose material around the site.

Dust monitoring is to be considered (where required) under the contractor's soil and water management plan. If excessive dust is generated all site activities should cease until either wind conditions are more acceptable or a revised method of excavation/remediation is developed.

Dust is also produced during the transfer of material to and from the site. All material should be covered during transport and should be properly disposed of on delivery. No material is to be left in an exposed, un-monitored condition.

All equipment and machinery should be brushed or washed down before leaving the site to limit dust and sediment movement off-site. In the event of prolonged rain and lack of paved areas all vehicles should be washed down prior to exit from the site, and any soil or dirt on the wheels of the vehicles removed. Water used to clean the vehicles should be collected and tested prior to appropriate disposal under the Waste Classification Guidelines.

8.8 Odour Control Plan

All activities undertaken at the site should be completed in a manner that minimises emissions of smoke, fumes and vapour into the atmosphere and any odours arising from the works or stockpiled material should be controlled. Control measures may include:

- Maintenance of construction equipment so that exhaust emissions comply with the Clean Air Regulations issued under the POEO Act;
- Demolition materials and other combustible waste should not be burnt on site;
- The spraying of a suitable proprietary product to suppress any odours that may be generated by excavated materials; and
- Use of protective covers (e.g. tarpaulins or builder's plastic).

All practicable measures should be taken to reduce fugitive emissions emanating from the site so that associated odours do not constitute a nuisance and that the ambient air quality is not adversely impacted.

Excavation of odorous soil is not expected as part of the remediation. In the event of an unexpected find of odorous soil, the following odour management plan should be implemented to limit the exposure of site personnel and surrounding land users to unpleasant odours:

- Excavation and stockpiling of material should be scheduled during periods with low winds if possible;

- A suitable proprietary product could be sprayed on material during excavation and following stockpiling to reduce odours;
- All complaints from workers and neighbours should be logged and a response provided. Work should be rescheduled as necessary to minimise odour problems;
- The site foreman should consider the following odour control measures as outlined in NEPM:
  - reduce the exposed surface of the odorous materials;
  - time excavation activities to reduce off-site nuisance (particularly during strong winds); and
  - cover exposed excavation faces overnight or during periods of low excavation activity.
- If continued complaints are received, alternative odour management strategies should be considered and implemented.

8.9 Health and Safety Plan

A site specific WHS plan should be prepared by the contractor for all work to be undertaken at the site. The WHS plan should meet all the requirements outlined in SafeWork NSW WHS regulations.

As a minimum requirement, personnel must wear appropriate protective clothing, including long sleeve shirts, long trousers and steel cap boots. Gloves and eye protection should be worn when working on remediation activities. Washroom and lunchroom facilities should also be provided to allow workers to remove potential contamination from their hands and clothing prior to eating or drinking.

8.10 Waste Management

Prior to commencement of remedial works and excavation for the proposed development, the contractor should develop a waste management or recycling plan to minimise the amount of waste produced by the development area. This should, as a minimum, include measures to recycle and re-use natural excavated material wherever possible.

8.11 Incident Management Contingency

The validation consultant should be contacted if any unexpected conditions are encountered at the site. This should enable the scope of remedial/validation works to be adjusted as required. Similarly if any incident occurs at the site, the validation consultant should be advised to assess potential impacts on contamination conditions and the remediation/validation timetable.

8.12 Hours of Operation

Hours of operation should be between those approved by Council under the development approval process. Reference should also be made to any specific conditions imposed by other consent authority/regulatory bodies.

9 CONCLUSION

EIS are of the opinion that the remediation goal can be achieved provided this RAP is implemented accordingly. A validation report should be prepared on completion of remediation activities and should be submitted to the consent authority.

9.1 Remediation Category

Remediation can fall under the following two categories outlined in SEPP55:

Table 9-1: Remediation Category

Category	Details
Category 1	Category 1 remediation works are those undertaken in the following areas specified under Clause 9 of SEPP55: A designated development; • Carried out on land declared to be a critical habitat; • Development for which another SEPP or REP requires a development consent; or • Carried out in an area or zone classified as: ➢ Coastal Protection; ➢ Conservation or heritage conservation; ➢ Habitat protection, or habitat or wildlife corridor; ➢ Environmental protection; ➢ Escarpment, escarpment protection or preservation; ➢ Floodway or wetland; ➢ Nature reserve, scenic area or scenic protection; etc. • Work that is not carried out in accordance with the site management provisions contained in the consent authority Development Control Plan (DCP)/Local Environmental Plan (LEP) etc. Approval is required from the consent authority for Category 1 remediation work. The RAP needs to be assessed and determined either as part of the existing DA or as a new and separate DA. Category 1 remediation work is identified as advertised development work unless the remediation work is a designated development or a state significant development (Part 6 of EPAA Regulation 1994). The client's planner Willow Tree Planning have assessed and confirmed that the remediation on site falls under the Category 1 Remediation Work. The confirmation letter, dated 23 January 2019, is attached in the appendices. This RAP is to be provided to Council as part of the DA.
Category 2	Remediation works which do not fall under the above category are classed as Category 2. Development consent is not required for Category 2 remediation works, however the consent authority should be given 30 days' notice prior to commencement of works.

9.2 Regulatory Requirements

The regulatory requirements applicable for the proposed development at the site are outlined in the following table:

Table 9-2: Regulatory Requirement

Guideline	Applicability
Duty to Report Contamination (2015)[10]	At this stage, EIS consider that there is no requirement to notify the NSW EPA of the site contamination. This requirement should be reassessed following review of the validation results.
POEO Act 1997	Section 143 of the POEO Act 1997 states that if waste is transported to a place that cannot lawfully be used as a waste facility for that waste, then the transporter and owner of the waste are each guilty of an offence. The transporter and owner of the waste have a duty to ensure that the waste is disposed of in an appropriate manner. Appropriate waste tracking is required for all waste that is disposed off-site. Asbestos waste must be tracked using WasteLocate.
WHS Code of Practice 2016[11]	Sites with asbestos become a 'workplace' when work is carried out there and require a register and asbestos management plan. Appropriate SafeWork NSW notification will be required for asbestos removal works or handling (i.e. in the event of an unexpected find). Contractors are also required to be appropriately licensed for the asbestos works undertaken (i.e. bonded or friable asbestos works).

[10] NSW EPA, (2015). *Guidelines on the Duty to Report Contamination under the Contamination Land Management Act 1997.* (referred to as Duty to Report Contamination 2015)

[11] Safe Work Australia, (2016). *Code of Practice – How to Manage and Control Asbestos in the Workplace.*

10 LIMITATIONS

The report limitations are outlined below:

- EIS accepts no responsibility for any unidentified contamination issues at the site. Any unexpected problems/subsurface features that may be encountered during development works should be inspected by an environmental consultant as soon as possible;
- Previous use of this site may have involved excavation for the foundations of buildings, services, and similar facilities. In addition, unrecorded excavation and burial of material may have occurred on the site. Backfilling of excavations could have been undertaken with potentially contaminated material that may be discovered in discrete, isolated locations across the site during construction work;
- This report has been prepared based on site conditions which existed at the time of the investigation; scope of work and limitation outlined in the EIS proposal; and terms of contract between EIS and the client (as applicable);
- The conclusions presented in this report are based on investigation of conditions at specific locations, chosen to be as representative as possible under the given circumstances, visual observations of the site and immediate surrounds and documents reviewed as described in the report;
- Subsurface soil and rock conditions encountered between investigation locations may be found to be different from those expected. Groundwater conditions may also vary, especially after climatic changes;
- The investigation and preparation of this report have been undertaken in accordance with accepted practice for environmental consultants, with reference to applicable environmental regulatory authority and industry standards, guidelines and the assessment criteria outlined in the report;
- Where information has been provided by third parties, EIS has not undertaken any verification process, except where specifically stated in the report;
- EIS has not undertaken any assessment of off-site areas that may be potential contamination sources or may have been impacted by site contamination, except where specifically stated in the report;
- EIS accept no responsibility for potentially asbestos containing materials that may exist at the site. These materials may be associated with demolition of pre-1990 constructed buildings or fill material at the site;
- EIS have not and will not make any determination regarding finances associated with the site;
- Additional investigation work may be required in the event of changes to the proposed development or landuse. EIS should be contacted immediately in such circumstances;
- Material considered to be suitable from a geotechnical point of view may be unsatisfactory from a soil contamination viewpoint, and vice versa; and
- This report has been prepared for the particular project described and no responsibility is accepted for the use of any part of this report in any other context or for any other purpose.

LIST OF IN-TEXT TABLES

Table 2-1: Site Identification **3**
Table 2-2: CSM **8**
Table 5-1: Consideration of Remediation Options **12**
Table 5-1: Remediation Details **15**
Table 6-1: Validation Requirements **17**
Table 8-1: Project Contacts **22**
Table 9-1: Remediation Category **26**
Table 9-2: Regulatory Requirement **27**

IMPORTANT INFORMATION ABOUT THIS REPORT

These notes have been prepared by EIS to assist with the assessment and interpretation of this report.

The Report is based on a Unique Set of Project Specific Factors:
This report has been prepared in response to specific project requirements as stated in the EIS proposal document which may have been limited by instructions from the client. This report should be reviewed, and if necessary, revised if any of the following occur:

- The proposed land use is altered;
- The defined subject site is increased or sub-divided;
- The proposed development details including size, configuration, location, orientation of the structures or landscaped areas are modified;
- The proposed development levels are altered, eg addition of basement levels; or
- Ownership of the site changes.

EIS/J&K will not accept any responsibility whatsoever for situations where one or more of the above factors have changed since completion of the assessment. If the subject site is sold, ownership of the assessment report should be transferred by EIS to the new site owners who will be informed of the conditions and limitations under which the assessment was undertaken. No person should apply an assessment for any purpose other than that originally intended without first conferring with the consultant.

Changes in Subsurface Conditions:
Subsurface conditions are influenced by natural geological and hydrogeological process and human activities. Groundwater conditions are likely to vary over time with changes in climatic conditions and human activities within the catchment (e.g. water extraction for irrigation or industrial uses, subsurface waste water disposal, construction related dewatering). Soil and groundwater contaminant concentrations may also vary over time through contaminant migration, natural attenuation of organic contaminants, ongoing contaminating activities and placement or removal of fill material. The conclusions of an assessment report may have been affected by the above factors if a significant period of time has elapsed prior to commencement of the proposed development.

This Report is based on Professional Interpretations of Factual Data:
Site assessments identify actual subsurface conditions at the actual sampling locations at the time of the investigation. Data obtained from the sampling and subsequent laboratory analyses, available site history information and published regional information is interpreted by geologists, engineers or environmental scientists and opinions are drawn about the overall subsurface conditions, the nature and extent of contamination, the likely impact on the proposed development and appropriate remediation measures.

Actual conditions may differ from those inferred, because no professional, no matter how qualified, and no subsurface exploration program, no matter how comprehensive, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than an assessment indicates. Actual conditions in areas not sampled may differ from predictions. Nothing can be done to prevent the unanticipated, but steps can be taken to help minimise the impact. For this reason, site owners should retain the services of their consultants throughout the development stage of the project, to identify variances, conduct additional tests which may be needed, and to recommend solutions to problems encountered on site.

Assessment Limitations:
Although information provided by a site assessment can reduce exposure to the risk of the presence of contamination, no environmental site assessment can eliminate the risk. Even a rigorous professional assessment may not detect all contamination on a site. Contaminants may be present in areas that were not surveyed or sampled, or may migrate to areas which showed no signs of contamination when sampled. Contaminant analysis cannot possibly cover every type of contaminant which may occur; only the most likely contaminants are screened.

Misinterpretation of Site Assessments by Design Professionals:

Costly problems can occur when other design professionals develop plans based on misinterpretation of an assessment report. To minimise problems associated with misinterpretations, the environmental consultant should be retained to work with appropriate professionals to explain relevant findings and to review the adequacy of plans and specifications relevant to contamination issues.

Logs Should not be Separated from the Assessment Report:
Borehole and test pit logs are prepared by environmental scientists, engineers or geologists based upon interpretation of field conditions and laboratory evaluation of field samples. Logs are normally provided in our reports and these should not be re-drawn for inclusion in site remediation or other design drawings, as subtle but significant drafting errors or omissions may occur in the transfer process. Photographic reproduction can eliminate this problem, however contractors can still misinterpret the logs during bid preparation if separated from the text of the assessment. If this occurs, delays, disputes and unanticipated costs may result. In all cases it is necessary to refer to the rest of the report to obtain a proper understanding of the assessment. Please note that logs with the 'Environmental Log' header are not suitable for geotechnical purposes as they have not been peer reviewed by a Senior Geotechnical Engineer.

To reduce the likelihood of borehole and test pit log misinterpretation, the complete assessment should be available to persons or organisations involved in the project, such as contractors, for their use. Denial of such access and disclaiming responsibility for the accuracy of subsurface information does not insulate an owner from the attendant liability. It is critical that the site owner provides all available site information to persons and organisations such as contractors.

Read Responsibility Clauses Closely:
Because an environmental site assessment is based extensively on judgement and opinion, it is necessarily less exact than other disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. To help prevent this problem, model clauses have been developed for use in written transmittals. These are definitive clauses designed to indicate consultant responsibility. Their use helps all parties involved recognise individual responsibilities and formulate appropriate action. Some of these definitive clauses are likely to appear in the environmental site assessment, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to any questions.

REPORT FIGURES

AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM, 29 DEC 2018.

This plan should be read in conjunction with the EIS report.

