REPORT TO

SYESUN PTY LTD

ON

DATA GAP INVESTIGATION

FOR

PROPOSED GARDEN CENTRE REDEVELOPMENT

AT

277 MONA VALE ROAD, TERREY HILLS, NSW

Date: 18 June 2025

Ref: E34278PHrpt4-rev1

JKEnvironments

www.jkenvironments.com.au

T: +61 2 9888 5000

JK Environments Pty Ltd

ABN 90 633 911 403

Report prepared by:

Todd Hore
Senior Associate Environmental Engineer

Report reviewed by:

Brendan Page
Principal | Environmental Scientist
CEnvP SC

For and on behalf of
JKE
PO BOX 976
NORTH RYDE BC NSW 1670

DOCUMENT REVISION RECORD

Report Reference	Report Status	Report Date
E34278PHrpt4	Final Report	20 December 2024
E34278PHrpt4-rev1	Final Report – updated development	18 June 2025

Executive Summary

Syesun Pty Ltd ('the client') commissioned JK Environments (JKE) to undertake a Data Gap Investigation (DGI) for the proposed garden centre redevelopment at 277 Mona Vale Road, Terrey Hills, NSW ('the site'). The purpose of the investigation is to assess the data gaps identified in a previous version of the Remediation Action Plan (RAP) prepared for the site.

The RAP outlined remediation measures (capping and containment) to be implement to reduce the risks associated with asbestos in soil. Data gaps were identified in the RAP associated with:

- Deep fill in the north-east section of the site (BH101) and the associated potential for Hazardous Ground Gas (HGG) in that area. Additional monitoring and risk analysis was considered necessary to meet guideline requirements; and
- The unknown source of the Total Recoverable Hydrocarbons TRH (F2) that was previously detected in the MW101 groundwater sample. The existing Above Ground Storage Tank (AST) at the site was identified as a potential TRH source and was targeted for the DGI.

The DGI included soil sampling targeted at the AST, groundwater sampling from existing monitoring wells and HGG monitoring from six wells installed along the north and east boundaries of the proposed building footprint.

Two boreholes were drilled in the immediate vicinity of the AST (BH207 and BH208). Samples were obtained from directly beneath the concrete pavement and analysed for TRH and Benzene, Toluene, Ethylbenzene, Xylene (BTEX). The results were less than the Site Assessment Criteria (SAC). Traces of heavy fraction TRH were detected in both samples, however, these concentrations were relatively low (maximum 200mg/kg) and not considered to represent a risk to receptors.

The three groundwater monitoring wells installed for the Detailed Site Investigation (DSI) were re-sampled for the DGI. Samples were analysed for TRH and BTEX and all of the results were less than the SAC and less than the laboratory detection limits.

Based on the results of the survey and contour plan, MW101A is in the down gradient area of the site. No TRH has been detected in either of the other monitoring wells. These results indicate that the traces of TRH (F2) detected in MW101A during the DSI may have been a sampling anomaly. Based on this, the groundwater at the site is not considered to represent a risk to receptors and no management is considered to be required.

We note that shallow fill (typically less than 1m deep) was encountered during drilling for installation of the HGG monitoring wells and the no organic material was encountered in the fill. This confirms that the deep fill in the BH101 area is very localised and not representative of the general site conditions in the north-eastern area of the site.

With the exception of relatively low concentrations of carbon dioxide and one detection of carbon monoxide, no other HGG was detected during the monitoring. The carbon dioxide is considered to be consistent with natural ground conditions and we do not consider that there is a significant source of carbon dioxide-generating material or waste that requires further consideration in the context of the proposed development scenario.

Based on the HGG monitoring data, and considering multiple lines of evidence including the fact that the DGI proved that the deep fill previously identified in BH101 is very localised, the risk posed to potential receptors based on the HGG data is low and HGG protection measures are not considered to be required for the proposed development.

The DGI has not identified any additional risks posed by soil or groundwater contamination, nor by HGG, that would require revision of the RAP. We note that the RAP stated that 'the extent of remediation is to be confirmed following the data gap investigation'. Given no additional risks have been identified during the DGI, the extent and detail of remediation in the RAP is considered to remain unchanged.

JKE is of the opinion that the site can be made suitable for the proposed development via remediation and the implementation of the RAP. A site validation report is to be prepared on completion of remediation activities and submitted to the consent authority to demonstrate that the site is suitable for the proposed development. The site will require management via a Long-Term Environmental Management Plan (LTEMP) to manage asbestos in soil that is

capped during the remediation process. The LTEMP will provide a passive management approach which would not impose any onerous constraints on the day-to-day site use under the proposed development scenario.

