

17 September 2025

Solar Canopy – The Collaroy Centre

22 Homestead Ave, Collaroy NSW

GEOTECHNICAL INVESTIGATION REPORT

Specialised Solutions Pty Ltd

Job No. SYD2025-0121AB | Rev 0





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1.0 INTRODUCTION

1.1 General

CMW Geosciences (CMW) was engaged by Specialised Solutions Pty Ltd (Specialised Solutions) to carry out a geotechnical investigation of a site located at 22 Homestead Ave, Collaroy NSW, which is being considered for the construction of a solar canopy over an existing basketball court.

The scope of work and associated terms and conditions of our engagement were detailed in our services proposal letter referenced SYD2025-0121AA, Rev 0 dated 19 August 2025.

CMW understands Specialised Solutions is working to construct a solar canopy at The Collaroy Centre located at 22 Homestead Ave, Collaroy NSW and owned and operated by the Salvation Army. The proposed development includes construction of the canopy over an existing tennis/basketball court located in the southern area of the Collaroy Centre premises. The proposed layout for the solar canopy can be seen in Figure 1.

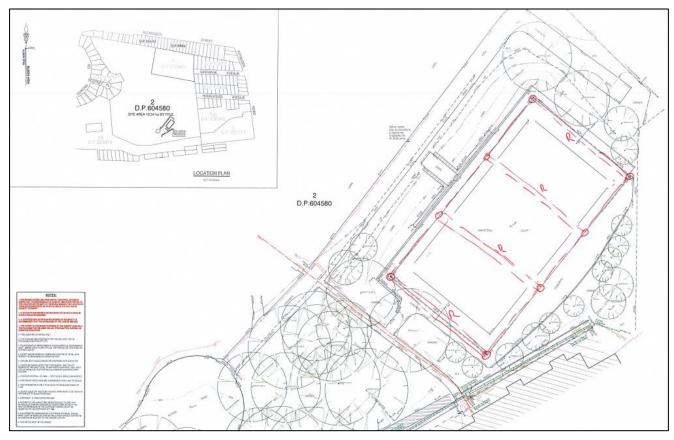


Figure 1: Proposed Collaroy Centre Solar Canopy Site Layout

1.2 Scope

CMW has conducted the following scope of investigation:

- Desktop study of available geotechnical information, previous investigation reports and Before You Dig Australia (BYDA) and review of provided service locating plans.
- Drilling of four (4) boreholes across the site area to a depth of 4.0m below ground level (mBGL).
- Collection of geotechnical samples to assist in preliminary soil parameter determination for the site.



- Logging of boreholes in general accordance with AS1726-2017 Geotechnical Site Investigations, completed by a CMW Geotechnical Engineer on-site.
- Laboratory testing on samples recovered from the investigation.

This report presents the results of the site investigation undertaken on 29 August 2025.

2.0 SITE CONDITIONS

2.1 Surface Conditions and Topography

The investigation location is part of the Collaroy Centre, a conference centre located in Collaroy NSW, in the Northern Beaches area of Sydney. The site is a developed parcel of land used for camps, conferences and retreats and contains accommodation, meeting/event facilities and recreation facilities including a tennis/basketball court (the investigation location). The court is bounded by the grounds of the Centre to the north and west, and Aged Care Living Residences to the south and east. A fence and trees/shrubs surround the court on three sides, with a sandstone block wall and steps providing access from the northwest. The Collaroy Centre is situated on a hillside sloping from the northwest corner to the east and south. The basketball court itself is relatively flat and consists of a concrete slab.

The approximate location of the site is shown in Figure 2 below. Figure 3 presents the typical surface conditions encountered.



Figure 2: Location of Proposed Solar Canopy Site at The Collaroy Centre





Figure 3: Site Conditions at Proposed Solar Canopy Site

2.2 Site Geology

A review of the NSW Government MinView Seamless Geology references for the area suggests the site is underlain by Newport Formation siliciclastic sedimentary rock, consisting of interbedded laminite, shale and sandstone white quartz to quartz-lithic, very fine to medium-grained sandstone; minor shale breccia and pebble polymictic conglomerate (at base of sandstone units); minor red clays.



Figure 4: NSW Seamless Geology at Solar Canopy Site



3.0 SITE INVESTIGATION

3.1 Preliminaries

The investigation occurred on 29 August 2025. Prior to carrying out the fieldwork, a review of available geotechnical information and Before You Dig Australia (BYDA) search was completed for the investigation area and reviewed prior to attending site. As part of the initial request for quotation by Specialised Services, CMW was provided with a service location report completed for Specialised Services prior to our investigation. This document was also reviewed prior to the investigation taking place.

A walkover survey of the site was undertaken on 29 August 2025 prior to drilling works commencing to assess the general site conditions and nearby structures.

3.2 Borehole Drilling

Borehole drilling works were completed on 29 August 2025 with a geotechnical site investigation drilling rig, using concrete coring (diatube) techniques to remove the concrete slab of the court followed by continuous flight augers in soil materials. Four (4) boreholes were drilled to a depth of 4.0mBGL. Standard Penetration Tests (SPT) were carried out in the soil materials at 1m to 1.5m intervals. Groundwater observations were recorded during borehole drilling. Rock materials were not encountered in any of the boreholes.

Geotechnical samples were taken from the drilling rig auger and from the SPT sample spoon for laboratory testing.

Fieldwork was carried out under the direction of a CMW Geotechnical Engineer in general accordance with AS1726 - Geotechnical Site Investigations. Investigation locations were positioned using a handheld GPS unit with an accuracy of \pm 5m. Borehole locations are presented in Appendix A.

A summary of the borehole locations can be seen in Table 1. Borehole logs are presented in Appendix B.

Table 1: Summary of Borehole Drilling Locations							
Location (GDA2020 MGA Zone 56)							
Borehole ID	Easting (m)	Northing (m)					
BH01	342398	6265895					
BH02	342406	6265887					
BH03	342392	6265866					
BH04	342382	6265875					

3.3 Scheduled Laboratory Testing

Geotechnical soil samples were transported to NATA accredited laboratories for testing. A summary of the soil testing scheduled is presented in Table 2.