Title: **SITE LOCATION PLAN**

Location: 128 ANDREWS ROAD
PENRITH, NSW

Report No: E31675KR

Figure No: 1

ENVIRONMENTAL INVESTIGATION SERVICES

EIS

PLOT DATE: 31/01/2019 4:52:23 PM DWG FILE: S:\5 EIS\5C EIS JOBS\31000'S\E31675KR PENRITH\CAD\E31675KR_RAP.DWG

LAMBRIDGE PLACE

3 x ASTs (CALTEX)

BH188(0.65) BH184(0.4) BH177(1.0) BH189(>0.9) BH171(0.7) BH101(0.85) BH185(0.5) BH165(0.5) MW203(0.3) BH102(0.5) BH178(0.8) BH159(0.55) BH172(0.45) BH153(0.4) BH179(0.5) MW166(0.25) BH186(1.1) BH173(0.4) BH3(0.0) BH147(0.6) MW204(0.3) BH160(0.45) BH141(0.7) BH167(0.5) BH154(0.3) BH135(0.6) BH180(0.5) BH148(0.4) BH161(0.4) BH174(0.4) BH4(0.0) BH129(0.4) MW181(0.4) MW202(0.4) BH168(0.3) BH142(0.3) BH155(0.6) BH123(0.35) F2 BH136(0.35) BH149(0.4) BH5(0.0) BH162(0.4) BH130(0.45) BH117(0.6) BH175(0.4) BH143(0.3) BH111(0.5) BH182(0.7) BH156(0.4) BH124(0.3) BH169(0.2) MW137(0.5) BH107(0.45) BH187(0.6) BH150(0.3) BH1(0.0) BH131(0.35) BH118(0.5) BH104(0.4) BH163(0.35) BH144(0.4) BH112(0.4) BH183(0.5) BH157(0.3) BH125(0.5) BH176(1.0) BH138(0.4) BH108(0.4) MW170(0.5) BH119(0.5) BH151(0.3) MW201(0.4) BH132(0.4) BH105(0.2) SW1 SS1 BH164(0.4) BH145(0.2) BH113(0.4) BH126(0.4) BH158(0.4) BH139(0.7) BH109(0.3) BH120(0.4) BH152(0.35) BH2(0.0) BH133(0.4) BH106(0.3) BH114(0.6) BH127(0.3) BH146(0.35) BH140(0.4) BH110(0.5) BH121(0.7) BH134(0.35) BH115(0.4) BH128(0.25) BH122(0.4) BH116(0.65) AST

BH103(0.4)

AERIAL IMAGE SOURCE: NEARMAP.COM, 08 APR 2018.

LEGEND

- APPROXIMATE SITE BOUNDARY
- BH (Fill Depth) — BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m), (EIS AUGUST 2018)
- MW137(Fill Depth) — GROUND WATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m), (EIS AUGUST 2018)
- MW201(Fill Depth) — GROUND WATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m), (EIS 5 & 6 NOV 2018)
- BH (Fill Depth) — BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m), (JK GEOTECHNICS JULY 2018)
- SW — SURFACE WATER SAMPLE
- SS — SURFACE SAMPLE
- F — FIBRE CEMENT FRAGMENT
- STOCKPILE (SP)

0 20 40 60 80 100
SCALE 1:2000 @A3 METRES

This plan should be read in conjunction with the EIS report.

Title: **SAMPLE LOCATION PLAN**

Location: 128 ANDREWS ROAD PENRITH, NSW

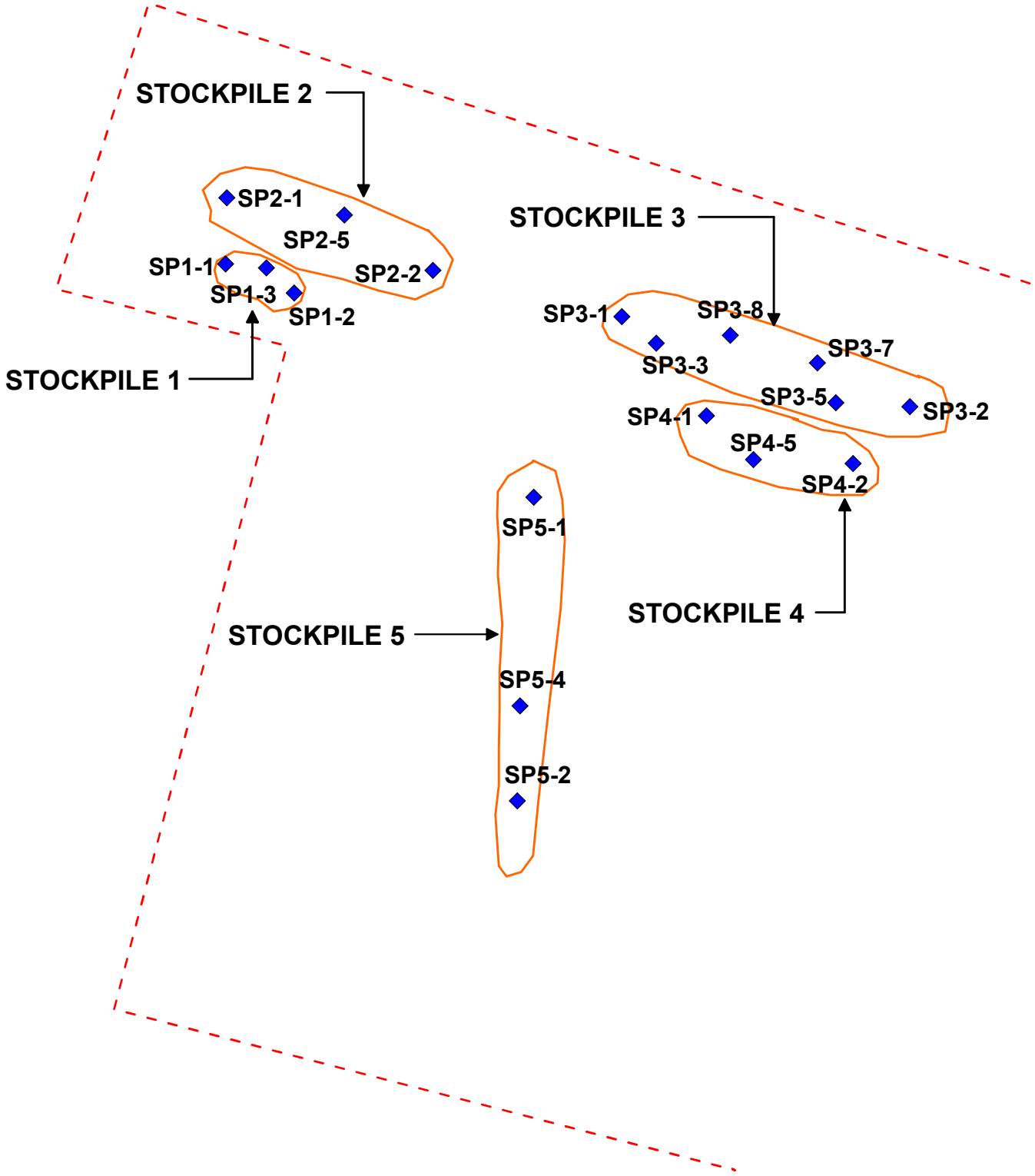
Report No: E31675KR

Figure No: 2

ENVIRONMENTAL INVESTIGATION SERVICES

EIS

PLOT DATE: 31/01/2019 6:00:38 PM DWG FILE: S:\S EIS\5C EIS..\OBS\31000'S\E31675KR PENRITH\CAD\E31675KR_RAP.DWG



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This plan should be read in conjunction with the report.

ENVIRONMENTAL INVESTIGATION SERVICES
www.jkgroup.net.au

STOCKPILE SAMPLE LOCATION PLAN

128 ANDREWS ROAD, PENRITH

PROJECT ID: E31675KR

F3

LAMBRIDGE PLACE

BH185	0.0-0.2
COPPER	1700
ZINC	1700
DUPAM9	
COPPER	8400
ZINC	7400

BH179	0.0-0.2
COPPER	1700
ZINC	2600
TRH F3	2600
DUPAM7	
COPPER	1900
ZINC	2600

BH4	0.0-0.2
CHROMIUM	930
COPPER	1500
NICKEL	660

BH182	0.0-0.1
COPPER	760
ZINC	800

BH187	0.0-0.2
COPPER	570
DUPAM14	
COPPER	370

BH183	0.0-0.2
COPPER	6800
ZINC	17000
DUPAM16	
COPPER	6600
ZINC	12000

SS1	-
CHROMIUM	1900
COPPER	7200
ZINC	7300
TRH F3	7600
TRH F3	7600

3 x ASTs (CALTEX)

AST

BH188(0.65) BH184(0.4) BH177(1.0) BH189(0.9) BH171(0.7) BH101(0.85) BH185(0.5) BH165(0.5) BH102(0.5) BH178(0.8) MW203(0.3) BH159(0.55) BH172(0.45) BH153(0.4) BH179(0.5) MW166(0.25) BH186(1.1) BH173(0.4) BH3(0.0) BH147(0.6) MW204(0.3) BH160(0.45) BH141(0.7) BH167(0.5) BH154(0.3) BH180(0.5) BH135(0.6) BH148(0.4) BH161(0.4) BH174(0.4) BH129(0.4) BH4(0.0) BH142(0.3) MW181(0.4) MW202(0.4) BH168(0.3) BH155(0.6) BH123(0.35) F2 BH136(0.35) BH149(0.4) BH5(0.0) BH162(0.4) BH117(0.6) BH130(0.45) BH143(0.3) BH111(0.5) BH175(0.4) BH182(0.7) BH169(0.2) BH156(0.4) MW137(0.5) BH124(0.3) BH107(0.45) BH150(0.3) BH1(0.0) BH118(0.5) BH187(0.6) BH131(0.35) BH104(0.4) BH163(0.35) BH144(0.4) BH125(0.5) BH112(0.4) BH183(0.5) BH157(0.3) BH138(0.4) BH176(1.0) BH119(0.5) BH108(0.4) MW170(0.5) BH151(0.3) BH132(0.4) MW201(0.4) BH113(0.4) BH105(0.2) SW1 SS1 BH164(0.4) BH145(0.2) BH126(0.4) BH158(0.4) BH139(0.7) BH109(0.3) BH120(0.4) BH152(0.35) BH2(0.0) BH133(0.4) BH106(0.3) BH114(0.6) BH127(0.3) BH146(0.35) BH140(0.4) BH110(0.5) BH121(0.7) BH134(0.35) BH115(0.4) BH128(0.25) BH122(0.4) BH116(0.65) BH103(0.4)

LEGEND

- APPROXIMATE SITE BOUNDARY
- BH (Fill Depth) — BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m), (EIS AUGUST 2018)
- MW137(Fill Depth) — GROUND WATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m), (EIS AUGUST 2018)
- MW201(Fill Depth) — GROUND WATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m), (EIS 5 & 6 NOV 2018)
- BH (Fill Depth) — BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m), (JK GEOTECHNICS JULY 2018)
- SW — SURFACE WATER SAMPLE
- SS — SURFACE SAMPLE
- F — FIBRE CEMENT FRAGMENT
- STOCKPILE (SP)

SAMPLE ID	DEPTH (metres)
CHEMICAL	CONCENTRATION

- SOIL CONTAMINATION ABOVE SAC FOR MANAGEMENT LIMIT (mg/kg)
- SOIL CONTAMINATION ABOVE SAC FOR ECOLOGICAL RISK (mg/kg)

AERIAL IMAGE SOURCE: NEARMAP.COM, 08 APR 2018.

0 20 40 60 80 100
SCALE 1:2000 @A3 METRES

This plan should be read in conjunction with the EIS report.

Title: **SOILCONTAMINATION PLAN**

Location: 128 ANDREWS ROAD PENRITH, NSW

Report No: E31675KR

Figure No: 4

ENVIRONMENTAL INVESTIGATION SERVICES

EIS

PLOT DATE: 31/01/2019 5:27:45 PM DWG FILE: S:\5 EIS\5C EIS JOBS\31000'S\E31675KR PENRITH\CADIE\E31675KR_RAP.DWG

LAMBRIDGE PLACE

DEPTH RANGE			
No.	FROM DEPTH	TO DEPTH	COLOUR
1	-2.000	-1.500	
2	-1.500	-1.000	
3	-1.000	-0.500	
4	-0.500	0.000	
5	0.000	0.500	
6	0.500	1.000	
7	1.000	1.500	
8	1.500	2.000	
9	2.000	2.500	

BH185	0.0-0.2
COPPER	1700
ZINC	1700
DUPAM9	
COPPER	8400
ZINC	7400

BH179	0.0-0.2
COPPER	1700
ZINC	2600
TRH F3	2600
DUPAM7	
COPPER	1900
ZINC	2600

BH4	0.0-0.2
CHROMIUM	930
COPPER	1500
NICKEL	660

BH182	0.0-0.1
COPPER	760
ZINC	800

BH187	0.0-0.2
COPPER	570
DUPAM14	
COPPER	370

BH183	0.0-0.2
COPPER	6800
ZINC	17000
DUPAM16	
COPPER	6600
ZINC	12000

SS1	-
CHROMIUM	1900
COPPER	7200
ZINC	7300
TRH F3	7600
TRH F3	7600

BH188(0.65) BH184(0.4) BH177(1.0) BH189(>0.9) BH171(0.7) BH101(0.85) BH185(0.5) BH165(0.5) MW203(0.3) BH102(0.5) BH178(0.8) BH159(0.55) BH172(0.45) BH153(0.4) BH179(0.5) MW166(0.25) BH3(0.0) BH147(0.6) MW204(0.3) BH186(1.1) BH173(0.4) BH160(0.45) BH141(0.7) BH167(0.5) BH154(0.3) BH135(0.6) BH180(0.5) BH148(0.4) BH174(0.4) BH161(0.4) BH129(0.4) BH4(0.0) BH142(0.3) MW181(0.4) MW202(0.4) BH168(0.3) BH155(0.6) BH123(0.35) F2 BH136(0.35) BH149(0.4) BH162(0.4) BH5(0.0) BH117(0.6) BH130(0.45) BH182(0.7) BH175(0.4) BH143(0.3) BH111(0.5) BH169(0.2) BH156(0.4) MW137(0.5) BH124(0.3) BH107(0.45) BH187(0.6) BH150(0.3) BH1(0.0) BH118(0.5) BH104(0.4) BH163(0.35) BH131(0.35) BH144(0.4) BH112(0.4) BH183(0.5) BH125(0.5) BH176(1.0) BH157(0.3) BH138(0.4) BH108(0.4) MW170(0.5) BH151(0.3) BH119(0.5) MW201(0.4) BH132(0.4) BH105(0.2) SW1 SS1 BH164(0.4) BH145(0.2) BH126(0.4) BH113(0.4) BH158(0.4) BH139(0.7) BH109(0.3) BH120(0.4) BH2(0.0) BH133(0.4) BH106(0.3) BH152(0.35) BH114(0.6) BH127(0.3) BH146(0.35) BH140(0.4) BH110(0.5) BH121(0.7) BH134(0.35) BH115(0.4) BH128(0.25) BH122(0.4) BH116(0.65) BH103(0.4)

PROPOSED WAREHOUSE BEL 25.62

AERIAL IMAGE SOURCE: NEARMAP.COM, 08 APR 2018.