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

Table of Contents

List of Tables

Attachments

Abbreviations

Asbestos Fines/Fibrous Asbestos	**AF/FA**
Asbestos Management Plan	**AMP**
Ambient Background Concentrations	**ABC**
Added Contaminant Limits	**ACL**
Asbestos Containing Material	**ACM**
Area of Environmental Concern	**AEC**
Australian Height Datum	**AHD**
Acid Sulfate Soil	**ASS**
Above-Ground Storage Tank	**AST**
Before You Dig Australia	**BYDA**
Below Ground Level	**BGL**
Bureau of Meteorology	**BOM**
Benzene, Toluene, Ethylbenzene, Xylene	**BTEX**
Cation Exchange Capacity	**CEC**
Combined Risk Value	**CRV**
Contaminated Land Management	**CLM**
Contaminant(s) of Potential Concern	**CoPC**
Chain of Custody	**COC**
Conceptual Site Model	**CSM**
Development Application	**DA**
Data Quality Indicator	**DQI**
Data Quality Objective	**DQO**
Detailed Site Investigation	**DSI**
Ecological Investigation Level	**EIL**
Ecological Screening Level	**ESL**
Environmental Management Plan	**EMP**
Environment Protection Authority	**EPA**
Finished Floor Level	**FFL**
Health Investigation Level	**HIL**
Health Screening Level	**HSL**
Health Screening Level-Site Specific Assessment	**HSL-SSA**
International Organisation of Standardisation	**ISO**
JK Environments	**JKE**
JK Geotechnics	**JKG**
Lab Control Spike	**LCS**
Long Term Environmental Management Plan	**LTEMP**
Map Grid of Australia	**MGA**
National Association of Testing Authorities	**NATA**
National Environmental Protection Measure	**NEPM**
Photo-ionisation Detector	**PID**
Protection of the Environment Operations	**POEO**
Practical Quantitation Limit	**PQL**
Quality Assurance	**QA**
Quality Control	**QC**
Relative Level	**RL**
Remediation Action Plan	**RAP**
Remedial Works Plan	**RWP**
Relative Percentage Difference	**RPD**
Reduced/Relative Level	**RL**
Site Assessment Criteria	**SAC**
Sampling, Analysis and Quality Plan	**SAQP**
State Environmental Planning Policy	**SEPP**
Site Specific Assessment	**SSA**

Source, Pathway, Receptor	**SPR**
Specific Contamination Concentration	**SCC**
Standard Penetration Test	**SPT**
Standing Water Level	**SWL**
Trichloroethene	**TCE**
Trip Blank	**TB**
Toxicity Characteristic Leaching Procedure	**TCLP**
Total Recoverable Hydrocarbons	**TRH**
Trip Spike	**TS**
Upper Confidence Limit	**UCL**
United States Environmental Protection Agency	**USEPA**
World Health Organisation	**WHO**
Work Health and Safety	**WHS**

Units

%Lower Explosive Limit	**%LEL**
%volume/volume	**%v/v**
Litres	**L**
Litres per Hour	**L/H**
Metres BGL	**mBGL**
Metres	**m**
Millivolts	**mV**
Millilitres	**ml or mL**
Milliequivalents	**meq**
micro Siemens per Centimetre	**µS/cm**
Micrograms per Litre	**µg/L**
Milligrams per Kilogram	**mg/kg**
Milligrams per Litre	**mg/L**
Parts Per Million	**ppm**
Percentage	**%**
Percentage weight for weight	**%w/w**

1 INTRODUCTION

Syesun Pty Ltd ('the client') commissioned JK Environments (JKE) to undertake a Data Gap Investigation (DGI) for the proposed garden centre redevelopment at 277 Mona Vale Road, Terrey Hills, NSW ('the site'). The purpose of the investigation is to assess the data gaps identified in a previous version of the Remediation Action Plan (RAP)[1] prepared for the site. The site location is shown on Figure 1 and the investigation was confined to the site boundaries as shown on Figure 2.

The primary data gaps identified in the RAP included:

- The Hazardous Ground Gas (HGG) assessment was limited to field screening during drilling and a single monitoring event from two HGG wells. Additional monitoring and risk analysis was considered necessary to meet guideline requirements; and
- The source of the Total Recoverable Hydrocarbon TRH (F2) detected in the MW101 groundwater samples had not been confirmed and JKE recommended that this would need to be managed via the implementation of appropriate procedures during and following demolition.

It was also acknowledged that a sample was not obtained from directly beneath the Above-Ground Storage Tank (AST) bund.

This report has been prepared to address the RAP requirements. The RAP was prepared to support the lodgement of a Development Application (DA) for the proposed garden centre redevelopment, with regards to Chapter 4 of State Environmental Planning Policy (Resilience and Hazards) 2021[2] (formerly known as SEPP55).

A geotechnical investigation was undertaken previously to this DSI by JK Geotechnics (JKG). The results of the geotechnical investigation are presented in a separate report (Ref: 34278Brpt, dated 3 September 2021)[3]. This report should be read in conjunction with the JKG report.

JKE has previously undertaken a Preliminary Site Investigation (PSI) at the site. (Ref: E24278PHrpt)[4] and a Detailed Site Investigation (DSI) (Ref: E27318PHrpt)[5] was also undertaken to address the recommendations of the PSI. A summary of this information, together with a summary of the RAP has been included in Section 2.

[1] JKE (2023). *Report to Syesun Pty Ltd on Remediation Action Plan for Proposed Garden Centre Redevelopment at 277 Mona Vale Road, Terrey Hills, NSW* (ref: E34278PHrpt3-RAP-rev1, dated 21 June 2023)

[2] *State Environmental Planning Policy (Resilience and Hazards) 2021* (NSW) (referred to as SEPP Resilience and Hazards 2021)

[3] JKG, (2021). *Report to Syesun Pty Ltd on Geotechnical Investigation for Proposed Redevelopment of Garden Centre at 277 Mona Vale Road, Terrey Hills, NSW* (referred to as JKG report)

[4] JKE (2021). *Report to Syesun Pty Ltd on Preliminary (Stage 1) Site Investigation for Proposed Garden Centre Redevelopment at 277 Mona Vale Road, Terrey Hills, NSW.* (Ref: E24278PHrpt, dated 28 October 2021- subsequently updated in 2025) *(referred to as PSI)*

[5] JKE (2022). *Report to Syesun Pty Ltd on Detailed (Stage 2) Site Investigation for Proposed Garden Centre Redevelopment at 277 Mona Vale Road, Terrey Hills, NSW.* (Ref: E24278PHrpt2-rev1, dated 13 June 2022- subsequently updated in 2025) (referred to as DSI)

1.1 Proposed Development Details

We understand that the site is occupied by a garden centre that will remain in use and that the western portion of the site is to be redeveloped as a separate fruit and pet shop. A new 100 space car park is proposed adjacent to the new buildings. The proposed works will be at a similar grade to the existing ground levels with minor filling likely.