Table 2: Proposed Geotechnical Laboratory Schedule							
Test Standard Quantity							
Atterberg Limits	AS1289.3.1.2, 3.2.1, 3.3.1	3					
Linear Shrinkage	AS1289.3.4.1	3					
Soil Aggressivity (pH, Cl, SO ₄)	АРНА	2					
Particle Size Distribution	AS 1289.3.6.1	1					

4.0 INVESTIGATION RESULTS

4.1 Subsurface Conditions

Unit 1 - Concrete and Sand - FILL

The concrete slab that comprises the court covers the investigation area. This slab reached a depth of 0.13 to 0.14m below ground level. Fine to medium grained, angular to sub-angular sand, believed to be subbase material, was found beneath BH01 and BH02 to depths of 0.15m and 0.75m respectively. It is likely that this fill material was used to create an even area on which to install the existing concrete slab.

Unit 2 - Silty Clay and Silty Sandy CLAY - Firm to Stiff

Medium to high plasticity silty clay was encountered in BH01, BH02 and BH04, below the short depth fill zone. Medium to high plasticity silty sandy clay was encountered below the fill zone in BH03. The clays were assessed to be firm to stiff in consistency and generally moist, near the plastic limit. The material was typically orange-brown mottled grey and dark grey-brown in colour with fine grained, angular to sub-angular sand found in BH03. This layer extended to depths of approximately 1.5m.

Unit 3 – Silty CLAY – Stiff to Very Stiff

Medium to high plasticity silty clay was found in each borehole below Unit 2. The clay in this zone was assessed to be stiff to very stiff in consistency and generally moist, near the plastic limit. The material was typically orange-brown mottled grey in colour and extended to depths of 3.00m.

Unit 4 - Silty Clay - Very Stiff

Medium to high plasticity silty clay was encountered in each borehole below Unit 3 materials. These clays were assessed to be very stiff consistency and moist, near plastic limit. The material was typically red-brown and orange-red, mottled grey in colour and extended to depths of 3.00 to terminated borehole depth of 4.00m.

4.2 Groundwater

Groundwater was not encountered during our investigation. However, given the presence of a clayey soil profile and the site geometry, it is possible that perched groundwater may occur during and following periods of rainfall.



5.0 LABORATORY TEST RESULTS

Geotechnical laboratory testing was carried out in accordance with the requirements of the current edition of AS 1289 (where applicable). All testing was scheduled by CMW and carried out by a NATA registered laboratory. A summary of the scheduled laboratory testing is provided in Table 3 (Aggressivity), Table 4 (Atterberg Limits, Moisture Content) and Table 5 (Particle Size Distribution). Laboratory test certificates are provided in Appendix C.

Table 3: Aggressivity Assessment Test Results								
Location ID Sample Depth (m bgl) pH SO4 (mg/kg) Chloride (mg/kg) (ohm cm)								
BH01	0.70 - 0.80	5.1	78	< 10	17000			
BH04	0.90 - 1.00	7.2	110	49	3000			

Table 4: Summary of Civil Engineering Laboratory Test Results								
	Atterberg Limits							
Location ID	Depth (mBGL)	Ш	PL	PI	LS			
		(%)	(%)	(%)	(%)			
BH02	3.50 - 3.95	52	17	35	14			
BH03	2.00 - 2.45	47	16	31	12			
BH04	3.50 - 3.95	56	18	38	13			
Note: LL = liquid limit, PL = plasticity limit, PI = plasticity index, LS = linear shrinkage								

Table 5: Particle Size Distribution Test Results								
Location ID	Sample Depth (m bgl)	% Gravel	% Sand	% Fines				
BH01	1.00 - 1.30	0	53	47				

6.0 GEOTECHNICAL

6.1 Foundations

6.1.1 Geotechnical Model

The ground conditions encountered are generally consistent with the published geology for the area, and materials encountered in the boreholes are predominantly clay with varying amounts of sand and gravel present. Based on the borehole data and laboratory test results and our previous experience of these soil types, the following geotechnical parameters are recommended for use in the design of foundations for the proposed solar canopy.



	Table 6: Ground Model										
Unit	Depth Interval (m)	Bulk Density (kN/m3)	Effective Friction Angle Ø' (°)	Poisson's Ratio (v)	Drained Cohesion c'(kPa)	Undrained Shear Strength cu (kPa)	Drained Youngs Modulus E' (MPa)	Undrained Youngs Modulus Eu (MPa)	Modulus of Subgrade Reaction (kPa/m)		
1	0 to 0.5				Igno	ore					
2	0.5 to 1.5	18	25	0.3	2	55	13	17	9000/B		
3	1.5 to 3.0	19	26	0.3	3	70	16	21	11000/B		
4	3.0 to 4.0	19	28	0.3	4	85	19	25	14000/B		

B = Pile Diameter

6.1.2 Deep Foundations

For axial loading, the ultimate geotechnical strength (R_{ug}) of a bored pile can be estimated based on the ultimate shaft adhesion, f_s and ultimate end bearing pressure, f_b . The design geotechnical strength ($R_{d,g}$) of the bored pile can then be calculated by multiplying R_{ug} by an appropriate geotechnical strength reduction factor (ϕ_g) as detailed in Section 4.4 of AS2159-2009. The geotechnical reduction factor (ϕ_g) must be determined by the designer and is based on several factors including site, design, installation, and testing risk. For preliminary design purposes ϕ_g is expected to be 0.4 unless dynamic or static load testing is carried out during construction to confirm the pile load capacity. The tension skin friction can be considered as 0.8 of the axial skin friction provided in Table 7 below.

CMW recommends that for pile capacity, a pile depth of 1.5 times the diameter of the pile from surface be ignored. It is also recommended to carry out site specific pile design based on provided design parameters.

For piles subject to lateral and/or cyclic loads it is recommended that lateral stability checks are carried out using finite element, subgrade modulus, P-Y analysis or other appropriate methods which consider the shape of the deflected pile and the pile soil interaction behaviour.