LEGEND

- APPROXIMATE SITE BOUNDARY
- BH (Fill Depth) — BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m), (EIS AUGUST 2018)
- MW137(Fill Depth) — GROUND WATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m), (EIS AUGUST 2018)
- MW201(Fill Depth) — GROUND WATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m), (EIS 5 & 6 NOV 2018)
- BH (Fill Depth) — BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m), (JK GEOTECHNICS JULY 2018)
- SW — SURFACE WATER SAMPLE
- SS — SURFACE SAMPLE
- F — FIBRE CEMENT FRAGMENT
- STOCKPILE (SP)

SAMPLE ID	DEPTH (metres)
CHEMICAL	CONCENTRATION

- SOIL CONTAMINATION ABOVE SAC FOR MANAGEMENT LIMIT (mg/kg)
- SOIL CONTAMINATION ABOVE SAC FOR ECOLOGICAL RISK (mg/kg)

0 20 40 60 80 100
SCALE 1:2000 @A3 METRES

This plan should be read in conjunction with the EIS report.

Title: **PROPOSED CUT & FILL EARTHWORKS**

Location: 128 ANDREWS ROAD PENRITH, NSW

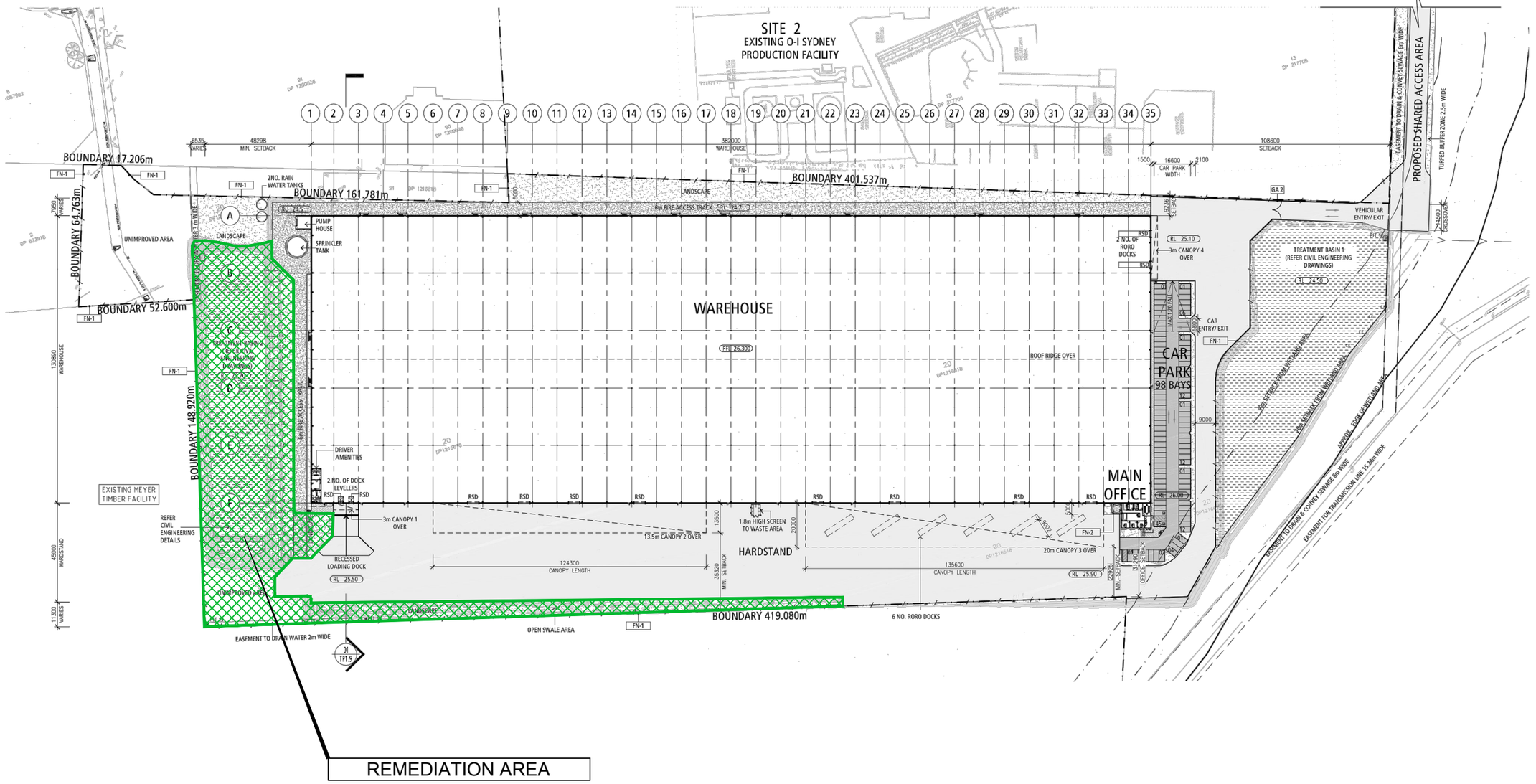
Report No: E31675KR

Figure No: 5

ENVIRONMENTAL INVESTIGATION SERVICES

EIS

PLOT DATE: 31/01/2019 5:44:40 PM DWG FILE: S:\5 EIS\5C EIS JOBS\31000'S\E31675KR PENRITH\CAD\E31675KR_RAP.DWG



SCALE	0 20 40 60 80 100 METRES, 1:2000 @A3
	This plan should be read in conjunction with the EIS report.
Title:	**REMEDIATION AREA**
Location:	128 ANDREWS ROAD PENRITH, NSW
Report No:	E31675KR
Figure No:	6
	ENVIRONMENTAL INVESTIGATION SERVICES

PLOT DATE: 31/01/2019 5:56:40 PM DWG FILE: S:\5 EIS\5C EIS JOBS\31000\SIE31675KR PENRITH\CAD\E31675KR_RAP.DWG

Appendix A: Copy of Borehole Logs

JK Geotechnics
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

BOREHOLE LOG

Borehole No. 1
1/1

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. 31675B
Date: 26/7/18
Method: SPIRAL AUGER JK300
Logged/Checked by: A.B./D.B.
R.L. Surface: ≈ 25.1m
Datum: AHD

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION AND AFTER 1.5 HRS						0			TOPSOIL: Silt, low plasticity, brown, trace of roots.	w<PL			GRASS COVER
					N = 8 9,5,3			ML	SILT: low plasticity, orange brown, trace of fine grained sand, and clay.	w<PL	(St-VSt)		ALLUVIAL TOO FRIABLE FOR HP TESTING
						1			as above, but with fine grained sand, and clay.				
					N = 7 3,3,4								TOO FRIABLE FOR HP TESTING
						2							
					N = 10 4,4,6	3			SILT: low plasticity, light brown, with fine grained sand, and clay.				TOO FRIABLE FOR HP TESTING
								GM	Sandy silty GRAVEL: medium to coarse grained, dark grey and grey sub rounded and sub angular gravel in a sandy silt, low plasticity, orange brown, fine grained sand matrix, trace of sub rounded and sub angular, dark grey cobbles.	D	D		HIGH 'TC' BIT RESISTANCE
						4			END OF BOREHOLE AT 3.7m				'TC' BIT REFUSAL
						5							
						6							
						7							

JK Geotechnics
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

BOREHOLE LOG

Borehole No. 2
1/1

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. 31675B
Date: 26/7/18
Method: SPIRAL AUGER JK300
Logged/Checked by: A.B./D.B.
R.L. Surface: ≈ 25.6m
Datum: AHD

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION AND AFTER 2 HRS	■					0		ML	SILT: low plasticity, brown, trace of roots.	w<PL	(St-VSt)		GRASS COVER
									as above, but without roots.				ALLUVIAL
				■	N = 16 16,9,7	1			SILT: low plasticity, orange brown, with fine grained sand, and clay.				TOO FRIABLE FOR HP TESTING
				■	N = 9 5,5,4	2		SM	Sandy SILT: low plasticity, orange brown, fine grained sand, with clay.				TOO FRIABLE FOR HP TESTING
					Nc= 7/20 REF	3		GM	Sandy silty GRAVEL: medium to coarse grained, dark grey and grey, sub rounded and sub angular gravel in a sandy silt, low plasticity, orange brown matrix, with sub rounded and sub angular cobbles.	D	D		HIGH 'TC' BIT RESISTANCE
									END OF BOREHOLE AT 3.1m				'TC' BIT REFUSAL
						4							
						5							
						6							
						7							

JK Geotechnics
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

BOREHOLE LOG

Borehole No. 3
1/1

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. 31675B
Date: 26/7/18

Method: SPIRAL AUGER
JK300

Logged/Checked by: A.B./D.B.

R.L. Surface: ≈ 24.6m
Datum: AHD

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■					0		ML	SILT: low plasticity, brown, trace of roots.	w<PL	(St-VSt)		GRASS COVER
									as above, but without roots.				ALLUVIAL
				■	N = 15 8,8,7	1			SILT: low plasticity, orange brown, trace of fine to coarse grained sand, and clay.				TOO FRIABLE FOR HP TESTING
				■	N = 6 2,3,3	2			as above, but with fine grained sand, and clay.				TOO FRIABLE FOR HP TESTING
				■	N = 9 6,4,5	3		SM	Sandy SILT: low plasticity, light brown, fine to medium grained sand, with clay.				
								GM	Sandy silty GRAVEL: medium to coarse grained, dark grey and grey, sub rounded and sub angular gravel in a sandy silt, low plasticity, light brown matrix, fine to medium grained sand.	M	D		HIGH 'TC' BIT RESISTANCE
						4			END OF BOREHOLE AT 3.75m				'TC' BIT REFUSAL
						5							
						6							
						7							

JK Geotechnics
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

BOREHOLE LOG

Borehole No. 4
1/1

Client: CADENCE PROPERTY GROUP PTY LTD
Project: PROPOSED WAREHOUSE
Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. 31675B
Date: 26/7/18
Method: SPIRAL AUGER JK300
Logged/Checked by: A.B./D.B.
R.L. Surface: ≈ 24.1m
Datum: AHD

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION AND AFTER 3 HRS						0		-	TOPSOIL: Silty clay, low plasticity, dark brown, trace of roots, and ash.	w<PL			GRASS COVER
									as above, but without roots.				
					N = 5 3,2,3			ML	Clayey SILT: low plasticity, light brown.	w>PL	St	150 130 110	ALLUVIAL
						1							
									as above, but light brown mottled orange brown, trace of fine to medium grained ironstone gravel, and fine grained sand.		VSt		
					N = 14 6,6,8							230 250 310	
						2							
					N = 15 5,6,9	3					St-VSt	170 190 220	
								SM	Silty SAND: fine to medium grained, light grey and brown.	M	MD		
					N > 11 11,11/ 60mm			GM	Sandy silty GRAVEL: course grained, dark grey and grey sub rounded and sub angular gravel, in a sandy silt, low plasticity, orange brown, fine to medium grained sand matrix with grey sub rounded and sub angular cobbles.	M	D		HIGH 'TC' BIT RESISTANCE
					REFUSAL	5			END OF BOREHOLE AT 4.9m				'TC' BIT REFUSAL
						6							
						7							

Document Set ID: 8566509
Version: 1, Version Date: 08/02/2019

JK Geotechnics
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

BOREHOLE LOG

Borehole No. 5
1/1

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. 31675B
Date: 26/7/18

Method: SPIRAL AUGER
JK300

Logged/Checked by: A.B./D.B.