Proposed development plans are attached in the appendices.

1.2 Aims and Objectives

The primary aims of the investigation were to better assess the soil directly beneath the AST bund and HGG conditions. The objectives were to:

- Better assess the HGG conditions in the north-east section of the site;
- Assess the soil contamination conditions immediately beneath the AST;
- Update the existing conceptual site model (CSM);
- Assess the potential risks posed by contamination to the receptors identified in the CSM (Tier 1 assessment);
- Assess whether revision of the remediation strategy is required; and
- Assess whether the site be made suitable subject to remediation.

1.3 Scope of Work

The investigation was undertaken generally in accordance with a JKE proposal (Ref: EP56512PH-rev1) of 25 June 2024 and written acceptance from the client of 2 July 2024. The scope of work included the following:

- Review of the CSM;
- Design and implementation of a sampling, analysis and quality plan (SAQP);
- Interpretation of the analytical results against the adopted Site Assessment Criteria (SAC);
- Data Quality Assessment; and
- Preparation of a report including a Tier 1 risk assessment.

The scope of work was undertaken with reference to the National Environmental Protection (Assessment of Site Contamination) Measure 1999 as amended (2013)[6], other guidelines made under or with regards to the Contaminated Land Management Act (1997)[7] and SEPP Resilience and Hazards 2021. A list of reference documents/guidelines is included in the appendices.

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

[7] Contaminated Land Management Act 1997 (NSW) (referred to as CLM Act 1997)

2 SITE INFORMATION

2.1 Background

2.1.1 Investigations

The PSI included an assessment of the site history, a walkover site inspection and soil sampling from 10 boreholes.

The PSI identified that the site has historically been used for agricultural and horticultural activities from around the mid-1900s onwards. An above-ground storage tank (AST) was also observed during the site inspection. It was noted that agricultural/horticultural activities are listed in Table 1 of the SEPP Planning Guidelines as activities that may cause contamination. This triggered a need for a DSI under the purview of SEPP Resilience and Hazards 2021.

The following potential contamination sources/areas of environmental concern (AEC) were identified:

- Fill material;
- The AST;
- Historical agricultural use of the site;
- Pesticides may have been used beneath the buildings and/or around the site; and
- Hazardous building materials from former building and demolition activities. These materials may also be present in the existing buildings/structures on site.

The DSI included a review of the PSI, soil sampling from 30 location, groundwater sampling from three locations and Hazardous Ground Gas (HGG) sampling from two locations.

At the time of the inspection, the majority of site was occupied by a plant nursery, landscape/garden centre and a café.

Fill was encountered at the surface or beneath the pavement in all boreholes, except BH113 and BH116, and extended to depths of approximately 0.2m to 4.5m. The fill typically comprised silty gravelly sand/gravelly silty sand, silty sand and silty clayey sand/silty sandy clay with inclusions of igneous and ironstone gravel, ash, slag and building rubble (brick, concrete, asphaltic concrete [AC], glass and tile fragments). During the PSI, fill was also found to contain organic material.

Groundwater monitoring wells were installed in BH101A (MW101A), BH102 (MW102) and BH105 (MW105). Standing Water Levels (SWLs) measured in the monitoring wells installed at the site ranged from 0.53m to 2.76m.

Methane and carbon dioxide were encountered both during drilling of BH101 and spot monitoring in MW101. We note that MW101 is located in the north-east corner of the site, outside of the proposed building footprint. The methane and carbon dioxide are considered most likely to be associated with organic material in fill.

All of the soil analysis results were less than the Site Assessment Criteria (SAC), with the exception of asbestos. We note that asbestos was detected at concentrations that exceeded the SAC in fill samples from

BH101 and BH128. Asbestos was also detected at concentrations less than the SAC in fill samples from BH104, BH106, BH110 and TP127. The asbestos impact would be limited vertically to the depth of fill and appears to extend horizontally across the entire site. The asbestos was found as bonded fibre cement/asbestos containing material (ACM) and as Asbestos Fines/Fibrous Asbestos (AF/FA). The AF/FA is considered to be friable based on the NEPM (2013) definitions and represents a greater risk to human receptors compared to the ACM as there is an increased potential for the asbestos fibres to become mobilised/airborne during soil disturbance.

Traces of TRH (F2) were detected in MW101A in the north-eastern corner of the site and the source of the TRH was unknown.

There was no visible asbestos at the ground surface and only limited samples containing asbestos were from at or near the surface. On this basis, there was considered to be a low risk of a complete source-pathway-receptor (SPR) linkage. in the current site configuration and risks from asbestos were considered likely to remain low whilst the fill remains undisturbed. The risk of exposure to asbestos could increase during excavation/disturbance of the fill if such activities are not managed appropriately.

JKE considered that the site can be made suitable for the proposed development via remediation. The following was recommended:

- A RAP should be prepared to outline measures to reduce the risks associated with the asbestos in fill at the site. The RAP must also outline the details of additional HGG monitoring at the site and other site management protocols to address the data gaps;
- An Asbestos Management Plan (AMP) is to prepared for the construction phase of the proposed development for the removal of the asbestos waste, as required under the NSW Work Health and Safety Regulation 2017; and
- An AMP is to be prepared for management of asbestos in soil whilst the existing retail premises continue to operate.