Table 7: Geotechnical Design Parameters for Bored Piles in Axial Compression									
Material Ultimate Skin Friction f _s (kPa) Ultimate End Bearing f _b (kPa)									
Unit 1	ignore	ignore							
Unit 2 – Clay F-St 47 500									
Unit 3 – Clay St-VSt	49	600							
Unit 4 – Clay VSt 49 750									

Notes:

- 1. Capacities provided are ultimate values in compression and rely on minimum ratio of pile depth to pile diameter of 4 into the founding stratum.
- 2. The designer must apply appropriate reductions based on the piling technique adopted for tensile loading.
- 2. The parameters above assume that the pile base is clear of debris. If seepage occurs into the pile excavation, dewatering should be conducted prior to pouring concrete, or concrete should be placed using a tremie. For bored piles, the subsurface profile encountered during pile excavation should be observed by a geotechnical engineer to confirm the design assumptions.
- 3. All piles shall be designed in accordance with the requirements of AS2159 2009 and in accordance with good engineering practice.
- 4. It should be noted that the design values may vary for different pile diameters and founding depths, and different values may be applied depending on the type of pile adopted, founding depth, installation method, level of supervision, static load and pull-out testing (depending on the design philosophy i.e. pile spacing and whether uplift is the critical load). Pile design should be checked for serviceability, and for lateral and uplift loading that may potentially occur during flood conditions.



5. As noted in the geological model the presence of sand layers over the pile interval is unlikely. Given they are not consistent across the profile it is recommended that these layers be ignored when calculating pile capacities. The behaviour of sand layers and their potential for disturbance particularly below the water table should be considered carefully.

6.1.3 Shallow Foundations

CMW understand that the solar canopy structure will have pile foundations but have also completed assessment of potential shallow foundations if they are required. Shallow footings for the proposed solar canopy structure at this site could consist of shallow strip or pad footings founded below the ground surface on the Unit 2 materials. The shear strength and stiffness of the near surface material, within 1.5 times the width below the base of the footings, governs the allowable bearing capacity. An appropriate geotechnical strength reduction factor (ϕ_g) must be determined by the designer and is based on several factors including site, design, installation, and testing risk. For preliminary design purposes ϕ_g is expected to be 0.4 as referenced in AS5100.3:2017 Table 5.3.3.3(A) – Range of values for geotechnical strength reduction factor (ϕ_g) for shallow footings.

The calculation of preliminary available foundation bearing pressures for isolated shallow footings at this site has been carried out using the Terzaghi General bearing capacity equation. If required by Specialised Solutions, earthworks and foundation preparation would be required prior to installation. Shallow strip or pad footings founded at 0.5m depth would be anticipated by CMW to be founded (if required) within the Unit 2 clays. CMW does not anticipate any potential shallow footings to be founded (if required) beyond these depths. Maximum allowable bearing pressures are provided in Table 8.

Table 8: Summary of Shallow Footing Design Bearing Pressure								
Founding Depth (m)	Founding Depth (m) Anticipated Footing Width (m) Footing Length (m) Allowable Bearing Pressure (kPa)							
0.5	O.F. Harita 2		strip	80*				
0.5	Unit 2	1.0	1.0	100*				

^{*}The values presented in Table 7 are considered appropriate for centrally loaded footings. For eccentrically loaded footings the allowable bearing capacity must be assessed based on the effective footing dimensions using appropriate methods such as Hanson.

6.2 Site Classification

Australian Standard AS2870-2011 'Residential Slabs and Footings' provides guidance on classifying each site by estimating the characteristic surface movement (ys), based on the guidance of the AS2870-2011.

Based on the reactivity of the soil at this site, the site is classified as M being moderately reactive, which may experience moderate ground movements from moisture change. The reactivity of the existing site profile has been estimated to be between 20mm and 40mm for the profiles observed in the boreholes, on the basis of the following assessment parameters:

- Depth of Suction Change Hs = 1.8m for Sydney Region
- Design suction change of $\Delta u = 1.2pF$ (AS 2870 Table 2.4)
- Cracked depth of 0.9m (AS 2870 section 2.3.2)



This site classification provides a guide to the level of surface movement due to seasonal moisture changes that could be expected at the site. It is to be noted that this site classification is based on material encountered in the upper horizons of the boreholes comprising of soil units.

It is expected that if earthworks are to be undertaken with controlled filling, the site should be re-assessed to provide a final site classification taking into consideration of the impact of the final soil profile and a cracked zone depth of zero.

Larger ys values may occur when the future moisture content change in the soil exceeds design moisture content change as determined from AS2870. Such changes may occur, for example, adjacent to leaking water services or where the soils are desiccated by the roots of trees.

We caution that AS2870:2011 is intended for consideration of residential structures and associated moisture variability. The proposed structures to be located on this site may require consideration of the site conditions based on engineering principles.

6.3 Aggressivity

A total of four samples taken from four different locations at a range of depths from 1.00m to 1.10m were tested for durability properties and aggressivity to steel and concrete, with the results presented in Table 3. Chemical testing of the subsurface indicate that the soil tested has:

- pH > 5.0
- Chloride < 5,000 ppm, and
- Sulfate < 5,000 ppm

We note that the soils across the area would generally be considered low permeability (i.e. clays).

General guidance on the aggressivity of soils to concrete and steel piles is provided in Section 6 of AS2159-2009 "Australian Standard on Design and Installation of Piling".

An extract from AS2159-2009 (Tables 6.4.2 and Table 6.5.2) on aggressivity to concrete and steel are provided in Figure 5 and Figure 6.