R.L. Surface: ≈ 24.8m
Datum: AHD

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLET-ION						0		ML	SILT: low plasticity, brown, trace of roots.	w<PL	(St-VSt)		GRASS COVER
									Clayey SILT: low plasticity, orange brown.				ALLUVIAL
				■	N = 16 9,10,6	1							TOO FRIABLE FOR HP TESTING
									SILT: low plasticity, orange brown, with clay, trace of fine grained sand, and clay.				
				■	N = 7 3,3,4	2							TOO FRIABLE FOR HP TESTING
								GM	Sandy silty GRAVEL: medium to coarse grained, dark grey and grey sub rounded and sub angular gravel in a sandy silt, low plasticity, orange brown, fine to medium grained sand matrix, trace of dark grey, sub rounded and sub angular cobbles.	D	D		HIGH 'TC' BIT RESISTANCE
						3			END OF BOREHOLE AT 3.0m				'TC' BIT REFUSAL
						4							
						5							
						6							
						7							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **101**

1/1

Environmental logs are not to be used for geotechnical purposes

DUPAM18 0.0-0.5

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 21/8/18 **Datum:**

Logged/Checked by: M.M.P./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Silt, low plasticity, light brown, trace of fine to coarse grained igneous gravel and concrete fragments.	w<PL			
							0.5			FILL: Clayey silt, low to medium plasticity, grey mottled brown, trace of fine to coarse grained igneous and ironstone gravel.				
							1		ML	Clayey SILT: low to medium plasticity, red mottled grey, trace of fine to coarse grained ironstone gravel.	w<PL			
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **102**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** HAND AUGER **R.L. Surface:** N/A

Date: 22/8/18 **Datum:**

Logged/Checked by: A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■				0			FILL: Clayey silt, low plasticity, dark grey, with organic material, trace of roots.	w>PL			WEED COVER
	■		■							as above, but brown mottled grey, trace of root fibres and ash.				
							0.5		ML	SILT: low plasticity, brown mottled light grey, trace of root fibres.	w>PL			
	■		■				1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **103**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 24/8/18 **Datum:**

Logged/Checked by: M.M.P./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Clayey silt, low plasticity, light brown, trace of root fibres and ash.	w<PL			GRASS COVER
							0.5		ML	Clayey SILT, low plasticity, brown, trace of root fibres.	w<PL			
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **104**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 24/8/18 **Datum:**

Logged/Checked by: M.M.P./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Silt, low plasticity, light brown, trace of root fibres and clay fines.	w<PL			GRASS COVER
							0.5		ML	Clayey SILT, low plasticity, red brown.	w<PL			
							1			END OF BOREHOLE AT 1.0m				REFUSAL ON INFERRED ROCK
							1.5							
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **105**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 24/8/18 **Datum:**

Logged/Checked by: M.M.P./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■				0			FILL: Silt, low plasticity, light brown, trace of root fibres.	w<PL			GRASS COVER
									ML	Clayey SILT, low plasticity, red brown, trace of ash.	w<PL			
	■		■				0.5							
									-	SILT: low plasticity, red brown, trace of clay fines.				
	■		■				1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **106**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 24/8/18 **Datum:**

Logged/Checked by: M.M.P./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■				0			FILL: Silt, low plasticity, light brown, trace of root fibres and clay fines.	w<PL			GRASS COVER
									ML	SILT, low plasticity, red brown, trace of clay fines and ash.	w<PL			
							0.5							
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **107**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 24/8/18 **Datum:**

Logged/Checked by: M.M.P./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Silt, low plasticity, light brown, trace of root fibres and clay fines.	w<PL			GRASS COVER
							0.5		ML	SILT, low plasticity, red brown, trace of clay fines.	w<PL			
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **108**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 24/8/18 **Datum:**

Logged/Checked by: M.M.P./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Silt, low plasticity, light brown, trace of root fibres.	w<PL			GRASS COVER
							0.5		ML	SILT, low plasticity, red brown, trace of clay fines.	w<PL			
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **109**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 24/8/18 **Datum:**

Logged/Checked by: M.M.P./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■				0			FILL: Silt, low plasticity, light brown, trace of root fibres, clay fines and ash.	w<PL			GRASS COVER
									ML	SILT, low plasticity, red brown, trace of ash.	w<PL			
	■		■				0.5							
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **110**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 24/8/18 **Datum:**

Logged/Checked by: A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Silt, low plasticity, light brown, trace of root fibres and ash.	w<PL			GRASS COVER
							0.5		ML	SILT, low plasticity, brown, trace of clay fines.	w<PL			
							1			SILT: low plasticity, red brown.				
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **111**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 24/8/18 **Datum:**

Logged/Checked by: A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Silt, low plasticity, light brown, trace of root fibres, clay fines and ash.	w<PL			GRASS COVER
							0.5		ML	SILT, low plasticity, red brown, trace of clay fines.	w<PL			
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **112**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 24/8/18 **Datum:**

Logged/Checked by: A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■				0			FILL: Silt, low plasticity, light brown, trace of root fibres.	w<PL			GRASS COVER
	■		■				0.5		ML	Clayey SILT, low plasticity, brown, trace of ash.	w<PL			
	■		■				1			SILT: low plasticity, red brown, trace of clay fines.				
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **113**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 24/8/18 **Datum:**

Logged/Checked by: A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■				0			FILL: Silt, low plasticity, light brown, trace of root fibres.	w<PL			GRASS COVER
							0.5		ML	SILT, low plasticity, red brown.	w<PL			
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **114**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 24/8/18 **Datum:**

Logged/Checked by: A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Silt, low plasticity, light brown, trace of root fibres, clay fines and ash.	w<PL			GRASS COVER
							0.5		ML	SILT, low plasticity, red brown, trace of clay fines and ash.	w<PL			
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **115**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 24/8/18 **Datum:**

Logged/Checked by: A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Silt, low plasticity, light brown, trace of root fibres, clay fines and ash.	w<PL			GRASS COVER
							0.5		ML	SILT, low plasticity, brown, trace of clay fines and ash.	w<PL			
							1			SILT: low plasticity, red brown.				
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **116**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 24/8/18 **Datum:**

Logged/Checked by: A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■				0			FILL: Silty clay, low to medium plasticity, light brown, trace of root fibres and ash.	w<PL			GRASS COVER
							0.5		ML	SILT, low plasticity, light yellow brown, trace of clay fines.	w<PL			
	■		■				1							
										END OF BOREHOLE AT 1.1m				REFUSAL ON INFERRED ROCK
							1.5							
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **117**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 24/8/18 **Datum:**

Logged/Checked by: A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Silt, low plasticity, light brown, trace of root fibres.	w<PL			GRASS COVER
							0.5		ML	SILT, low plasticity, red brown, trace of fine to coarse grained ironstone gravel.	w<PL			
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **118**

1/1

Environmental logs are not to be used for geotechnical purposes

DUPAM34 0.0-0.5

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 24/8/18 **Datum:**

Logged/Checked by: A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■				0			FILL: Clayey silt, low plasticity, light brown, trace of root fibres.	w<PL			GRASS COVER
	■		■				0.5		ML	SILT, low plasticity, red brown, trace of clay fines.	w<PL			
	■		■				1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **119**

1/1

Environmental logs are not to be used for geotechnical purposes

DUPAM33 0.0-0.5

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 24/8/18 **Datum:**

Logged/Checked by: A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■				0			FILL: Silt, low plasticity, light brown, trace of root fibres and clay fines.	w<PL			GRASS COVER
							0.5		ML	SILT, low plasticity, red brown.	w<PL			
	■		■				1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **120**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 23/8/18 **Datum:**

Logged/Checked by: M.M.P./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Silt, low plasticity, light brown, trace of root fibres, clay fines and ash.	w<PL			GRASS COVER
							0.5		ML	SILT, low plasticity, red brown.	w<PL			
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **121**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 23/8/18 **Datum:**

Logged/Checked by: M.M.P./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Silt, low plasticity, light brown, trace of root fibres and ash.	w<PL			GRASS COVER
							0.5		ML	SILT, low plasticity, red brown, trace of clay fines.	w<PL			
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **122**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 23/8/18 **Datum:**

Logged/Checked by: M.M.P./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Silt, low plasticity, light brown, trace of root fibres.	w<PL			GRASS COVER
							0.5		ML	SILT, low plasticity, red brown, trace of fine to coarse grained ironstone gravel.	w<PL			
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **123**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 23/8/18 **Datum:**

Logged/Checked by: M.M.P./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Silt, low plasticity, light brown, trace of root fibres and clay fines.	w<PL			GRASS COVER
							0.5		ML	SILT, low plasticity, red brown, trace of clay fines.	w<PL			
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **124**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 23/8/18 **Datum:**

Logged/Checked by: M.M.P./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■				0			FILL: Clayey silt, low plasticity, light brown, trace of root fibres.	w<PL			GRASS COVER
	■		■				0.5		ML	SILT, low plasticity, red brown.	w<PL			
	■		■				1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **125**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 23/8/18 **Datum:**

Logged/Checked by: M.M.P./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Clayey silt, low plasticity, light brown, trace of root fibres.	w<PL			GRASS COVER
							0.5		ML	Clayey SILT, low plasticity, red brown, trace of fine to coarse grained ironstone gravel.	w<PL			
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **126**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 23/8/18 **Datum:**

Logged/Checked by: M.M.P./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Silt, low plasticity, light brown, trace of root fibres and clay fines.	w<PL			GRASS COVER
							0.5		ML	SILT, low plasticity, red brown.	w<PL			
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **127**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 23/8/18 **Datum:**

Logged/Checked by: M.M.P./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■	■					0			FILL: Silt, low plasticity, light brown, trace of root fibres and ash.	w<PL			GRASS COVER
	■	■					0.5		ML	Clayey SILT, low plasticity, dark brown, trace of ash.	w<PL			
	■						1			SILT, low plasticity, red brown, trace of fine to coarse grained ironstone gravel and ash.				
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **128**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 23/8/18 **Datum:**

Logged/Checked by: M.M.P./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■				0			FILL: Silt, low plasticity, light brown, trace of root fibres.	w<PL			GRASS COVER
	■		■				0.5		ML	Clayey SILT, low plasticity, dark brown, trace of ash.	w<PL			
	■		■				1			SILT, low plasticity, red brown, trace of ash.				
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **129**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 23/8/18 **Datum:**

Logged/Checked by: A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■				0			FILL: Silt, low plasticity, light brown, trace of root fibres.	w<PL			GRASS COVER
	■		■				0.5		ML	SILT, low plasticity, red brown, trace of clay fines.	w<PL			
	■		■				1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **130**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 23/8/18 **Datum:**

Logged/Checked by: A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Silt, low plasticity, light brown, trace of root fibres.	w<PL			GRASS COVER
							0.5		ML	Clayey SILT, low plasticity, red brown.	w<PL			
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **131**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 23/8/18 **Datum:**

Logged/Checked by: A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■				0			FILL: Silt, low plasticity, light brown, trace of root fibres.	w<PL			GRASS COVER
							0.5		ML	SILT, low plasticity, red brown.	w<PL			
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **132**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 23/8/18 **Datum:**

Logged/Checked by: A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Silt, low plasticity, light brown, trace of root fibres and clay fines.	w<PL			GRASS COVER
							0.5		ML	SILT, low plasticity, red brown, trace of clay fines, and fine to coarse grained ironstone gravel.	w<PL			
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **133**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 23/8/18 **Datum:**

Logged/Checked by: A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Silt, low plasticity, light brown, trace of root fibres and clay fines.	w<PL			GRASS COVER
							0.5		ML	Clayey SILT: low plasticity, red brown.	w<PL			
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **134**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 23/8/18 **Datum:**

Logged/Checked by: A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Silt, low plasticity, light brown, trace of root fibres and clay fines.	w<PL			GRASS COVER
							0.5		ML	SILT: low plasticity, red brown, trace of clay fines.	w<PL			
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **135**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 23/8/18 **Datum:**

Logged/Checked by: A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Silt, low plasticity, light brown, trace of root fibres.	w<PL			GRASS COVER
							0.5		ML	SILT: low plasticity, red brown.	w<PL			
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **136**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 23/8/18 **Datum:**

Logged/Checked by: A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■				0			FILL: Clayey silt, low plasticity, light brown, trace of root fibres and ash.	w<PL			GRASS COVER
	■		■				0.5		ML	Clayey SILT: low plasticity, red brown.	w<PL			
	■		■				1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No.
137/MW137
1/2

Environmental logs are not to be used for geotechnical purposes

DUPAM1 0.5-0.95
DUPAM2 1.5-1.95

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** SPIRAL AUGER JK308 **R.L. Surface:** N/A

Date: 20/8/18 **Datum:**

Logged/Checked by: A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■				0			FILL: Silt, low plasticity, brown, trace of root fibres.	w<PL			WEED COVER
	■		■			N = 8 7,4,4	0.5		ML	SILT: low plasticity, orange brown, trace of fine to medium grained sand.	w<PL			
	■		■			N = 5 3,2,3	1							
	■		■			N = 4 3,1,3	1.5							
	■		■				2							
							2.5							
							3		GP	Sandy silty GRAVEL: fine to coarse grained, dark grey with low plasticity sandy silt, orange brown.	D			
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No.
137/MW137
2/2

Environmental logs are not to be used for geotechnical purposes

DUPAM1 0.5-0.95
DUPAM2 1.5-1.95

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** SPIRAL AUGER JK308 **R.L. Surface:** N/A

Date: 20/8/18 **Datum:**

Logged/Checked by: A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	■		■				4			Sandy silty GRAVEL: fine to coarse grained, dark grey with low plasticity sandy silt, orange brown.	D			
							4.5			END OF BOREHOLE AT 4.4m				REFUSAL ON GRAVEL GROUNDWATER MONITORING WELL INSTALLED TO 3.7m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 0.7m TO 3.7m. CASING 0.0m TO 0.7m. 2mm SAND FILTER PACK 0.5m TO 3.7m. BENTONITE SEAL 0.2m TO 0.5m. BACKFILLED WITH SAND TO THE SURFACE. COMPLETED WITH A CONCRETED GATIC COVER
							5							
							5.5							
							6							
							6.5							
							7							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **138**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 23/8/18 **Datum:**

Logged/Checked by: A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Silt, low plasticity, light brown, trace of root fibres and clay fines.	w<PL			GRASS COVER
							0.5		ML	SILT: low plasticity, red brown, trace of clay fines.	w<PL			
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **139**

1/1

Environmental logs are not to be used for geotechnical purposes

DUPAM31 0.0-0.5
DUPAM32 1.1-1.5

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 23/8/18 **Datum:**

Logged/Checked by: A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Silt, low plasticity, light brown, trace of root fibres.	w<PL			GRASS COVER
							0.5		ML	SILT: low plasticity, red brown, trace of clay fines.	w<PL			
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **140**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 23/8/18 **Datum:**

Logged/Checked by: M.M.P./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Silt, low plasticity, light brown, trace of root fibres and clay fines.	w<PL			GRASS COVER
							0.5		ML	SILT: low plasticity, red brown, trace of clay fines.	w<PL			
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **141**

1/1

Environmental logs are not to be used for geotechnical purposes

DUPAM27 0.0-0.35
DUPAM28 1.1-1.5

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 23/8/18 **Datum:**

Logged/Checked by: M.M.P./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Clayey silt, low plasticity, light brown, trace of root fibres.	w<PL			GRASS COVER
							0.5		ML	Clayey SILT: low plasticity, yellow brown, trace of fine to coarse grained ironstone gravel.	w<PL			
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **142**