2.1.2 Remediation

The primary contaminant identified at the site that required preparation of the original RAP was asbestos. The proposed remediation strategy included a combination of excavation and off-site disposal of fill where required to achieve the development levels, and cap and containment of the fill that remains in-situ. A visual marker layer will be installed over the remaining contaminated fill prior to the reinstatement of these areas with clean capping materials. The areas where fill remains will be managed under a Long Term Environmental Management Plan (LTEMP).

The capping specifications are shown in the table below:

Table 2-1: Capping Specification from RAP

Area	Capping Specification^
Continuous hardstand (e.g. pavement/concrete, or beneath permanent fixed features such as steps, retaining walls etc.)	Installation of: • Geotextile (or geogrid) marker[8] layer over the contaminated fill; • Clean imported (validated) basecourse, as required based on the engineering specification; and • Pavement material (i.e. concrete) as per engineering specification, or construction of the above ground feature.
Other areas with non-continuous hardstand (e.g. tiled areas, paving/pavers etc.)	Installation of: • Geotextile (or geogrid) marker over the contaminated fill; • At least 200mm clean imported (validated) capping material; and • Surface finish to required development design.
Landscaped areas, new plantings (trees, shrubs etc) and underground services	Any landscaped areas must be capped as follows: • Geotextile (or geogrid) marker over the contaminated fill; • At least 500mm clean imported (validated) capping material; and • Surface finish to required development design. All new plantings and underground services are to be placed above (not within) the contaminated fill (i.e. must be above the marker layer). Depending on the service depths and tree planting depths, this may require excavation and the placement of additional clean (validated) material to depths of >500mm. Installation of a marker layer is not required for existing services/service trenches to remain.

Prior to commencement of remediation, a data gap investigation was recommended. The outcome of that investigation must be considered in the context of the remediation and an updated RAP or Remedial Works Plan (RWP) must be prepared to outline any additional requirements relating to site remediation and validation.

JKE was of the opinion that the site could be made suitable for the proposed development via remediation and the implementation of the RAP. A site validation report is to be prepared on completion of remediation activities and submitted to the consent authority to demonstrate that the site is suitable for the proposed development. The site will require management via a LTEMP. The LTEMP will provide a passive management approach which would not impose any onerous constraints on the day-to-day site use under the proposed development scenario.

Notwithstanding the above, we note that the RAP has been revised in 2025 to consider the revised proposed development scheme. In the context of the revised RAP, the site boundary was also revised to address only the proposed development area for which approval for development and use was being sought.

[8] The purpose of the geotextile (or geogrid) marker is to provide visual demarcation to the underlying contaminated fill, should the overlying capping layers be disturbed. The client/project manager, remediation contractor and validation consultant are to agree on appropriate materials based on the project requirements (including but not limited to landscaping and engineering requirements).

2.2 Site Identification

Table 2-2: Site Identification

Current Site Owner (certificate of title):	Syesun Pty Limited
Site Address:	277 Mona Vale Road (also known as 62 Myoora Road), Terrey Hills, NSW
Lot & Deposited Plan:	Lot 4 in DP 737411
Current Land Use:	Garden Centre
Proposed Land Use:	Garden Centre
Local Government Area:	Northern Beaches Council
Current Zoning:	RU4 Primary Production Small Lots
Site Area (m^2) (approx.):	200
RL (AHD in m) (approx.):	28,000
Geographical Location (decimal degrees) (approx.):	Latitude: -33.686399 Longitude: 151.225561
Site Location Plan:	Figure 1
Sample Location Plan:	Figure 2

2.3 Site Location, Topography and Regional Setting

The site is located in a mixed residential and commercial area of Terrey Hills and is bound by Mona Vale Road to the east, Cooyong Road to the north and Myoora Road to the west. The site is located approximately 500m to the west of Kimbriki Resource Recovery Centre (landfill).

The site is located towards the crest of a south-east facing hillside that falls towards Deep Creek and eventually Narrabeen Lagoon. The site itself falls to the south-east at approximately 1-3°. Parts of the site appear to have been levelled to account for the slope and accommodate the existing development. The hill becomes markedly steeper on the east side of Mona Vale Road.

2.4 Summary of Site Inspections

Walkover site inspections were undertaken for the PSI and DSI. In summary:

- At the time of the inspection, the majority of site was occupied by a plant nursery, landscape/garden centre and a café. The main retail building, located in the east section of the site, was single storey and of brick construction. A group of three smaller buildings was located south of the main building and included a toilet block, storage shed and cashier. Two portable buildings were located in the centre of

the site and were occupied by office space. A large greenhouse was located west of the main building and generally contained potted plants and garden products. Concrete paved footpaths extended through the greenhouse. Two buildings (an existing or former house and a garage) were located in the south-west corner of the site and appeared to include fibre-cement cladding). The cladding on the former garage was damaged;

- AC-paved car parks were located along the east and north site boundaries;
- An AST was located in a brick and concrete bund, adjacent to the west end of a row of landscaping supply bays (see Figure 2). The bund was filled with mulch and, although no staining was observed within the bund, the mulch appeared wet in sections. Staining was observed on the ground surface immediately east of the AST. Consultation with the client indicated that the AST was used to store diesel.;
- Native shrubs and trees were present along the east, north and west site boundaries. Some native and exotic plants were located throughout the site associated with the nursery; and
- The surrounding land uses included residential areas to the north, a school to the west, a mixed rural and commercial area to the south and a vegetation corridor beyond Mona Vale Road to the east with Kimbriki Recycling Centre within the corridor.