Figure 5: Extract from AS2159-2009 for durability design of steel piles in soil

EXP	OSURE CLASSI	TABLE FICATION FO	` '	LES—PILES II	N SOIL
	Exposure	conditions		Exposure c	lassification
	Chlor	ides Cl			
pН	In soil ppm	In groundwater	Resistivity ohm.cm	Soil condition A*	Soil condition B†
>5	<5000	<1 000	>5 000	Non-aggressive	Non-aggressiv
4–5	5000-20,000	1 000-10 000	2 000-5 000	Mild	Non-aggressiv
3–4	20,000-50,000	10 000-20 000	1 000-2 000	Moderate	Mild
<3	>50,000	>20 000	<1 000	Severe	Moderate



Figure 6: Extract from AS2159-2009 for durability design of concrete piles in soil

EXPOSUI	TABLE 6.4.2(C) EXPOSURE CLASSIFICATION FOR CONCRETE PILES—PILES IN SOIL					
	Exposure conditions Exposure classification					
Sulfates (expr	essed as SO ₄ *)	Chlorides in				
In soil	In groundwater	pН	pН	groundwater	Soil conditions A†	Soil conditions B‡
ppm	ppm		ppm	· ·		
< 5000	<1000	>5.5	<6000	Mild	Non-aggressive	
5000-10 000	1000-3000	4.5-5.5	6000-12 000	Moderate	Mild	
10 000–20 000	3000-10 000	4-4.5	12 000-30 000	Severe	Moderate	
>20 000	>10 000	<4	>30 000	Very severe	Severe	

- * Approximately 100 ppm SO₄ = 80 ppm SO₃
- † Soil conditions A-high permeability soils (e.g., sands and gravels) which are in groundwater
- ‡ Soil conditions B—low permeability soils (e.g., silts and clays) or all soils above groundwater

Based on the above results, in accordance with AS2159-2009 Table 6.4.2 and Table 6.5.2(C), piled foundations in such environments are considered to have an exposure classification as per Table 9.

Table 9: Summary of Exposure Classification for Buried Structures		
Structural Element Material	Assessment to Tables 6.4.2(C) and 6.5.2(C) of AS2159	
Concrete	Non-aggressive	
Steel	Non-aggressive to Mild	

7.0 SAFETY IN DESIGN

The design landform requires site excavations that may include geotechnical works such as temporary excavations and deep and shallow subsoil drains as specified in the Geotechnical report(s) and on the drawings. Exposure to these works forms a significant safety risk for contractors and inspectors/ testers.

In conducting our scope of work, we have considered and addressed Safety in Design (SiD) aspects relevant to our understanding of the proposed design and construction work. SiD must consider the construction, operation, maintenance, and ultimate demolition phases of the relevant works.

It is noted that CMW are focussed on design aspects, and whilst we have attempted to be comprehensive in our assessment, it is the Contractors responsibility to cover construction related risks in a more comprehensive manner (being the competent party in that respect). The CMW designs/ specifications for undercuts and drainage elements have been made so that no personnel are ever expected to enter unbattered or unprotected excavations to complete the construction. If at any stage a contractor does not consider that a design for excavations can be safely constructed, then CMW must be contacted immediately to discuss alternative design and/ or methods and avoid risk to personnel.



8.0 CLOSURE

This report has been prepared for use by Specialised Solutions in relation to the proposed Solar Canopy at 22 Homestead Ave, Collaroy NSW project in accordance with the scope, proposed uses and limitations described in the report. Should you have further questions relating to the use of your report please do not hesitate to contact us.

Where a party other than Specialised Solutions seeks to rely upon or otherwise use this report, the consent of CMW should be sought prior to any such use. CMW can then advise whether the report and its contents are suitable for the intended use by the other party.



USING YOUR CMW GEOTECHNICAL REPORT

Geotechnical reporting relies on interpretation of facts and collected information using experience, professional judgement, and opinion. As such it generally has a level of uncertainty attached to it, which is often far less exact than other engineering design disciplines. The notes below provide general advice on what can be reasonably expected from your report and the inherent limitations of a geotechnical report.

Preparation of your report

Your geotechnical report has been written for your use on your project. The contents of your report may not meet the needs of others who may have different objectives or requirements. The report has been prepared using generally accepted Geotechnical Engineering and Engineering Geology practices and procedures. The opinions and conclusions reached in your report are made in accordance with these accepted principles. Specific items of geotechnical or geological importance are highlighted in the report.

In producing your report, we have relied on the information which is referenced or summarised in the report. If further information becomes available or the nature of your project changes, then the findings in this report may no longer be appropriate. In such cases the report must be reviewed, and any necessary changes must be made by us.

Your geotechnical report is based on your project's requirements

Your geotechnical report has been developed based on your specific project requirements and only applies to the site in this report. Project requirements could include the type of works being undertaken; project locality, size and configuration; the location of any structures on or around the site; the presence of underground utilities; proposed design methodology; the duration or design life of the works; and construction method and/or sequencing.

The information or advice in your geotechnical report should not be applied to any other project given the intrinsic differences between different projects and site locations. Similarly geotechnical information, data and conclusions from other sites and projects may not be relevant or appropriate for your project.

Interpretation of geotechnical data

Site investigations identify subsurface conditions at discrete locations. Additional geotechnical information (e.g. literature and external data source review, laboratory testing etc) are interpreted by Geologists or Engineers to provide an opinion about a site specific ground models, their likely impact on the proposed development and recommended actions. Actual conditions may differ from those inferred to exist due to the variability of geological environments. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions. Interpretation of factual data can be influenced by design and/or construction methods. Where these methods change review of the interpretation in the report may be required.

Subsurface conditions can change

Subsurface conditions are created by natural processes and then can be altered anthropically or over time. For example, groundwater levels can vary with time or activities adjacent to your site, fill may be placed on a site, or the consistency of near surface conditions might be susceptible to seasonal changes. The report is based on conditions which existed at the time of investigation. It is important to confirm whether conditions may have changed, particularly when large periods of time have elapsed since the investigations were performed.

Interpretation and use by other design professionals

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a geotechnical report. To help avoid misinterpretations, it is important to retain the assistance of CMW to work with other project design professionals who are affected by the contents of your report. CMW staff can explain the report implications to design professionals and then review design plans and specifications to see that they have correctly incorporated the findings of this report.