1/1

Environmental logs are not to be used for geotechnical purposes

DUP29 0.0-0.3
DUP30 1.0-1.5

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 23/8/18 **Datum:**

Logged/Checked by: M.M.P./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■				0			FILL: Silt, low plasticity, light brown, trace of root fibres.	w<PL			GRASS COVER
	■		■				0.5		ML	Clayey SILT: low plasticity, red brown.	w<PL			
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **143**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 23/8/18 **Datum:**

Logged/Checked by: M.M.P./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■				0			FILL: Clayey silt, low plasticity, light brown, trace of root fibres.	w<PL			GRASS COVER
									ML	SILT: low plasticity, red brown, trace of clay fines.	w<PL			
	■		■				0.5							
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **144**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 23/8/18 **Datum:**

Logged/Checked by: M.M.P./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Silt, low plasticity, light brown, trace of root fibres and ash.	w<PL			GRASS COVER
							0.5		ML	SILT: low plasticity, red brown.	w<PL			
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **145**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 23/8/18 **Datum:**

Logged/Checked by: M.M.P./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Silt, low plasticity, light brown, trace of root fibres.	w<PL			GRASS COVER
									ML	SILT: low plasticity, red brown, trace of clay fines, fine to coarse grained ironstone gravel.	w<PL			
							0.5							
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **146**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 22/8/18 **Datum:**

Logged/Checked by: M.M.P./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■				0			FILL: Silt, low plasticity, light brown, trace of root fibres.	w<PL			GRASS COVER
							0.5		ML	SILT: low plasticity, red brown.	w<PL			
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **147**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 22/8/18 **Datum:**

Logged/Checked by: M.M.P./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Silt, low plasticity, light brown, trace of root fibres.	w<PL			GRASS COVER
							0.5		ML	SILT: low plasticity, red brown, trace of fine to coarse grained ironstone gravel.	w<PL			
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **148**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 22/8/18 **Datum:**

Logged/Checked by: M.M.P./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Clayey silt, low plasticity, light brown, trace of root fibres.	w<PL			GRASS COVER
							0.5		ML	SILT: low plasticity, red brown, trace of fine to coarse grained ironstone gravel.	w<PL			
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **149**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 22/8/18 **Datum:**

Logged/Checked by: M.M.P./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■				0			FILL: Clayey silt, low plasticity, light brown, trace of root fibres.	w<PL			GRASS COVER
	■		■				0.5		ML	SILT: low plasticity, red brown, trace of clay fines, fine to coarse grained ironstone gravel.	w<PL			
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **150**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 22/8/18 **Datum:**

Logged/Checked by: M.M.P./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■				0			FILL: Clayey silt, low plasticity, light brown, trace of root fibres.	w<PL			GRASS COVER
	■		■				0.5		ML	SILT: low plasticity, red brown, trace of fine to coarse grained ironstone gravel.	w<PL			
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **151**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 22/8/18 **Datum:**

Logged/Checked by: M.M.P./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■				0			FILL: Silt, low plasticity, light brown, trace of root fibres.	w<PL			GRASS COVER
	■		■				0.5		ML	SILT: low plasticity, red brown, trace of clay fines.	w<PL			
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **152**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 22/8/18 **Datum:**

Logged/Checked by: M.M.P./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Silt, low plasticity, light brown, trace of root fibres.	w<PL			GRASS COVER
							0.5		ML	SILT: low plasticity, red brown.	w<PL			
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **153**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 22/8/18 **Datum:**

Logged/Checked by: M.M.P./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Silt, low plasticity, light brown, trace of root fibres.	w<PL			GRASS COVER
							0.5		ML	SILT: low plasticity, red brown, trace of clay fines.	w<PL			
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **154**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 22/8/18 **Datum:**

Logged/Checked by: M.M.P./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■				0			FILL: Silt, low plasticity, light brown, trace of root fibres.	w<PL			GRASS COVER
									ML	SILT: low plasticity, red brown, trace of clay fines.	w<PL			
	■		■				0.5							
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **155**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 22/8/18 **Datum:**

Logged/Checked by: M.M.P./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Silt, low plasticity, light brown, trace of root fibres.	w<PL			GRASS COVER
							0.5		ML	SILT: low plasticity, red brown.	w<PL			
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **156**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 22/8/18 **Datum:**

Logged/Checked by: M.M.P./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Silt, low plasticity, light brown.	w<PL			GRASS COVER
							0.5		ML	SILT: low plasticity, red brown, trace of clay fines.	w<PL			
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **157**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 22/8/18 **Datum:**

Logged/Checked by: M.M.P./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■				0			FILL: Silt, low plasticity, light brown, trace of root fibres.	w<PL			GRASS COVER
									ML	SILT: low plasticity, red brown.	w<PL			
	■		■				0.5							
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **158**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 22/8/18 **Datum:**

Logged/Checked by: M.M.P./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Silt, low plasticity, light brown, trace of root fibres.	w<PL			GRASS COVER
							0.5		ML	SILT: low plasticity, red brown, trace of clay fines.	w<PL			
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **159**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 22/8/18 **Datum:**

Logged/Checked by: M.M.P./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■				0			FILL: Silt, low plasticity, light brown, trace of root fibres.	w<PL			GRASS COVER
							0.5		ML	SILT: low plasticity, red brown, trace of fine to coarse grained ironstone gravel.	w<PL			
	■		■				1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **160**

1/1

Environmental logs are not to be used for geotechnical purposes

DUPAM25 0.0-0.45
DUPAM26 0.6-1.0

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 21/8/18 **Datum:**

Logged/Checked by: A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■				0			FILL: Silt, low plasticity, light brown, trace of root fibres.	w<PL			GRASS COVER
							0.5		ML	SILT: low plasticity, yellow brown, trace of fine to coarse grained ironstone gravel.	w<PL			
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **161**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 21/8/18 **Datum:**

Logged/Checked by: A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■				0			FILL: Silt, low plasticity, brown.	w<PL			GRASS COVER
							0.5		ML	Clayey SILT: low plasticity, yellow brown.	w<PL			
	■		■				1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **162**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 21/8/18 **Datum:**

Logged/Checked by: A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■				0			FILL: Silt, low plasticity, brown, trace of root fibres.	w<PL			GRASS COVER
							0.5		ML	SILT: low plasticity, red brown.	w<PL			
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **163**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 21/8/18 **Datum:**

Logged/Checked by: A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■				0			FILL: Silt, low plasticity, brown, trace of root fibres.	w<PL			GRASS COVER
									ML	SILT: low plasticity, red brown.	w<PL			
	■		■				0.5							
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **164**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 21/8/18 **Datum:**

Logged/Checked by: A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■				0			FILL: Silt, low plasticity, brown, trace of root fibres.	w<PL			GRASS COVER
							0.5		ML	Clayey SILT: low plasticity, light brown.	w<PL			
	■		■							SILT: low plasticity, red brown, trace of clay fines.	w<PL			
							1							
	■		■				1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **165**

1/1

Environmental logs are not to be used for geotechnical purposes

DUPAM21 0.0-0.3
DUPAM22 0.6-1.0

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 21/8/18 **Datum:**

Logged/Checked by: M.M.P./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■				0			FILL: Silt, low plasticity, light brown, trace of root fibres.	w<PL			GRASS COVER
	■		■				0.5		ML	SILT: low plasticity, red brown.	w<PL			
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No.
166/MW166
1/2

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** SPIRAL AUGER JK308 **R.L. Surface:** N/A

Date: 20/8/18 **Datum:**

Logged/Checked by: A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■				0			FILL: Silt, low plasticity, brown, trace of root fibres.	w<PL			GRASS COVER
									ML	SILT: low plasticity, orange brown, trace of fine to coarse grained sandstone gravel.	w<PL			
	■		■			N = 8 8,4,4	0.5							
							1							
	■		■			N = 5 3,2,3	1.5							
							2							
	■		■			N = 5 3,2,3	2.5			SILT: low plasticity, yellow brown.				
							3			SILT: low plasticity, orange brown, trace of fine to coarse grained river gravel.				
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No.
166/MW166
2/2

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** SPIRAL AUGER JK308 **R.L. Surface:** N/A

Date: 20/8/18 **Datum:**

Logged/Checked by: A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
									ML	SILT: low plasticity, orange brown, trace of fine to coarse grained river gravel.	w<PL			
							4		GC	Silty sandy GRAVEL: fine to coarse grained, dark grey, and low plasticity Sandy SILT, orange brown.	M			
							4.5			END OF BOREHOLE AT 4.4m				REFUSAL ON GRAVEL GROUNDWATER MONITORING WELL INSTALLED TO 4.0m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 1.0m TO 4.0m. CASING 0.0m TO 1.0m. 2mm SAND FILTER PACK 0.6m TO 4.0m. BENTONITE SEAL 0.2m TO 0.6m. BACKFILLED WITH SAND TO THE SURFACE. COMPLETED WITH A CONCRETED GATIC COVER
							5							
							5.5							
							6							
							6.5							
							7							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **167**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 21/8/18 **Datum:**

Logged/Checked by: A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Clayey silt, low plasticity, brown, trace of root fibres.	w<PL			GRASS COVER
							0.5		ML	SILT: low plasticity, red brown.	w<PL			
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **168**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 21/8/18 **Datum:**

Logged/Checked by: A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■				0			FILL: Silt, low plasticity, brown, trace of root fibres.	w<PL			GRASS COVER
	■		■				0.5		ML	SILT: low plasticity, red brown, trace of fine to coarse grained ironstone gravel.	w<PL			
	■		■				1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **169**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 21/8/18 **Datum:**

Logged/Checked by: A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■				0			FILL: Silt, low plasticity, brown, trace of root fibres.	w<PL			GRASS COVER
									ML	SILT: low plasticity, red brown, trace of clay fines.	w<PL			
	■		■				0.5							
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No.
170/MW170
1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** SPIRAL AUGER JK308 **R.L. Surface:** N/A

Date: 20/8/18 **Datum:**

Logged/Checked by: A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Silt, low plasticity, brown, trace of root fibres.	w<PL			WEED COVER
						N = 8 6,4,4	0.5		ML	SILT: low plasticity, orange brown, trace of fine to medium grained sand.	w<PL			
						N = 5 3,2,3	1.5							
						N = 6 3,2,4	2.5			SILT: low to medium plasticity, light brown, trace of clay fines.				GROUNDWATER MONITORING WELL INSTALLED TO 2.8m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 0.8m TO 2.8m. CASING 0.0m TO 0.8m. 2mm SAND FILTER PACK 0.6m TO 2.8m. BENTONITE SEAL 0.2m TO 0.6m. BACKFILLED WITH SAND TO THE SURFACE. COMPLETED WITH A CONCRETED GATIC COVER
							3		GC	Silty GRAVEL: medium to coarse grained, dark grey, and low plasticity SILT, orange brown.				REFUSAL ON GRAVEL
							3.5			END OF BOREHOLE AT 3.5m				

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **171**

1/1

Environmental logs are not to be used for geotechnical purposes

DUPAM19 0.0-0.5
DUPAM20 0.7-1.1

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 21/8/18 **Datum:**

Logged/Checked by: M.M.P./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■				0			FILL: Silt, low plasticity, light brown, trace of concrete and brick fragments.	w<PL			GRASS COVER
							0.5		ML	SILT: low plasticity, red brown, clay fines, trace of fine to coarse grained ironstone gravel.	w<PL			
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **172**

1/1

Environmental logs are not to be used for geotechnical purposes

DUPAM23 0.0-0.4
DUPAM24 0.8-1.3

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 21/8/18 **Datum:**

Logged/Checked by: M.M.P./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Silt, low plasticity, light brown, trace of root fibres.	w<PL			GRASS COVER
							0.5		ML	SILT: low plasticity, orange brown.	w<PL			
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **173**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 21/8/18 **Datum:**

Logged/Checked by: M.M.P./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■				0			FILL: Silt, low plasticity, light brown, trace of root fibres.	w<PL			GRASS COVER
	■		■				0.5		ML	SILT: low plasticity, red brown.	w<PL			
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **174**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 21/8/18 **Datum:**

Logged/Checked by: A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Silt, low plasticity, light brown, trace of root fibres.	w<PL			GRASS COVER
							0.5		ML	SILT: low plasticity, red brown, trace of fine to coarse grained ironstone gravel.	w<PL			
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **175**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 21/8/18 **Datum:**

Logged/Checked by: A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■				0			FILL: Silt, low plasticity, brown, trace of root fibres.	w<PL			GRASS COVER
							0.5		ML	SILT: low plasticity, red brown, trace of fine to coarse grained ironstone gravel.	w<PL			
	■		■				1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **176**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 21/8/18 **Datum:**

Logged/Checked by: A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Clayey silt, low plasticity, light brown, trace of root fibres.	w<PL			GRASS COVER
							0.5			FILL: Silty clay, low to medium plasticity, brown, trace of ash.				
							1		ML	SILT: low plasticity, red brown.	w<PL			
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **177**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 21/8/18 **Datum:**

Logged/Checked by: M.M.P./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■				0			FILL: Silt, low plasticity, light brown, trace of fine to coarse grained igneous gravel, brick and concrete fragments.	w<PL			GRASS COVER
	■		■				0.5			FILL: Clayey silt, low plasticity, dark brown, trace of fine to coarse grained igneous gravel and brick fragments.				
	■		■				1		ML	Clayey SILT: low plasticity, yellow grey, trace of fine to coarse grained ironstone gravel.	w<PL			
							1.5			SILT: low plasticity, light grey.				
										END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **178**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 21/8/18 **Datum:**

Logged/Checked by: M.M.P./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■				0			FILL: Silty clay, low to medium plasticity, dark brown, trace of root fibres and ash.	w<PL			GRASS COVER
							0.5			FILL: Clayey silt, low to medium plasticity, orange brown.				
	■		■				1		ML	SILT: low plasticity, orange grey, with clay fines.	w<PL			
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **179**