2.5 Underground Services

The 'Before You Dig Australia' (BYDA) plans were reviewed for the PSI/DSI. Major services were not identified that would be expected to act as preferential pathways for contamination migration.

3 GEOLOGY AND HYDROGEOLOGY

3.1 Regional and On-site Geology

Regional geological information sourced from a Lotsearch *Environmental Risk and Planning Report* was reviewed for the PSI. The report indicated that the site is underlain by Hawkesbury Sandstone, which typically consists of medium to coarse grained quartz sandstone with minor shale and laminite lenses. The PSI/DSI encountered fill across the entire site that extended to depths of approximately 0.2m to 4.5m, underlain by silty clay and siltstone/sandstone bedrock.

3.1.1 Acid Sulfate Soil (ASS) Risk and Planning

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

3.2 Hydrogeology

The PSI indicated that the subsurface conditions at the site consist of residual soils (anticipated to be of relatively low permeability) overlying shallow bedrock. The potential for viable groundwater abstraction and use of groundwater under these conditions is considered to be low and only available using very deep wells.

Groundwater monitoring wells were installed in BH101A (MW101A), BH102 (MW102) and BH105 (MW105) for the DSI. The SWLs were measured at depths between 0.53mBGL to 2.76mBGL. Groundwater flow would generally be expected occur in a down gradient direction perpendicular to the ground surface elevation contours shown on Figure 4. Based on this, groundwater is expected to generally flow towards the east and south-east.

3.2.1 Receiving Water Bodies

Surface water bodies were not identified in the immediate vicinity of the site. The closest surface water body is Deep Creek located approximately 1,800m to the south-east of the site. This is down-gradient from site, however, due to the distance from the site, is unlikely to be a potential receptor.

4 CONCEPTUAL SITE MODEL

NEPM (2013) defines a CSM as a representation of site related information regarding contamination sources, receptors and exposure pathways between those sources and receptors. The CSM for the site is presented in the following sub-sections and is based on the site information (including the site inspection information) and the review of site history information. Reference should also be made to the figures attached in the appendices.

A review of the CSM in relation to SPR linkages has been undertaken as part of the Tier 1 risk assessment process, as outlined in Section 9.

4.1 Potential Contamination Sources/AEC and CoPC

The potential contamination sources/AEC and CoPC are presented in the following table:

Table 4-1: Potential (and/or known) Contamination Sources/AEC and Contaminants of Potential Concern

Source / AEC	CoPC
Fill material – The site has been historically filled to achieve the existing levels. The fill may have been imported from various sources and could be contaminated. Fill can also become contaminated in situations where former buildings are demolished and where soils are moved around the site during cut/fill earthworks. Fill material was encountered during the PS/DSI that extended to depths of approximately 0.2m to 4.5m. The fill depths are shown on Figure 2 in Appendix A. Asbestos was encountered at multiple locations within the fill across the site. The asbestos in fill is considered to be associated with historical demolition of former structures. There is a potential for HGG, primarily including methane and carbon dioxide, to be associated with the deep fill where organic materials are present. Methane and carbon dioxide were encountered both during drilling of BH101 and spot monitoring in MW101. We note that MW101 is located in the north-east corner of the site, outside of the proposed building footprint.	Asbestos is considered to be the primary contaminant of concern for remediation and validation across the entire site. HGG: primarily methane and carbon dioxide. Further investigation, monitoring and assessment of HGG risks will be required. Based on the current proposed development details it appears that fill is likely to remain across the site. Areas between BH101 (where deep fill exists) and existing/proposed buildings were to be the target of the DGI.
Fuel storage – One AST was identified at the site (see Figure 2). The AST was located in a concrete bund, however, staining was observed on the ground surface immediately east. No contamination was identified associated with the AST, however, the potential exists for localised and unidentified impacts directly beneath the AST. A sample was not obtained from beneath the footprint of the bund during the DSI.	Lead, TRH, BTEX and polycyclic aromatic hydrocarbons (PAHs) The area directly beneath the AST was to be the target of the DGI.

4.2 Mechanism for Contamination, Affected Media, Receptors and Exposure Pathways

At this stage, the risk driving the remediation relates to asbestos in fill. Potential contamination sources associated with HGG and the AST will be considered for the DGI. The mechanisms for contamination, affected media, receptors and exposure pathways have been identified below relevant to this contamination.

The mechanisms for contamination, affected media, receptors and exposure pathways relevant to the potential contamination sources/AEC are outlined in the following CSM table:

Table 4-2: CSM

Potential mechanism for contamination	The mechanism for asbestos in soil contamination includes fill placement/demolition of structures and 'top down' impacts. The potential mechanisms for contamination from the AST are most likely to include 'top-down' impacts and spills. The potential for HGG is considered to be associated with organic material within the fill. The impact would be expected to occur through soil pore space to the surface or into the proposed buildings. We note that the fill at the site was variable, however, the majority included sand, and is typically above the groundwater table. The fill would have a moderate potential for pore space in soil and movement of HGG.
Affected media	Soil has been identified as an affected medium for asbestos and beneath the AST. It is noted that asbestos fibres can also affect the air. Asbestos has not been found on the ground surface to-date. HGG has been identified as a potentially affected medium in the north-east section of the site. Groundwater has not been identified as affected media at this stage. This will be reconsidered following review of the results for the DGI, in particular soil results beneath the AST.
Receptor identification	Human receptors include site users (including adults and children using the retail facilities, and adult workers), construction workers and intrusive maintenance workers. Off-site human receptors include adjacent land users, primarily in a commercial land use scenario. Ecological receptors include terrestrial organisms and plants within unpaved areas (including the proposed landscaped areas).
Potential exposure pathways	The exposure pathway for asbestos includes inhalation of airborne asbestos fibres. Potential exposure pathways relevant to the human receptors from the AST include ingestion, dermal absorption and inhalation of dust (all contaminants) and vapours (volatile TRH, naphthalene and BTEX). Inhalation of HGG can cause human health effects ranging from nausea to asphyxiation. HGG such as methane can be flammable/explosive under certain atmospheric conditions, with the introduction of an ignition source. The potential for exposure would typically be associated with the construction and excavation works, and future use of the site.