Your report's recommendations require confirmation during construction

Your report is based on site conditions as revealed through selective point sampling. Engineering judgement is then applied to assess how indicative of actual conditions throughout an area the point sampling might be. Any assumptions made cannot be substantiated until construction is complete. For this reason, you should retain geotechnical services throughout the construction stage, to identify variances from previous assumption, conduct additional tests if required and recommend solutions to problems encountered on site.

A Geotechnical Engineer, who is fully familiar with the site and the background information, can assess whether the report's recommendations remain valid and whether changes should be considered as the project develops. An unfamiliar party using this report increases the risk that the report will be misinterpreted.

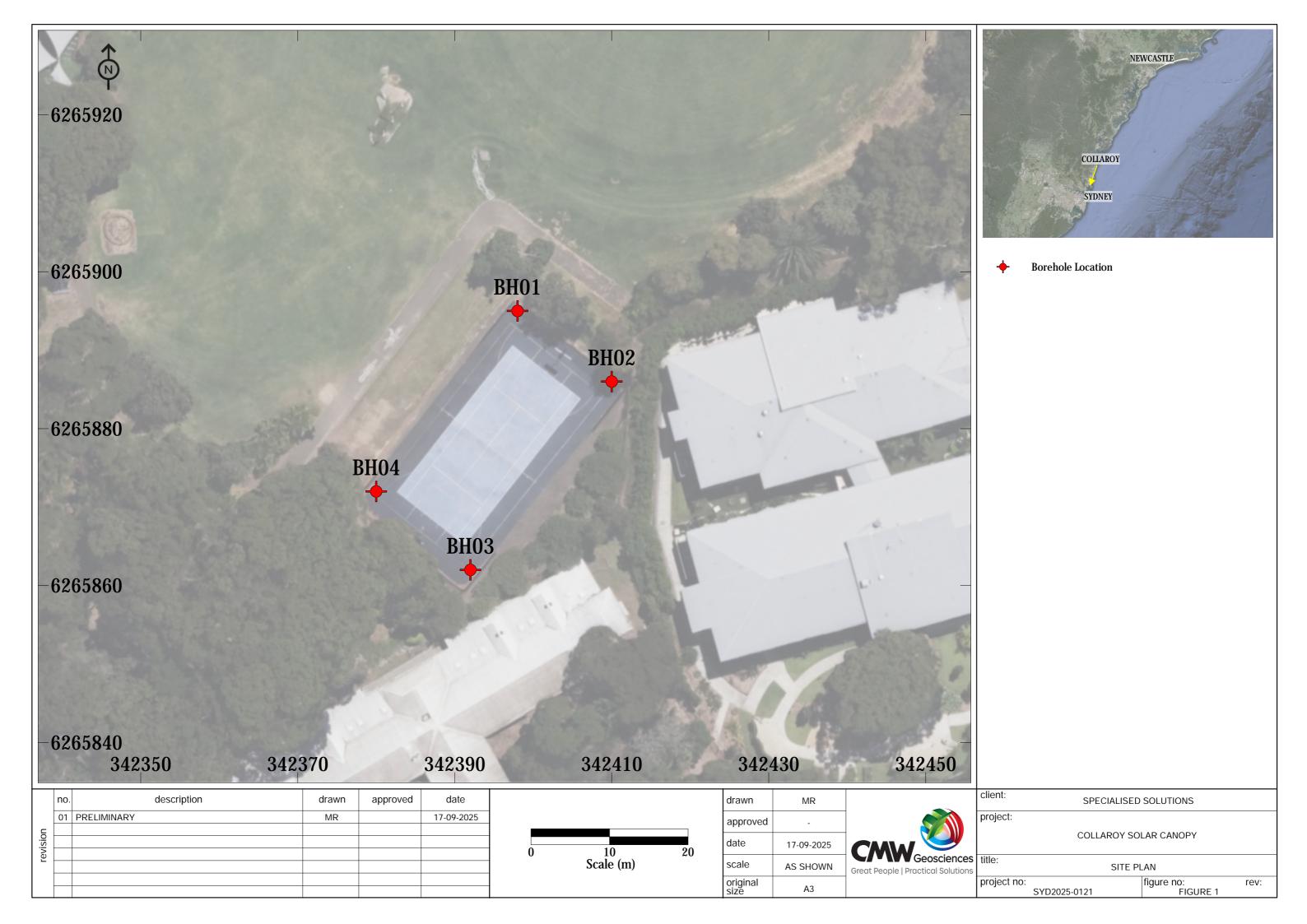
Environmental matters are not covered

Unless specifically discussed in your report environmental matters are not covered by a CMW Geotechnical Report. Environmental matters might include the level of contaminants present of the site covered by this report, potential uses or treatment of contaminated materials or the disposal of contaminated materials. These matters can be complex and are often governed by specific legislation.

The personnel, equipment, and techniques used to perform an environmental study can differ significantly from those used in this report. For that reason, our report does not provide environmental recommendations. Unanticipated subsurface environmental problems can have large consequences for your site. If you have not obtained your own environmental information about the project site, ask your CMW contact about how to find environmental risk-management guidance.



APPENDIX A Site Map





APPENDIX B

Borehole Logs

Client: Specialised Solutions

Project: Solar Canopy - Homestead Ave

Location: Collaroy, NSW Project ID: SYD2025-0121



CMWSYD-PP1

Pocket Penetrometer Equipment Ref.:

Date: 29/08/2025 1:25 Sheet 1 of 1 E.342398m N.6265895m Plant used: Comacchio 205 Position: Logged by: AS Checked by: AB Angle from horizontal: 90° Elevation: 32 m (mAHD) Contractor: Geotrace Consistency/ Relative Density Dynamic Cone Samples & Insitu Tests Moisture Condition Penetrometer (Blows/100mm) Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components Ê Graphic L Well Groundw Depth (Structure & other observations 귒 10 15 Depth Type & Results CONCRETE: Concrete core SUB BASE: SAND, fine grained, angular to sub-31.85 angular 6 CH: Silty CLAY: medium to high plasticity, orange brown mottled grey. 6 7 0.5-1.0 1 SPTLS 0.50 SPT: (4,5,9) 8 N=14 10 Rec.=1mm PP=250kPa 9 0.50 1 ES 9 9 1 D 1.0 12 16 16 20 15 13 13 30.20 CH: Silty CLAY: medium to high plasticity, brown 12 orange mottled grey. 12 SPT: (5,9,12) 2.00 2 ≈PL N=21 2.00 PP=450kPa 3.00 PP=500kPa 29.00 3 VSt CH: Silty CLAY: medium to high plasticity, red mottled grey. SPT: (5,8,13) 3.50 28.00 4 Borehole terminated at 4.00 m