1/1

Environmental logs are not to be used for geotechnical purposes

DUPAM7 0.0-0.2
DUPAM8 0.6-0.9

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** SPIRAL AUGER JK308 **R.L. Surface:** N/A

Date: 20/8/18 **Datum:**

Logged/Checked by: A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■				0			FILL: Silt, low plasticity, brown, trace of root fibres.	w<PL			GRASS COVER
	■		■			N = 23 5,8,15	0.5		ML	Clayey SILT: low plasticity, light brown, trace of ash.	w<PL			
	■		■			N = 18 7,8,10	1			SILT: low plasticity, light brown.	w>PL			
							1.5							
							2			END OF BOREHOLE AT 2.0m				
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **180**

1/1

Environmental logs are not to be used for geotechnical purposes

DUPAM5 0.0-0.1
DUPAM6 0.6-0.95

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** SPIRAL AUGER JK308 **R.L. Surface:** N/A

Date: 20/8/18 **Datum:**

Logged/Checked by: A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Silty clay, low to medium plasticity, brown, trace of root fibres.	w<PL			GRASS COVER
						N = 11 2,5,6	0.5		ML	Clayey SILT: low plasticity, grey mottled light brown, trace of ash.	w>PL			
							1			SILT: low plasticity, light brown.				
						N = 22 9,11,11	1.5							
							2			END OF BOREHOLE AT 2.0m				
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No.
181/MW181
1/2

Environmental logs are not to be used for geotechnical purposes

DUPAM3 0.0-0.2
DUPAM4 0.5-0.95

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** SPIRAL AUGER JK308 **R.L. Surface:** N/A

Date: 20/8/18 **Datum:**

Logged/Checked by: A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Silty clay, low to medium plasticity, dark brown, trace of root fibres and ash.	w<PL			GRASS COVER
						N = 11 3,5,6	0.5		ML	Clayey SILT: low plasticity, light brown.	w>PL			
						N = 12 3,5,7	1.5			Clayey SILT: low plasticity, orange brown mottled light brown, trace of fine to coarse grained ironstone gravel.				
						N = 13 5,6,7	2.5			Clayey SILT: low plasticity, orange brown, trace of fine to coarse grained sand.				
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No.
181/MW181
2/2

Environmental logs are not to be used for geotechnical purposes

DUPAM3 0.0-0.2
DUPAM4 0.5-0.95

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** SPIRAL AUGER JK308 **R.L. Surface:** N/A

Date: 20/8/18 **Datum:**

Logged/Checked by: A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
									ML	Clayey SILT: low plasticity, orange brown, trace of fine to coarse grained sand.	w>PL			
	■		■						GC	Sandy silty GRAVEL: fine to coarse grained, dark grey, and low plasticity Sandy SILT, orange brown.	M			
							4			END OF BOREHOLE AT 4.0m				REFUSAL ON GRAVEL GROUNDWATER MONITORING WELL INSTALLED TO 4.0m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 1.0m TO 4.0m. CASING 0.0m TO 1.0m. 2mm SAND FILTER PACK 0.5m TO 4.0m. BENTONITE SEAL 0.2m TO 0.5m. BACKFILLED WITH SAND TO THE SURFACE. COMPLETED WITH A CONCRETED GATIC COVER
							4.5							
							5							
							5.5							
							6							
							6.5							
							7							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **182**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** SPIRAL AUGER JK308 **R.L. Surface:** N/A

Date: 20/8/18 **Datum:**

Logged/Checked by: A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■				0			FILL: Silt, low plasticity, brown, trace of root fibres.	w<PL			GRASS COVER
						N = 3 1,1,2	0.5		ML	SILT: low plasticity, yellow brown, trace of fine to coarse grained ironstone gravel.	w<PL			
	■		■			N = 5 2,2,3	1							
							1.5							
							2			END OF BOREHOLE AT 2.0m				
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **183**

1/1

Environmental logs are not to be used for geotechnical purposes

DUPAM16 0.0-0.2
DUPAM17 0.5-0.95

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** SPIRAL AUGER JK308 **R.L. Surface:** N/A

Date: 20/8/18 **Datum:**

Logged/Checked by: A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■				0			FILL: Silt, low plasticity, brown, trace of root fibres and fine to coarse grained igneous gravel.	w<PL			GRASS COVER
	■		■			N = 5 2,2,3	0.5		ML	Clayey SILT: low plasticity, yellow brown, trace of fine to coarse grained ironstone gravel.	w>PL			
	■		■				1			Clayey SILT: low plasticity, orange brown, trace of fine to coarse grained ironstone gravel.				
	■		■			N = 5 2,2,3	1.5							
							2			END OF BOREHOLE AT 2.0m				
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **184**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 21/8/18 **Datum:**

Logged/Checked by: M.M.P./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■				0			FILL: Silt, low plasticity, light brown, trace of fine to coarse grained igneous gravel.	w<PL			GRASS COVER
							0.5		ML	SILT: low to medium plasticity, red brown, trace of fine to coarse grained ironstone gravel.	w<PL			
	■		■				1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **185**

1/1

Environmental logs are not to be used for geotechnical purposes

DUPAM9 0.0-0.2
DUPAM10 0.6-0.95

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** SPIRAL AUGER JK308 **R.L. Surface:** N/A

Date: 20/8/18 **Datum:**

Logged/Checked by: A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■				0			FILL: Silt, low plasticity, brown, trace of fine to coarse grained igneous gravel and root fibres.	w<PL			GRASS COVER
	■		■			N = 18 8,9,9	0.5		ML	SILT: low plasticity, orange brown.	w<PL			
	■		■			N = 13 5,6,7	1.5							
							2			END OF BOREHOLE AT 2.0m				
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **186**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** SPIRAL AUGER JK308 **R.L. Surface:** N/A

Date: 20/8/18 **Datum:**

Logged/Checked by: A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■				0			FILL: Silt, low plasticity, brown, trace of fine to coarse grained igneous gravel, root fibres and ash.	w<PL			GRASS COVER
	■		■			N = 14 8,7,7	0.5							
							1		ML	Clayey SILT: low plasticity, orange brown mottled light brown, trace of fine to coarse grained ironstone gravel.	w<PL			
	■		■			N = 14 6,7,7	1.5							
							2			END OF BOREHOLE AT 2.0m				DUPAM11 0.0-0.1 DUPAM12 0.5-0.95 DUPAM13 1.5-1.95
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **187**

1/1

Environmental logs are not to be used for geotechnical purposes

DUPAM14 0.0-0.2
DUPAM15 0.6-0.95

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** SPIRAL AUGER JK308 **R.L. Surface:** N/A

Date: 20/8/18 **Datum:**

Logged/Checked by: A.M./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Silt, low plasticity, brown, trace of fine to coarse grained igneous gravel and root fibres.	w<PL			GRASS COVER
						N = 13 6,6,7	0.5		ML	SILT: low plasticity, light brown, trace of fine to coarse grained ironstone gravel.	w<PL			
						N = 26 13,13,13	1							
							1.5							
							2			END OF BOREHOLE AT 2.0m				
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **188**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 21/8/18 **Datum:**

Logged/Checked by: M.M.P./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Silt, low plasticity, light brown, trace of fine to coarse grained igneous gravel.	w<PL			GRASS COVER
							0.5			FILL: Clayey silt, low plasticity, brown.				
							1		ML	Clayey SILT: low plasticity, red brown.	w<PL			
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **189**

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** EZI PROBE **R.L. Surface:** N/A

Date: 21/8/18 **Datum:**

Logged/Checked by: M.M.P./V.B.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■				0			FILL: Silt, low plasticity, brown, trace of fine to coarse grained igneous gravel and brick fragments.	w<PL			GRASS COVER
	■		■				0.5			FILL: Clayey silt, low plasticity, red brown, trace of fine to coarse grained igneous gravel.				
	■		■							FILL: Silty sand, fine to coarse grained, dark brown, trace of fine to coarse grained igneous gravel.				FCF SAMPLE MPF1 AT 0.9m
							1			END OF BOREHOLE AT 0.9m				REFUSAL ON VERY HARD SURFACE
							1.5							
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No.
MW201
1/2

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** SPIRAL AUGER/TUBEX JK500 **R.L. Surface:** N/A

Date: 05/11/2018 **Datum:**

Logged/Checked by: P.B./A.K.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
							0			FILL: Silt, low plasticity, brown, trace of root fibres.	w<PL			
									ML	SILT: low plasticity, orange brown, trace of fine to medium grained sand.	w<PL			
							1							
							2							
							3							
							4		GM	Sandy silty GRAVEL: fine to coarse grained, dark grey brown, with sandy silt, low plasticity, orange brown.	D			
							5							
							6							
12/11/18							7				M			

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No.
MW201
2/2

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** SPIRAL AUGER/TUBEX JK500 **R.L. Surface:** N/A

Date: 05/11/2018 **Datum:**

Logged/Checked by: P.B./A.K.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
							8		GM	Sandy silty GRAVEL: fine to coarse grained, dark grey brown, with sandy silt, low plasticity, orange brown.	M			
							9			END OF BOREHOLE AT 9.0m				GROUNDWATER MOINTORING WELL INSTALLED TO 8.5m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 2.5m TO 8.5m. CASING 0.0m TO 2.5m TO SURFACE. 2mm SAND FILTER PACK 5.5m TO 8. 5m. BENTONITE SEAL 5.0m TO 5. 5m. BACKFILLED TO THE SURFACE. COMPLETED 0.47m ABOVE GROUND
							10							
							11							
							12							
							13							
							14							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No.
MW202
1/2

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** SPIRAL AUGER/TUBEX JK500 **R.L. Surface:** N/A

Date: 05/11/2018 **Datum:**

Logged/Checked by: P.B./A.K.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
							0			FILL: Silt, low plasticity, brown, trace of root fibres.	w<PL			
							1		ML	SILT: low plasticity, orange brown, trace of fine to medium grained sand.	w<PL			
							2							
							3							
							4		GM	Sandy silty GRAVEL: fine to coarse grained, dark grey brown, with sandy silt, low plasticity, orange brown.	D			
							5							
							6				M			
12/11/18							7							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No.
MW202
2/2

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** SPIRAL AUGER/TUBEX JK500 **R.L. Surface:** N/A

Date: 05/11/2018 **Datum:**

Logged/Checked by: P.B./A.K.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
							8		GM	Sandy silty GRAVEL: fine to coarse grained, dark grey brown, with sandy silt, low plasticity, orange brown.	M			
							9			END OF BOREHOLE AT 9.0m				GROUNDWATER MOINTORING WELL INSTALLED TO 8.5m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 2.5m TO 8.5m. CASING 0.0m TO 2.5m TO SURFACE. 2mm SAND FILTER PACK 5.5m TO 8.5m. BENTONITE SEAL 5.0m TO 5.5m. BACKFILLED TO THE SURFACE. COMPLETED 0.61m ABOVE GROUND
							10							
							11							
							12							
							13							
							14							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No.
MW203
1/2

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** SPIRAL AUGER/TUBEX JK500 **R.L. Surface:** N/A

Date: 06/11/2018 **Datum:**

Logged/Checked by: P.B./A.K.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
							0			FILL: Silt, low plasticity, brown, trace of root fibres.	w<PL			
									ML	SILT: low plasticity, orange brown, trace of fine to medium grained sand.	w<PL			
							1							
							2							
							3							
							4		GM	Sandy silty GRAVEL: fine to coarse grained, dark grey brown, with sandy silt, low plasticity, orange brown.	D			
							5							
							6							
12/11/18							7				M			

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No.
MW203
2/2

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR
Date: 06/11/2018
Method: SPIRAL AUGER/TUBEX JK500
Logged/Checked by: P.B./A.K.
R.L. Surface: N/A
Datum:

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
									GM	Sandy silty GRAVEL: fine to coarse grained, dark grey brown, with sandy silt, low plasticity, orange brown.	M			
							8			END OF BOREHOLE AT 8.0m				GROUNDWATER MOINTORING WELL INSTALLED TO 8.0m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 2.0m TO 8.0m. CASING 0.0m TO 2.0m TO SURFACE. 2mm SAND FILTER PACK 4.5m TO 8.0m. BENTONITE SEAL 4.0m TO 4.5m. BACKFILLED TO THE SURFACE. COMPLETED 1.08m ABOVE GROUND
							9							
							10							
							11							
							12							
							13							
							14							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No.
MW204
1/2

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR
Date: 06/11/2018

Method: SPIRAL AUGER/TUBEX JK500

Logged/Checked by: P.B./A.K.

R.L. Surface: N/A
Datum:

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
							0			FILL: Silt, low plasticity, brown, trace of root fibres.	w<PL			
									ML	SILT: low plasticity, orange brown, trace of fine to medium grained sand.	w<PL			
							1							
							2							
							3							
							4		GM	Sandy silty GRAVEL: fine to coarse grained, dark grey brown, with sandy silt, low plasticity, orange brown.	D			
							5							
▶							6				M			
▼ 12/11/18							7							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No.
MW204
2/2

Environmental logs are not to be used for geotechnical purposes

Client: CADENCE PROPERTY GROUP PTY LTD

Project: PROPOSED WAREHOUSE

Location: 128 ANDREWS ROAD, PENRITH, NSW

Job No. E31675KR **Method:** SPIRAL AUGER/TUBEX JK500 **R.L. Surface:** N/A

Date: 06/11/2018 **Datum:**

Logged/Checked by: P.B./A.K.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
									GM	Sandy silty GRAVEL: fine to coarse grained, dark grey brown, with sandy silt, low plasticity, orange brown.	M			
							8			END OF BOREHOLE AT 8.0m				GROUNDWATER MOINTORING WELL INSTALLED TO 8.0m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 2.0m TO 8.0m. CASING 0.0m TO 2.0m TO SURFACE. 2mm SAND FILTER PACK 4.5m TO 8.0m. BENTONITE SEAL 4.0m TO 4.5m. BACKFILLED TO THE SURFACE. COMPLETED 1.08m ABOVE GROUND
							9							
							10							
							11							
							12							
							13							
							14							

ENVIRONMENTAL LOGS EXPLANATORY NOTES

INTRODUCTION

These notes have been provided to amplify the environmental report in regard to classification methods, field procedures and certain matters relating to the logging of soil and rock. Not all notes are necessarily relevant to all reports.