	Exposure during future site use could occur via inhalation of vapours/HGG within enclosed spaces such as buildings and basements.
Potential exposure mechanisms	The following have been identified as potential exposure mechanisms for site contamination: • Vapour/HGG intrusion or accumulation into semi-enclosed spaces such as trenches or excavations, or enclosed spaces such as the building (either from HGG formed by the degradation of waste, soil contamination or volatilisation of contaminants from groundwater); and • Contact (dermal, ingestion or inhalation) with exposed soils during construction, or during future site use in landscaped areas and/or unpaved areas.
Presence of preferential pathways for contaminant movement	No obvious potential preferential pathways for contaminant migration were identified at the site.

5 HGG PRELIMINARY QUALITATIVE RISK ASSESSMENT

A Level 1 preliminary HGG qualitative risk analysis and assessment is required under the NSW EPA Assessment and Management of Hazardous Ground Gases, Contaminated Land Guidelines (2020)[9].. The Level 1 HGG risk and preliminary Level 2 assessment is detailed below and is designed to address the following:

- Potential sources of ground gas;
- Receptors that could be affected;
- Possible pathway (linkages) by which gas could reach receptors; and
- Preliminary quantitative assessment of HGG conditions at the site.

5.1 Background on HGG

HGG (including methane, carbon dioxide, carbon monoxide and hydrogen sulphide) occur naturally in the environment from sources such as coal seams, peat/bog areas and alluvium organic rich sediments. Sources of HGG derived from anthropogenic activities include landfill sites, sewage/sludge, burial grounds, buried organic material, chemical industry and natural gas supply leakages.

Current and former landfill sites have the potential to generate HGG as a result of the biodegradation of organic materials in wastes deposited at the landfill site. The gas regime is influenced by the age and composition of the landfill. The gas regime is also influenced by physical parameters such as temperature, rainfall, atmospheric pressure, groundwater and geology.

The most commonly recognised hazards and effects of HGG have been identified in CIRIA publication R130[10] as:

- Flammable/explosive (death, injury and damage to property);
- Physiological effects on the body (from impairment of judgement to asphyxiation);
- Odour (nausea and other health effects); and
- Effects on vegetation (die-back).

More specific information regarding most common HGGs is summarised below:

- Methane is a hazardous gas originating from the degradation of organic matter. It is biochemically reactive and readily oxidises to carbon dioxide under aerobic conditions. Methane is a flammable gas which is explosive in the concentration range of 5% to 15%. It is less dense than air and is an asphyxiant at high concentrations (>33%) due to the displacement of oxygen;
- Carbon dioxide is often associated with the presence of methane. However, it can also be directly generated by soil. Carbon dioxide is an asphyxiant and a toxic gas which is denser than air. At concentrations of 3% it can result in shortness of breath, loss of consciousness can occur at 10% - 11% and it can be fatal at >22%;
- Carbon monoxide is an acutely toxic gas at high concentrations (>35ppm) and can be flammable and potentially explosive; and

[9] NSW EPA, (2020). *Assessment and Management of Hazardous Ground Gases. Contaminated Land Guidelines* (referred to as HGG 2020 Guidelines)
[10] Construction Industry Research and Information Association (CIRIA) C665 – Assessing Risks Posed by Hazardous Ground Gases to Buildings (2007) (referred to as CIRIA C665, 2007)

- Hydrogen sulphide is an acutely toxic gas which is flammable, an asphyxiant (between 400ppm and 500ppm), odorous and causes nausea.

For HGG to migrate away from its source, there must be a driving force and an available pathway. There are three principal factors influencing gas migrations:

- Advection (generation of gas from within the source and changes in atmospheric pressure (Differential pressure);
- Diffusion along gas concentration gradients; and
- Flow, in dissolved form, within liquids.

HGG has the potential to migrate through preferential pathways and enter buildings via the following routes:

- Crack or gaps in both solid and suspended floors;
- Joints formed during the construction process;
- Fractures in subsurface walls;
- Around service pipes and ducts; and
- Wall cavities.

5.2 Classification of Probability and Consequence

Probability and consequence are used to assess the level of risk. The classification of consequence and probability is presented below.

Table 5-1: Classification of Probability

Classification	Definition
High Likelihood	There is a pollution linkage and an event that either appears very likely in the short-term and almost inevitable over the long-term, or there is evidence at the receptor of harm or pollution.
Likely	There is a pollution linkage and all the elements are present and in the right place, which means that it is probable that an event will occur.
Low Likelihood	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such event would take place, and is less likely in the short-term.
Unlikely	There is a pollution linkage but circumstances are such that it is improbable that an event would occur even in the very long-term.