Termination Reason: Target Depth Remarks: No Groundwater Encountered

DCP/PSP Equipment Ref.:

CMWSYD-DCP01

In Situ Vane Ref.:

Client: Specialised Solutions

Project: Solar Canopy - Homestead Ave

Location: Collaroy, NSW Project ID: SYD2025-0121



Great People | Practical Solutions

CMWSYD-PP1

Pocket Penetrometer Equipment Ref.:

Date: 29/08/2025 1:25 Sheet 1 of 1 E.342406m N.6265887m Plant used: Comacchio 205 Position: Logged by: AS Checked by: AB Angle from horizontal: 90° Elevation: 30 m (mAHD) Contractor: Geotrace Consistency/ Relative Density Dynamic Cone Samples & Insitu Tests Penetrometer (Blows/100mm) Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components Ê Graphic L Well Groundw Depth (Structure & other observations 귒 10 15 Depth Type & Results CONCRETE: Concrete core 29.87 SUB BASE: SAND, fine to medium grained, angular to sub-angular ,brown, trace clay ... from 0.13m to 1.60m, inorganic smells 12 6 8 0.50 SPT: (2,1,1) N=2 0.50 PP=120kPa 6 29.30 CH: Silty CLAY: medium to high plasticity, brown. 4 1.0 1 D S to 8 9 13 28.50 16 CI: Silty CLAY: medium to high plasticity, orange 16 brown with grey. 24 2.00 SPT: (3,5,8) 2 N = 132.00 PP=300kPa St ≈PL 3.00 PP=380kPa 27.00 3 CI: Silty CLAY: medium to high plasticity, orange red mottled grey. SPT: (5,7,10) VSt 3.50 26.00 4 Borehole terminated at 4.00 m

Termination Reason: Target Depth Remarks: No Groundwater Encountered

DCP/PSP Equipment Ref.:

CMWSYD-DCP01

In Situ Vane Ref.:

Client: Specialised Solutions

Project: Solar Canopy - Homestead Ave

Location: Collaroy, NSW Project ID: SYD2025-0121



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Date: 29/08/2025 1:25 Sheet 1 of 1 E.342392m N.6265866m Plant used: Comacchio 205 Position: Logged by: AS Elevation: Checked by: AB Angle from horizontal: 90° 32 m (mAHD) Contractor: Geotrace Consistency/ Relative Density Dynamic Cone Samples & Insitu Tests Penetrometer (Blows/100mm) Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components Ê Graphic L Well Groundw Depth (Structure & other observations 귒 10 15 Type & Results CONCRETE: Concrete Core. 31.87 CH: Silty Sandy CLAY: medium to high plasticity, dark grey brown, trace sand fine grained angular to sub-angular. 5 6 0.50 SPT: (7,7,3) N=10 PP=450kPa 0.50 1ES 0.7 1.0 1 D VSt 12 30.50 CH: Silty CLAY: medium to high plasticity, orange green mottled grey. 12 15 2.00 SPT: (2,5,8) 16 2 N = 132.00 PP=600kPa ≈PL 29.50 CH: Silty CLAY: medium to high plasticity, grey. VSt SPT: (7,11,10) N=21 3.50 3.50 PP=600kPa 28.00 4 Borehole terminated at 4.00 m CMWSYD-PP1 CMWSYD-PP1 DCP/PSP Equipment Ref.: In Situ Vane Ref. Pocket Penetrometer Equipment Ref.:

Termination Reason: Target Depth Remarks: No Groundwater Encountered

Client: Specialised Solutions

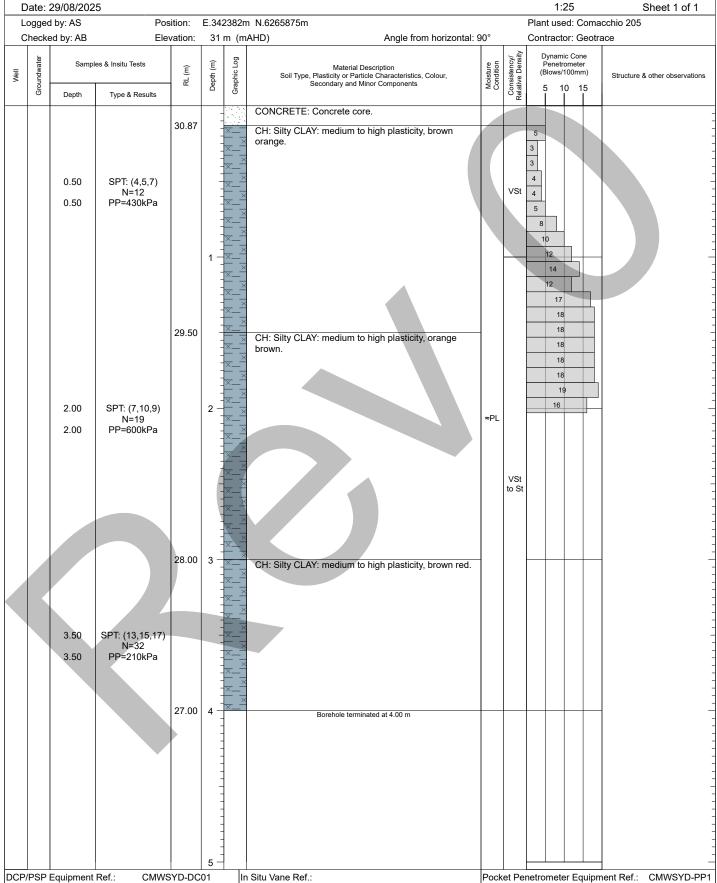
Project: Solar Canopy - Homestead Ave

Location: Collaroy, NSW Project ID: SYD2025-0121



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1:25 Sheet 1 of 1



Termination Reason: Target Depth Remarks: No Groundwater Encountered



APPENDIX C

Laboratory Test Results



Construction Sciences Pty Ltd ABN: 74 128 806 735

Address:

Unit 2, 4 Kellogg Road, Glendenning NSW 2761 Laboratory: Glendenning Laboratory

Phone: 02 9854 1700 Fax: 02 4577 9055

Email: Sydney@constructionsciences.net

PARTICLE SIZE DISTRIBUTION REPORT

Client: CMW GeoSciences

Client Address: Level 1, Suite 1, 12 Julius Avenue, North Ryde

Project: Solar Canopy Collaroy Location: Solar Canopy Collaroy

Supplied To: n/a

Area Description:

Report Number: 12385/R/25-18616-1

Project Number: 12385/P/25-98

Lot Number: BH01 - 1.0 - 1.3m

Client Reference/s: SYD2025-0121

Report Date / Page: 5/09/2025 Page 1 of 1

BH01

12385/T/25-10215

Test Procedures: AS1289.3.6.1

Sample Number 12385/S/25-76116

Client Reference

Sampling Method Sampled By Client Supplied

Date Sampled/Tested 29/08/2025 / 2/09/2025

Prep / Drying Method n/a

Prep > 53mm (%)

Borehole Depth

(m)

Clay

Internal Test Request:

1.0 - 1.3m

Material Source

Material Type

Specification

AS Sieve (mm)	Specification Minimum (%)	Percent Passing (%)	Specification Maximum (%)			PARTICLE SIZE DISTRIBUTION GRAPH
19.0		100			100 -	
13.2		100				
9.5		100			90 -	
6.7		100			80 -	
4.75		100			80 -	
2.36		100			70 -	
1.18		100			, 0	-
0.600		97		(%)	60 -	
0.425		92		ing] /
0.300		75		Jass	50 -	
0.150		55		int l		
0.075		47		Percent Passing (%)	40 -	
				Δ.]
					30 -	
						-
					20 -	
					10 -	
					10	
					0 -	1
					•	19.0 13.2 9.5 6.7 4.75 2.36 0.60 0.42 0.30
						19.0 13.2 9.5 6.7 4.75 2.36 2.36 0.600 0.425 0.300
						AS Sieve Size (mm)

Remarks

Accredited for compliance with ISO/IEC 17025 - Testing

Accreditation Number: 1986 Corporate Site Number: 12385



Approved Signatory: David Clout

Form ID: W9Rep Rev 3



Construction Sciences Pty Ltd

ABN: 74 128 806 735

Address:

Unit 2, 4 Kellogg Road, Glendenning NSW 2761 Laboratory: Glendenning Laboratory
Phone: 02 9854 1700
Fax: 02 4577 9055

Email: Sydney@constructionsciences.net

ATTERBERG LIMITS REPORT

Client: CMW GeoSciences

Client Address: Level 1, Suite 1, 12 Julius Avenue, North Ryde

Project: Solar Canopy Collaroy
Location: Solar Canopy Collaroy

Supplied To: n/a

• •

Area Description:

Report Number: 12385/R/25-18790-1

Project Number: 12385/P/25-98

Lot Number: BH02 - 3.5 - 3.95m

Internal Test Request: 12385/T/25-10215

Client Reference/s: SYD2025-0121

Report Date / Page: 8/09/2025 Page 1 of 3

Test Procedures: AS1289.3.1.1, AS 1289.3.3.1, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1

Sample Number 12385/S/25-76117 Sample Location

Sampling Method - BH02

Date Sampled 29/08/2025 Depth (m) 3.5 - 3.95m

Sampled By Client Supplied

Date Tested 4/09/2025

Drying / Prep Method Oven Dried / Dry Sieved Material Source -

 LL Water Type
 Potable
 Material Type
 Clay

 LL Device Type
 Cassagrande
 Specification

 Client Reference
 Prep Mat > 53mm (%)

Material Description SANDSTONE, Red.

Atterberg Limit	Specification Minimum	Test Result	Specification Maximum
Liquid Limit (%)		52	
Plastic Limit (%)		17	
Plasticity Index (%)		35	
Linear Shrinkage (%)		14.0	
Linear Shrinkage Mould Length / Defects:	Mould Length: 250.9mm / slightly	warped	

Remarks

NATA

Accredited for compliance with ISO/IEC 17025 - Testing

Accreditation Number: 1986 Corporate Site Number: 12385



Approved Signatory: David Clout

Form ID: W11bRep Rev 2



Construction Sciences Pty Ltd

ABN: 74 128 806 735

Address:

Unit 2, 4 Kellogg Road, Glendenning NSW 2761 Laboratory: Glendenning Laboratory

Phone: 02 9854 1700 **Fax:** 02 4577 9055

Email: Sydney@constructionsciences.net

ATTERBERG LIMITS REPORT

Client: CMW GeoSciences

Client Address: Level 1, Suite 1, 12 Julius Avenue, North Ryde

Project: Solar Canopy Collaroy
Location: Solar Canopy Collaroy

Supplied To: n/a

• •

Area Description:

Report Number: 12385/R/25-18790-1

Project Number: 12385/P/25-98

Lot Number: BH03 - 2.0 - 2.45m

Internal Test Request: 12385/T/25-10215

Client Reference/s: SYD2025-0121

Report Date / Page: 8/09/2025 Page 2 of 3

Test Procedures: AS1289.3.1.1, AS 1289.3.3.1, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1

Sample Number 12385/S/25-76118 Sample Location

Sampling Method - Borehole BH03

Date Sampled 29/08/2025 Depth (m) 2.0 - 2.45m

Sampled By Client Supplied
Date Tested 5/09/2025

LL Device Type Cassagrande Specification - Client Reference - Prep Mat > 53mm (%) -

Material Description SANDSTONE, Yellow.