Where geotechnical borehole logs are utilised for environmental purpose, reference should also be made to the explanatory notes included in the geotechnical report. Environmental logs are not suitable for geotechnical purposes.

The ground is a product of continuing natural and man-made processes and therefore exhibits a variety of characteristics and properties which vary from place to place and can change with time. Environmental studies include gathering and assimilating limited facts about these characteristics and properties in order to understand or predict the behaviour of the ground on a particular site under certain conditions. This report may contain such facts obtained by inspection, excavation, probing, sampling, testing or other means of investigation. If so, they are directly relevant only to the ground at the place where and time when the investigation was carried out.

DESCRIPTION AND CLASSIFICATION METHODS

The methods of description and classification of soils and rocks used in this report are based on Australian Standard 1726:2017 *'Geotechnical Site Investigations'*. In general, descriptions cover the following properties – soil or rock type, colour, structure, strength or density, and inclusions. Identification and classification of soil and rock involves judgement and the Company infers accuracy only to the extent that is common in current geoenvironmental practice.

Soil types are described according to the predominating particle size and behaviour as set out in the attached soil classification table qualified by the grading of other particles present (eg. sandy clay) as set out below:

Soil Classification	Particle Size
Clay	< 0.002mm
Silt	0.002 to 0.075mm
Sand	0.075 to 2.36mm
Gravel	2.36 to 63mm
Cobbles	63 to 200mm
Boulders	> 200mm

Non-cohesive soils are classified on the basis of relative density, generally from the results of Standard Penetration Test (SPT) as below:

Relative Density	SPT 'N' Value (blows/300mm)
Very loose (VL)	< 4
Loose (L)	4 to 10
Medium dense (MD)	10 to 30
Dense (D)	30 to 50
Very Dense (VD)	> 50

Cohesive soils are classified on the basis of strength (consistency) either by use of a hand penetrometer, vane shear, laboratory testing and/or tactile engineering examination. The strength terms are defined as follows.

Classification	Unconfined Compressive Strength (kPa)	Indicative Undrained Shear Strength (kPa)
Very Soft (VS)	≤ 25	≤ 12
Soft (S)	> 25 and ≤ 50	> 12 and ≤ 25
Firm (F)	> 50 and ≤ 100	> 25 and ≤ 50
Stiff (St)	> 100 and ≤ 200	> 50 and ≤ 100
Very Stiff (VSt)	> 200 and ≤ 400	> 100 and ≤ 200
Hard (Hd)	> 400	> 200
Friable (Fr)	Strength not attainable – soil crumbles	

Rock types are classified by their geological names, together with descriptive terms regarding weathering, strength, defects, etc. Where relevant, further information regarding rock classification is given in the text of the report. In the Sydney Basin, 'shale' is used to describe fissile mudstone, with a weakness parallel to bedding. Rocks with alternating inter-laminations of different grain size (eg. siltstone/claystone and siltstone/fine grained sandstone) are referred to as 'laminite'.

INVESTIGATION METHODS

The following is a brief summary of investigation methods currently adopted by the Company and some comments on their use and application. All methods except test pits, hand auger drilling and portable Dynamic Cone Penetrometers require the use of a mechanical rig which is commonly mounted on a truck chassis or track base.

Test Pits: These are normally excavated with a backhoe or a tracked excavator, allowing close examination of the insitu soils and 'weaker' bedrock if it is safe to descend into the pit. The depth of penetration is limited to about 3m for a backhoe and up to 6m for a large excavator. Limitations of test pits are the problems associated with disturbance and difficulty of reinstatement and the consequent effects on close-by structures. Care must be taken if construction is to be carried out near test pit locations to either properly recompact the backfill during construction or to design and construct the structure so as not to be adversely affected by poorly compacted backfill at the test pit location.

Hand Auger Drilling: A borehole of 50mm to 100mm diameter is advanced by manually operated equipment. Refusal of the hand auger can occur on a variety of materials such as obstructions within any fill, tree roots, hard clay, gravel or ironstone, cobbles and boulders, and does not necessarily indicate rock level.

Continuous Spiral Flight Augers: The borehole is advanced using 75mm to 115mm diameter continuous spiral flight augers, which are withdrawn at intervals to allow sampling and insitu testing. This is a relatively economical means of drilling in clays and in sands above the water table. Samples are returned to the surface by the flights or may be collected after withdrawal of the auger flights, but they can be very disturbed and layers may become mixed. Information from the auger sampling (as distinct from specific sampling by SPTs or undisturbed samples) is of limited reliability due to mixing or softening of samples by groundwater, or uncertainties as to the original depth of the samples. Augering below the groundwater table is of even lesser reliability than augering above the water table.

Rock Augering: Use can be made of a Tungsten Carbide (TC) bit for auger drilling into rock to indicate rock quality and continuity by variation in drilling resistance and from examination of recovered rock cuttings. This method of investigation is quick and relatively inexpensive but provides only an indication of the likely rock strength and predicted values may be in error by a strength order. Where rock strengths may have a significant impact on construction feasibility or costs, then further investigation by means of cored boreholes may be warranted.

Wash Boring: The borehole is usually advanced by a rotary bit, with water being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be assessed from the cuttings, together with some information from "feel" and rate of penetration.

Mud Stabilised Drilling: Either Wash Boring or Continuous Core Drilling can use drilling mud as a circulating fluid to stabilise the borehole. The term 'mud' encompasses a range of products ranging from bentonite to polymers. The mud tends to mask the cuttings and reliable identification is only possible from intermittent intact sampling (eg. from SPT and U50 samples) or from rock coring, etc.

Continuous Core Drilling: A continuous core sample is obtained using a diamond tipped core barrel. Provided full core recovery is achieved (which is not always possible in very low strength rocks and granular soils), this technique provides a very reliable (but relatively expensive) method of investigation. In rocks, NMLC or HQ triple tube core barrels, which give a core of about 50mm and 61mm diameter, respectively, is usually used with water flush. The length of core recovered is compared to the length drilled and any length not recovered is shown as NO CORE. The location of NO CORE recovery is determined on site by the supervising engineer; where the location is uncertain, the loss is placed at the bottom of the drill run.

Standard Penetration Tests: Standard Penetration Tests (SPT) are used mainly in non-cohesive soils, but can also be used in cohesive soils, as a means of indicating density or strength and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289.6.3.1–2004 (R2016) *'Methods of Testing Soils for Engineering Purposes, Soil Strength and Consolidation Tests – Determination of the Penetration Resistance of a Soil – Standard Penetration Test (SPT)'*.

The test is carried out in a borehole by driving a 50mm diameter split sample tube with a tapered shoe, under the impact of a 63.5kg hammer with a free fall of 760mm. It is normal for the tube to be driven in three successive 150mm increments and the 'N' value is taken as the number of blows for the last 300mm. In dense sands, very hard clays or weak rock, the full 450mm 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 150mm of, say, 4, 6 and 7 blows, as

  N = 13
  4, 6, 7

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

  N > 30
  15, 30/40mm

The results of the test can be related empirically to the engineering properties of the soil.

A modification to the SPT is where the same driving system is used with a solid 60° tipped steel cone of the same diameter as the SPT hollow sampler. The solid cone can be continuously driven for some distance in soft clays or loose sands, or may be used where damage would otherwise occur to the SPT. The results of this Solid Cone Penetration Test (SCPT) are shown as 'N_c' on the borehole logs, together with the number of blows per 150mm penetration.

LOGS

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

The terms and symbols used in preparation of the logs are defined in the following pages.

Interpretation of the information shown on the logs, and its application to design and construction, should therefore take into account the spacing of boreholes or test pits, the method of drilling or excavation, the frequency of sampling and testing and the possibility of other than 'straight line' variations between the boreholes or test pits. Subsurface conditions between boreholes or test pits may vary significantly from conditions encountered at the borehole or test pit locations.

GROUNDWATER

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

- Although groundwater may be present, in low permeability soils it may enter the hole slowly or perhaps not at all during the time it 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 and may not be the same at the time of construction.
- 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 be washed out of the hole or 'reverted' chemically if reliable water observations are to be made.

More reliable measurements can be made by installing standpipes which are read after the groundwater level has stabilised at intervals ranging from several days to 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 perched water tables or surface water.

FILL

The presence of fill materials can often be determined only by the inclusion of foreign objects (eg. bricks, steel, etc) or by distinctly unusual colour, texture or fabric. Identification of the extent of fill materials will also depend on investigation methods and frequency. Where natural soils similar to those at the site are used for fill, it may be difficult with limited testing and sampling to reliably assess the extent of the fill.

The presence of fill materials is usually regarded with caution as the possible variation in density and material type is much greater than with natural soil deposits. Consequently, there is an increased risk of adverse environmental characteristics or behaviour. If the volume and nature of fill is of importance to a project, then frequent test pit excavations are preferable to boreholes.

LABORATORY TESTING

Laboratory testing has not been undertaken to confirm the soil classification and rock strengths indicated on the environmental logs unless noted in the report.

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SYMBOL LEGENDS

SOIL


FILL


TOPSOIL


CLAY (CL, CI, CH)


SILT (ML, MH)


SAND (SP, SW)


GRAVEL (GP, GW)


SANDY CLAY (CL, CI, CH)


SILTY CLAY (CL, CI, CH)


CLAYEY SAND (SC)


SILTY SAND (SM)


GRAVELLY CLAY (CL, CI, CH)


CLAYEY GRAVEL (GC)


SANDY SILT (ML, MH)


PEAT AND HIGHLY ORGANIC SOILS (Pt)

ROCK


CONGLOMERATE


SANDSTONE


SHALE/MUDSTONE


SILTSTONE


CLAYSTONE


COAL


LAMINITE


LIMESTONE


PHYLLITE, SCHIST


TUFF


GRANITE, GABBRO


DOLERITE, DIORITE


BASALT, ANDESITE


QUARTZITE

OTHER MATERIALS


BRICKS OR PAVERS


CONCRETE


ASPHALTIC CONCRETE

CLASSIFICATION OF COARSE AND FINE GRAINED SOILS

Major Divisions		Group Symbol	Typical Names	Field Classification of Sand and Gravel	Laboratory Classification	
Coarse grained soil (more than 65% of soil excluding oversize fraction is greater than 0.075mm)	GRAVEL (more than half of coarse fraction is larger than 2.36mm	GW	Gravel and gravel-sand mixtures, little or no fines	Wide range in grain size and substantial amounts of all intermediate sizes, not enough fines to bind coarse grains, no dry strength	≤ 5% fines	$C_u > 4$ $1 < C_c < 3$
		GP	Gravel and gravel-sand mixtures, little or no fines, uniform gravels	Predominantly one size or range of sizes with some intermediate sizes missing, not enough fines to bind coarse grains, no dry strength	≤ 5% fines	Fails to comply with above
		GM	Gravel-silt mixtures and gravel-sand-silt mixtures	'Dirty' materials with excess of non-plastic fines, zero to medium dry strength	≥ 12% fines, fines are silty	Fines behave as silt
		GC	Gravel-clay mixtures and gravel-sand-clay mixtures	'Dirty' materials with excess of plastic fines, medium to high dry strength	≥ 12% fines, fines are clayey	Fines behave as clay
	SAND (more than half of coarse fraction is smaller than 2.36mm)	SW	Sand and gravel-sand mixtures, little or no fines	Wide range in grain size and substantial amounts of all intermediate sizes, not enough fines to bind coarse grains, no dry strength	≤ 5% fines	$C_u > 6$ $1 < C_c < 3$
		SP	Sand and gravel-sand mixtures, little or no fines	Predominantly one size or range of sizes with some intermediate sizes missing, not enough fines to bind coarse grains, no dry strength	≤ 5% fines	Fails to comply with above
		SM	Sand-silt mixtures	'Dirty' materials with excess of non-plastic fines, zero to medium dry strength	≥ 12% fines, fines are silty	N/A
		SC	Sand-clay mixtures	'Dirty' materials with excess of plastic fines, medium to high dry strength	≥ 12% fines, fines are clayey	

Major Divisions		Group Symbol	Typical Names	Field Classification of Silt and Clay			Laboratory Classification
				Dry Strength	Dilatancy	Toughness	% < 0.075mm
ine grained soils (more than 35% of soil excluding oversize fraction is less than 0.075mm)	SILT and CLAY (low to medium plasticity)	ML	Inorganic silt and very fine sand, rock flour, silty or clayey fine sand or silt with low plasticity	None to low	Slow to rapid	Low	Below A line
		CL, CI	Inorganic clay of low to medium plasticity, gravelly clay, sandy clay	Medium to high	None to slow	Medium	Above A line
		OL	Organic silt	Low to medium	Slow	Low	Below A line
	SILT and CLAY (high plasticity)	MH	Inorganic silt	Low to medium	None to slow	Low to medium	Below A line
		CH	Inorganic clay of high plasticity	High to very high	None	High	Above A line
		OH	Organic clay of medium to high plasticity, organic silt	Medium to high	None to very slow	Low to medium	Below A line
	Highly organic soil	Pt	Peat, highly organic soil	–	–	–	–

Laboratory Classification Criteria

A well graded coarse grained soil is one for which the coefficient of uniformity $Cu > 4$ and the coefficient of curvature $1 < C_c < 3$. Otherwise, the soil is poorly graded. These coefficients are given by:

$$C_u = \frac{D_{60}}{D_{10}} \quad \text{and} \quad C_c = \frac{(D_{30})^2}{D_{10}\ D_{60}}$$

Where D_{10}, D_{30} and D_{60} are those grain sizes for which 10%, 30% and 60% of the soil grains, respectively, are smaller.