Table 5-2: Classification of Consequence

Classification	Definition
Severe	Fatalities, including multiple fatalities Very serious injuries Catastrophic damage to buildings/property Short and long-term risks to water resources or ecosystems

Classification	Definition
Medium	Long-term damage to human health Serious injuries Major damage to structures Pollution of sensitive water resources
Mild	More significant non-permanent injuries Significant damage to buildings/structures/services
Minor	Minor non-permanent health effects Harm that may result in financial loss, business disruption or reputational damage Minor property damage

5.3 Qualitative Risk Matrix

The assessment of probability and consequence are then assessed against the risk matrix below:

Table 5-3: Qualitative Risk Matrix

		Consequence			
Probability		Severe	Medium	Mild	Minor
	High Likelihood	Very high risk	High risk	Moderate risk	Moderate/low risk
	Likely	High risk	Moderate risk	Moderate/low risk	Low risk
	Low Likelihood	Moderate risk	Moderate/low risk	Low risk	Very low risk
	Unlikely	Moderate/low risk	Low risk	Very low risk	Very low risk

5.4 Qualitative Risk Assessment of the Site

A qualitative risk assessment of the site is summarised in the table below. This is based on the existing site conditions and considering the proposed development details. JKE have adopted a conservative approach to the qualitative risk assessment.

Table 5-4: Qualitative Risk Assessment Based on Desktop Information

Landuse	HGG	Receptors	Pathways	Consequence	Probability	Risk
Garden Centre	CH_4, CO_2, CO and H_2S	Site occupants (primarily including adults – children may access the site infrequently and for short durations) and construction /maintenance workers	Ingress and accumulation of HGG	Effect on human health – Minor Damage to buildings and structures – Minor	Unlikely – At this stage based on the available information, JKE is of the opinion that only small quantities of organic material are likely to be present in the fill	Low risk

Landuse	HGG	Receptors	Pathways	Consequence	Probability	Risk
		Buildings and structures onsite			on the north-east section of the site.	

The Level 1 preliminary HGG qualitative risk analysis and assessment was undertaken with regards to the NSW EPA HGG 2020 guidelines. The risk posed by potential HGG at the site to receptors was assessed by JKE to be low. The assessment of risk was based on the available information, including preliminary HGG data from previous assessments and the CSM.

Although the Level 1 preliminary HGG qualitative risk assessment has indicated a low risk for potential HGG impacts at the site. The risk is to be further assessed by obtaining additional site-specific data and undertaking a preliminary Level 2 HGG semi-quantitative risk analysis.

6 SAMPLING, ANALYSIS AND QUALITY PLAN

6.1 Data Quality Objectives (DQO)

Data Quality Objectives (DQOs) were developed to define the type and quality of data required to achieve the project objectives outlined in Section 1.2. The DQOs were prepared with reference to the process outlined in Schedule B2 of NEPM (2013). The seven-step DQO approach for this project is outlined in the following sub-sections.

The DQO process is validated in part by the Data Quality Assurance/Quality Control (QA/QC) Evaluation. The Data (QA/QC) Evaluation is summarised in Section 8.1 and the detailed evaluation is provided in the appendices.

6.1.1 Step 1 - State the Problem

The DSI and RAP identified data gaps associated with potential sources of contamination/AEC at the site that may pose a risk to human health and the environment. Investigation data is required to better assess the contamination status of the site, better assess the risks posed by the contaminants in the context of the proposed development/intended land use, and confirm that the proposed remediation methodology remains appropriate.

The DQOs were developed by the author of this report and checked by the reviewer. Both the author and reviewer were joint decision-makers in relation to Step 2 of the DQO process.

6.1.2 Step 2 - Identify the Decisions of the Study

The objectives of the investigation are outlined in Section 1.2. The decisions to be made reflect these objectives and are as follows:

- Are any of the laboratory or HGG results above the site assessment criteria?
- Do potential risks associated with contamination or HGG exist, and if so, what are they?
- Is revision of the remediation strategy required?
- Can the site be made suitable subject to remediation?

6.1.3 Step 3 - Identify Information Inputs

The primary information inputs required to address the decisions outlined in Step 2 include the following:

- Existing relevant environmental data from previous reports;
- Sampling of potentially affected media, including soil and groundwater;
- Field monitoring of HGG;
- Observations of sub-surface variables such as soil type, photo-ionisation detector (PID) concentrations, odours and staining, and groundwater physiochemical parameters;
- Laboratory analysis of soils and groundwater for the CoPC identified in the CSM; and
- Field and laboratory QA/QC data.

6.1.4 Step 4 - Define the Study Boundary

The soil sampling will be confined to the area immediately beneath the AST and limited to the depth of BH207 and BH208 at a maximum of 0.2m. The groundwater sampling will be confined to the site boundaries as shown in Figure 2 and specifically to the monitoring wells installed for the DSI. The sampling was completed between 12 July 2024 and 22 July 2024 (temporal boundary).

The HGG monitoring was undertaken in the north-east section of the site between BH101 and along the east and north sides of the proposed building between. Monitoring was completed across three events between 24 July and 30 August 2024.

The assessment of potential risk to adjacent land users has been made based on data collected within the site boundary.

6.1.5 Step 5 - Develop an Analytical Approach (or Decision Rule)

6.1.5.1 Tier 1 Screening Criteria

The laboratory data will be assessed against relevant Tier 1 screening criteria (referred to as SAC), as outlined in Section 7. Exceedances of the SAC do not necessarily indicate a requirement for remediation or a risk to human health and/or the environment. Exceedances are considered in the context of the CSM and valid SPR-linkages.