Atterberg Limit	Specification Minimum	Test Result	Specification Maximum
Liquid Limit (%)		47	
Plastic Limit (%)		16	
Plasticity Index (%)		31	
Linear Shrinkage (%)		12.0	
Linear Shrinkage Mould Length / Defects:	Mould Length: 249.7mm / -	•	

Remarks

NATA

Accredited for compliance with ISO/IEC 17025 - Testing

Accreditation Number: 1986 Corporate Site Number: 12385



Approved Signatory: David Clout

Form ID: W11bRep Rev 2



Construction Sciences Pty Ltd

ABN: 74 128 806 735

Address:

Unit 2, 4 Kellogg Road, Glendenning NSW 2761 Laboratory: Glendenning Laboratory

Phone: 02 9854 1700 **Fax:** 02 4577 9055

Email: Sydney@constructionsciences.net

ATTERBERG LIMITS REPORT

Client: CMW GeoSciences

Client Address: Level 1, Suite 1, 12 Julius Avenue, North Ryde

Project: Solar Canopy Collaroy
Location: Solar Canopy Collaroy

Supplied To: n/a

Area Description:

Report Number: 12385/R/25-18790-1

Project Number: 12385/P/25-98

Lot Number: BH04 - 3.5 - 3.95m

Internal Test Request: 12385/T/25-10215

Client Reference/s: SYD2025-0121

Report Date / Page: 8/09/2025 Page 3 of 3

Test Procedures: AS1289.3.1.1, AS 1289.3.3.1, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1

Sample Number 12385/S/25-76119 Sample Location

Sampling Method - Broehole BH04

Date Sampled 29/08/2025 Depth (m) 3.5 - 3.95m

Sampled By Client Supplied
Date Tested 5/09/2025

Drying / Prep Method Oven Dried / Dry Sieved Material Source -

LL Water Type Potable Material Type Clay
LL Device Type Cassagrande Specification Client Reference - Prep Mat > 53mm (%) -

Material Description SANDSTONE, Orange Grey mix

Atterberg Limit	Specification Minimum	Test Result	Specification Maximum
Liquid Limit (%)		56	
Plastic Limit (%)		18	
Plasticity Index (%)		38	
Linear Shrinkage (%)		13.0	
Linear Shrinkage Mould Length / Defects:	Mould Length: 254.7mm / -		

Remarks

NATA

Accredited for compliance with ISO/IEC 17025 - Testing

Accreditation Number: 1986 Corporate Site Number: 12385



Approved Signatory: David Clout Form ID: W11bRep Rev 2



Envirolab Services Pty Ltd

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

CERTIFICATE OF ANALYSIS 389618

Client Details	
Client	CMW Geosciences
Attention	Matthew Ryan
Address	Lvl 1, Suite 1, 12 Julius Ave, NORTH RYDE, NSW, 2113

Sample Details	
Your Reference	<u>Soil Testing</u>
Number of Samples	2 Soil
Date samples received	29/08/2025
Date completed instructions received	29/08/2025

Analysis Details

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

Samples were analysed as received from the client unless as indicated below in the method summaries. Results relate specifically to the samples as received.

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

Report Details	
Date results requested by	05/09/2025
Date of Issue	04/09/2025
NATA Accreditation Number 290	This document shall not be reproduced except in full.
Accredited for compliance with IS	O/IEC 17025 - Testing. Tests not covered by NATA are denoted with *

Results Approved By

Priya Samarawickrama, Senior Chemist

Authorised By

Nancy Zhang, Laboratory Manager

Envirolab Reference: 389618 Revision No: R00



Soil Aggressivity			
Our Reference		389618-1	389618-2
Your Reference	UNITS	BH04	BH01
Depth		0.9	0.7
Date Sampled		29/08/2025	29/08/2025
Type of sample		Soil	Soil
Date prepared	-	01/09/2025	01/09/2025
Date analysed	-	01/09/2025	01/09/2025
pH 1:5 soil:water	pH Units	7.2	5.1
Electrical Conductivity 1:5 soil:water	μS/cm	330	58
Chloride, Cl 1:5 soil:water	mg/kg	49	<10
Sulphate, SO4 1:5 soil:water	mg/kg	110	78

Envirolab Reference: 389618 Revision No: R00

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

Envirolab Reference: 389618 Page | 3 of 6

Revision No: R00

QUALITY CONTROL: Soil Aggressivity						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			01/09/2025	1	01/09/2025	01/09/2025		01/09/2025	
Date analysed	-			01/09/2025	1	01/09/2025	01/09/2025		01/09/2025	
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	1	7.2	7.3	1	100	
Electrical Conductivity 1:5 soil:water	μS/cm	1	Inorg-002	<1	1	330	350	6	99	
Chloride, Cl 1:5 soil:water	mg/kg	10	Inorg-081	<10	1	49	51	4	98	
Sulphate, SO4 1:5 soil:water	mg/kg	10	Inorg-081	<10	1	110	110	0	103	[NT]

Envirolab Reference: 389618

Revision No: R00

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

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

Envirolab Reference: 389618 Revision No: R00

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

Air volumes are typically provided by customers (often as flow rate(s) and sampling time(s) and/or simply volumes) sampled or exposure times (determines 'volume' passive badges are exposed to)). Hence in such circumstances the volume measurement is inevitably not covered by Envirolab's NATA accreditation. An exception may occur where Envirolab Newcastle does the sampling where accreditation exists for certain types of sampling and hence volume determination(s). Note air volumes are often used to determine concentrations for dust and/or analyses on filters, sorbents and in impingers. For canister sampling, the air volume is covered by Envirolab's NATA accreditation.

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

For Dust Deposit Gauge (DDG) analysis the sampling, sampling period and funnel exposure area do not fall under Envirolab's NATA accreditation (unless the Newcastle laboratory where responsible for the sampling), hence the annotation on the DDG units of reporting.

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

Envirolab Reference: 389618

Revision No: R00





Sydney

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