NOTES:

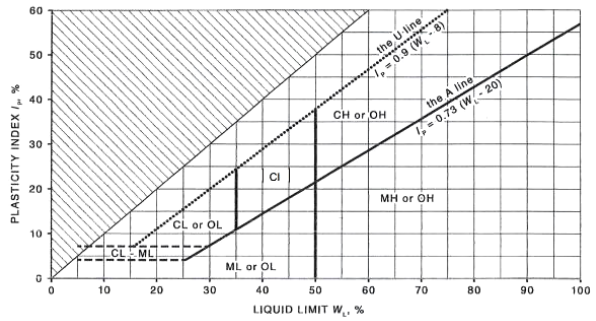
1 For a coarse grained soil with a fines content between 5% and 12%, the soil is given a dual classification comprising the two group symbols separated by a dash; for example, for a poorly graded gravel with between 5% and 12% silt fines, the classification is GP-GM.

2 Where the grading is determined from laboratory tests, it is defined by coefficients of curvature (C_c) and uniformity (C_u) derived from the particle size distribution curve.

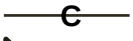
3 Clay soils with liquid limits > 35% and ≤ 50% may be classified as being of medium plasticity.

4 The U line on the Modified Casagrande Chart is an approximate upper bound for most natural soils.

Modified Casagrande Chart for Classifying Silts and Clays according to their Behaviour



LOG SYMBOLS

Log Column	Symbol	Definition
Groundwater Record		Standing water level. Time delay following completion of drilling/excavation may be shown.
		Extent of borehole/test pit collapse shortly after drilling/excavation.
		Groundwater seepage into borehole or test pit noted during drilling or excavation.
Samples	ES	Sample taken over depth indicated, for environmental analysis.
	U50	Undisturbed 50mm diameter tube sample taken over depth indicated.
	DB	Bulk disturbed sample taken over depth indicated.
	DS	Small disturbed bag sample taken over depth indicated.
	ASB	Soil sample taken over depth indicated, for asbestos analysis.
	ASS	Soil sample taken over depth indicated, for acid sulfate soil analysis.
	SAL	Soil sample taken over depth indicated, for salinity analysis.
Field Tests	N = 17 4, 7, 10	Standard Penetration Test (SPT) performed between depths indicated by lines. Individual figures show blows per 150mm penetration. 'Refusal' refers to apparent hammer refusal within the corresponding 150mm depth increment.
	N_c = 5 7 3R	Solid Cone Penetration Test (SCPT) performed between depths indicated by lines. Individual figures show blows per 150mm penetration for 60° solid cone driven by SPT hammer. 'R' refers to apparent hammer refusal within the corresponding 150mm depth increment.
	VNS = 25	Vane shear reading in kPa of undrained shear strength.
	PID = 100	Photoionisation detector reading in ppm (soil sample headspace test).
Moisture Condition (Fine Grained Soils)	*w* > PL	Moisture content estimated to be greater than plastic limit.
	w ≈ PL	Moisture content estimated to be approximately equal to plastic limit.
	w < PL	Moisture content estimated to be less than plastic limit.
	w ≈ LL	Moisture content estimated to be near liquid limit.
	w > LL	Moisture content estimated to be wet of liquid limit.
(Coarse Grained Soils)	D	DRY – runs freely through fingers.
	M	MOIST – does not run freely but no free water visible on soil surface.
	W	WET – free water visible on soil surface.
Strength (Consistency) Cohesive Soils	VS	VERY SOFT – unconfined compressive strength ≤ 25kPa.
	S	SOFT – unconfined compressive strength > 25kPa and ≤ 50kPa.
	F	FIRM – unconfined compressive strength > 50kPa and ≤ 100kPa.
	St	STIFF – unconfined compressive strength > 100kPa and ≤ 200kPa.
	VSt	VERY STIFF – unconfined compressive strength > 200kPa and ≤ 400kPa.
	Hd	HARD – unconfined compressive strength > 400kPa.
	Fr	FRIABLE – strength not attainable, soil crumbles.
	( )	Bracketed symbol indicates estimated consistency based on tactile examination or other assessment.
Density Index/ Relative Density (Cohesionless Soils)	VL	VERY LOOSE – Density Index (I_D) Range (%): ≤ 15 – SPT 'N' Value Range (Blows/300mm): 0 – 4
	L	LOOSE – Density Index (I_D) Range (%): > 15 and ≤ 35 – SPT 'N' Value Range (Blows/300mm): 4 – 10
	MD	MEDIUM DENSE – Density Index (I_D) Range (%): > 35 and ≤ 65 – SPT 'N' Value Range (Blows/300mm): 10 – 30
	D	DENSE – Density Index (I_D) Range (%): > 65 and ≤ 85 – SPT 'N' Value Range (Blows/300mm): 30 – 50
	VD	VERY DENSE – Density Index (I_D) Range (%): > 85 – SPT 'N' Value Range (Blows/300mm): > 50
	( )	Bracketed symbol indicates estimated density based on ease of drilling or other assessment.
Hand Penetrometer Readings	300 250	Measures reading in kPa of unconfined compressive strength. Numbers indicate individual test results on representative undisturbed material unless noted otherwise.

Log Column	Symbol	Definition
Remarks	'V' bit	Hardened steel 'V' shaped bit.
	'TC' bit	Twin pronged tungsten carbide bit.
	T_{60}	Penetration of auger string in mm under static load of rig applied by drill head hydraulics without rotation of augers.
	Soil Origin	The geological origin of the soil can generally be described as:
		RESIDUAL – soil formed directly from insitu weathering of the underlying rock. No visible structure or fabric of the parent rock.
		EXTREMELY WEATHERED – soil formed directly from insitu weathering of the underlying rock. Material is of soil strength but retains the structure and/or fabric of the parent rock.
		ALLUVIAL – soil deposited by creeks and rivers.
		ESTUARINE – soil deposited in coastal estuaries, including sediments caused by inflowing creeks and rivers, and tidal currents.
		MARINE – soil deposited in a marine environment.
		AEOLIAN – soil carried and deposited by wind.
		COLLUVIAL – soil and rock debris transported downslope by gravity, with or without the assistance of flowing water. Colluvium is usually a thick deposit formed from a landslide. The description 'slopewash' is used for thinner surficial deposits.
		LITTORAL – beach deposited soil.

Classification of Material Weathering

Term		Abbreviation		Definition
Residual Soil		RS		Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are no longer visible, but the soil has not been significantly transported.
Extremely Weathered		XW		Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are still visible.
Highly Weathered	Distinctly Weathered (Note 1)	HW	DW	The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable. Rock strength is significantly changed by weathering. Some primary minerals have weathered to clay minerals. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores.
Moderately Weathered		MW		The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable, but shows little or no change of strength from fresh rock.
Slightly Weathered		SW		Rock is partially discoloured with staining or bleaching along joints but shows little or no change of strength from fresh rock.
Fresh		FR		Rock shows no sign of decomposition of individual minerals or colour changes.

NOTE 1: The term 'Distinctly Weathered' is used where it is not practicable to distinguish between 'Highly Weathered' and 'Moderately Weathered' rock. 'Distinctly Weathered' is defined as follows: *'Rock strength usually changed by weathering. The rock may be highly discoloured, usually by iron staining. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores'*. There is some change in rock strength.

Rock Material Strength Classification

Term	Abbreviation	Uniaxial Compressive Strength (MPa)	Guide to Strength	
			Point Load Strength Index $Is_{(50)}$ (MPa)	Field Assessment
Very Low Strength	VL	0.6 to 2	0.03 to 0.1	Material crumbles under firm blows with sharp end of pick; can be peeled with knife; too hard to cut a triaxial sample by hand. Pieces up to 30mm thick can be broken by finger pressure.
Low Strength	L	2 to 6	0.1 to 0.3	Easily scored with a knife; indentations 1mm to 3mm show in the specimen with firm blows of the pick point; has dull sound under hammer. A piece of core 150mm long by 50mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling.
Medium Strength	M	6 to 20	0.3 to 1	Scored with a knife; a piece of core 150mm long by 50mm diameter can be broken by hand with difficulty.
High Strength	H	20 to 60	1 to 3	A piece of core 150mm long by 50mm diameter cannot be broken by hand but can be broken by a pick with a single firm blow; rock rings under hammer.
Very High Strength	VH	60 to 200	3 to 10	Hand specimen breaks with pick after more than one blow; rock rings under hammer.
Extremely High Strength	EH	> 200	> 10	Specimen requires many blows with geological pick to break through intact material; rock rings under hammer.

Appendix B: Remediation Category Confirmation Letter

23 January 2019 WTJ18-289

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JK Environments
PO Box 976
North Ryde NSW 1670
BPage@jkgeotechnics.com.au

Attention: Brendan Page – Environmental Scientist

DEVELOPMENT APPLICATION DA18/1114, PROPOSED WAREHOUSE AND DISTRIBUTION FACILITY & RELATED SITE WORKS INCLUDING ACCESS ROAD CONSTRUCTION AND BULK EARTHWORKS

PROPERTY AT: 128 & 130-172 ANDREWS ROAD, PENRITH (LOT 20 DP 1216618) & (LOT 13 DP 217705)

Dear Brendan,

Reference is made to Development Application DA18/1114 that was subsequently lodged with Penrith City Council 2 November 2018 for a proposed Warehouse and Distribution Facility, proposed Access Road and Bulk Earthworks at the identified Subject Site – 128 & 130-172 Andrews Road, Penrith (Lot 20 DP 1216618) & (Lot 13 DP 217705).

Following review of Council's additional information request dated 9 January 2019, particularly **Section 3(a)**, Willowtree Planning hereby confirm that a Remediation Action Plan (RAP), specifically Category 1 Remediation Work listed under Clause 9(e)(ix) of *State Environmental Planning Policy No 55 – Remediation of Land* (SEPP 55) would be required to satisfy Council's request.

Additionally, Clause 9(e)(ix) can be read in conjunction with Clause 7.5 of the *Penrith Local Environmental Plan 2010* (PLEP2010), which is applicable to the Subject Site concerning the protection of scenic character and landscape values.

Should you wish to discuss further, please contact the undersigned on 0413 555 638.

Yours Faithfully,

Andrew Cowan
Director
Willowtree Planning Pty Ltd

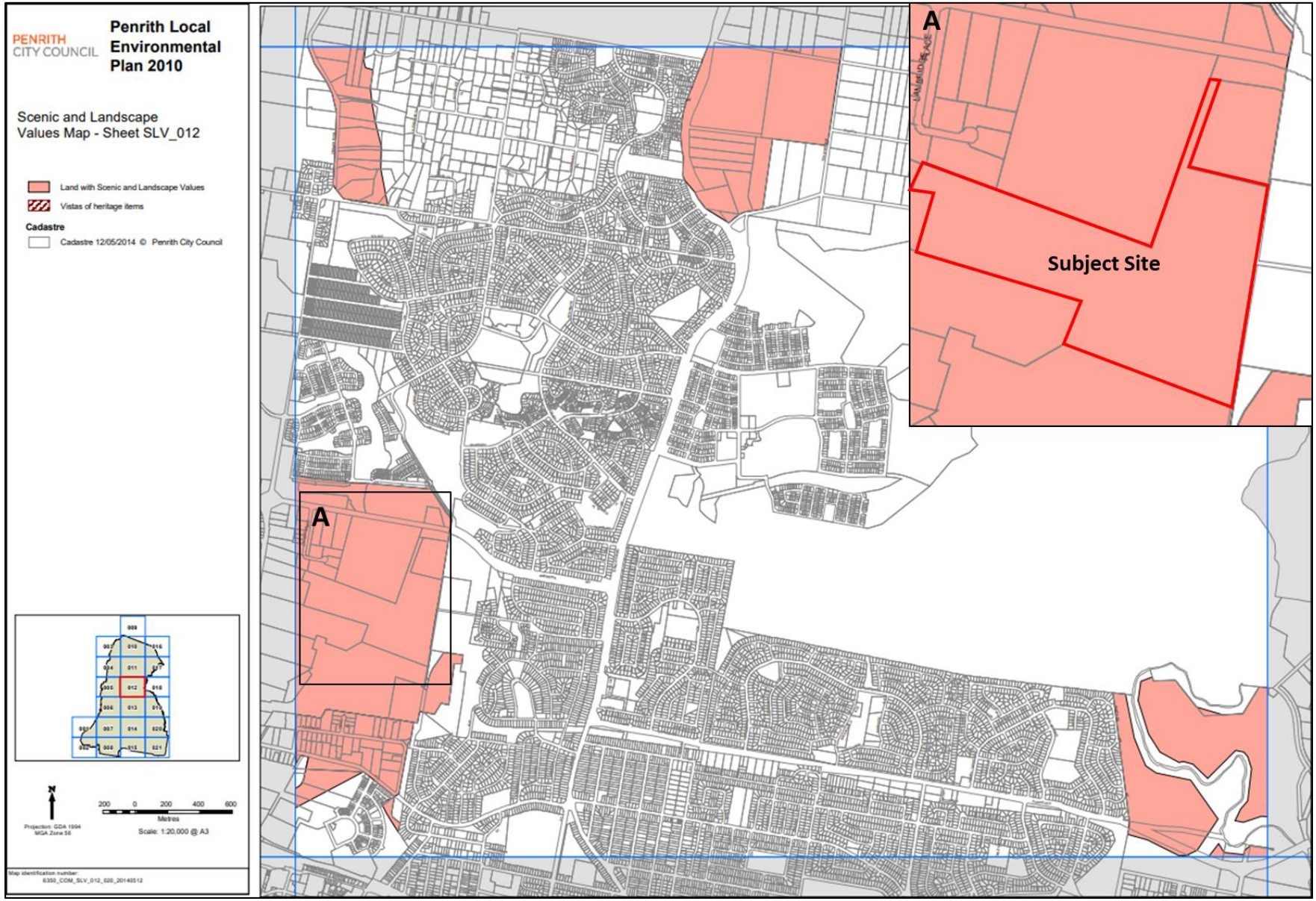

Figure 1 Subject Site Categorised under Clause 7.5 of the *Penrith Local Environmental Plan 2010* (PLEP2010) (Source: NSW Legislation, 2018)