For this investigation, the individual results have been assessed as either above or below the SAC. Statistical evaluation of the dataset via calculation of mean values and/or 95% upper confidence limit (UCL) values has not been undertaken due to the spatial distribution of the data and the number of samples submitted for analysis.

6.1.5.2 Field and Laboratory QA/QC

Field QA/QC included analysis of intra-laboratory duplicates, trip spike, trip blank and rinsate samples. Further details regarding the sampling and analysis undertaken, and the acceptable limits adopted, is provided in the Data Quality (QA/QC) Evaluation in the appendices.

The suitability of the laboratory data is assessed against the laboratory QA/QC criteria which is outlined in the attached laboratory reports. These criteria were developed and implemented in accordance with the laboratory's National Association of Testing Authorities, Australia (NATA) accreditation and align with the acceptable limits for QA/QC samples as outlined in NEPM (2013) and other relevant guidelines.

In the event that acceptable limits are not met by the laboratory analysis, other lines of evidence are reviewed (e.g. field observations of samples, preservation, handling etc) and, where required, consultation with the laboratory is undertaken in an effort to establish the cause of the non-conformance. Where uncertainty exists, JKE typically adopt the most conservative concentration reported (or in some cases, consider the data from the affected sample as an estimate).

6.1.5.3 Appropriateness of Practical Quantitation Limits (PQLs)

The PQLs of the analytical methods are considered in relation to the SAC to confirm that the PQLs are less than the SAC. In cases where the PQLs are greater than the SAC, a discussion of this is provided.

6.1.6 Step 6 – Specify Limits on Decision Errors

To limit the potential for decision errors, a range of quality assurance processes are adopted. A quantitative assessment of the potential for false positives and false negatives in the analytical results is undertaken with reference to Schedule B(3) of NEPM (2013) using the data quality assurance information collected.

Decision errors can be controlled through the use of hypothesis testing. The test can be used to show either that the baseline condition is false or that there is insufficient evidence to indicate that the baseline condition is false. The null hypothesis is an assumption that is assumed to be true in the absence of contrary evidence. For this investigation, the null hypothesis has been adopted which is that, there is considered to be a complete SPR linkage for the CoPC identified in the CSM unless this linkage can be proven not to (or unlikely to) exist. The null hypothesis has been adopted for this investigation.

Quantitative limits on decision errors were not established as the sample plan was not probabilistic.

6.1.7 Step 7 - Optimise the Design for Obtaining Data

The most resource-effective design will be used in an optimum manner to achieve the investigation objectives. Adjustment of the investigation design can occur following consultation or feedback from project stakeholders. For this investigation, the design was optimised via consideration of the various lines of evidence used to select the sample locations, the media being sampled, and also by the way in which the data were collected.

The sampling plan and methodology are outlined in the following sub-sections.

6.2 Soil Sampling Plan and Methodology

The soil sampling plan and methodology adopted for this investigation is outlined in the table below:

Table 6-1: Soil Sampling Plan and Methodology

Aspect	Input
Sampling Density and Sampling Plan	Samples were collected from two locations in the immediate vicinity of the AST, as shown on the attached Figure 2. The locations were considered appropriate to assess soil immediately beneath the AST.
Set-out and Sampling Equipment	Sampling locations were set out using a tape measure. In-situ sampling locations were checked for underground services by an external contractor prior to sampling. Samples were collected using a hand auger.
Sample Collection and Field QA/QC	Soil samples were obtained on 12 July 2024 in accordance with standard field procedures. Soil samples were collected from the sub-pavement fill. The sample depths are shown on the logs attached in the appendices.

Aspect	Input
	Samples were placed in glass jars with plastic caps and teflon seals with minimal headspace. Samples for asbestos analysis were placed in zip-lock plastic bags. During sampling, soil at selected depths was split into primary and duplicate samples for field QA/QC analysis. The field splitting procedure included splitting the soil by hand and alternately filling the sampling containers to obtain a representative split sample. Due to the limited depth of sampling, laboratory analysis was targeted at the highest risk contaminants associated with the AST (TRH and BTEX).
Field Screening	A portable Photoionisation Detector (PID) fitted with a 10.6mV lamp was used to screen the samples for the presence of volatile organic compounds (VOCs). PID screening for VOCs was undertaken on soil samples using the soil sample headspace method. VOC data was obtained from partly filled zip-lock plastic bags following equilibration of the headspace gases. PID calibration records are maintained on file by JKE. Fill/spoil at the sampling locations was visually inspected during the works for the presence of fibre cement fragments.
Decontami-nation and Sample Preservation	Sampling personnel used disposable nitrile gloves during sampling activities. Re-usable sampling equipment was decontaminated using Decon and potable water. Soil samples were preserved by immediate storage in an insulated sample container with ice or ice bricks. On completion of the fieldwork, the samples were stored temporarily in fridges in the JKE warehouse before being delivered in the insulated sample container to a NATA registered laboratory for analysis under standard chain of custody (COC) procedures.

6.3 Groundwater Monitoring Well Survey

The groundwater monitoring wells were surveyed on 16 July 2024 by JKE staff using a dumpy level. The survey was intended to inform creation of a groundwater contour plan (see Figure 4 attached). The contour plan indicates that groundwater flows to the east and south-east.

6.4 Groundwater Sampling Plan and Methodology

The groundwater sampling plan and methodology is outlined in the table below:

Table 6-2: Groundwater Sampling Plan and Methodology

Aspect	Input
Sampling Plan	Groundwater monitoring wells were installed during the DSI in BH101A (MW101A) which was a purpose-drilled hole at location 101 for installation of the groundwater monitoring well, BH102 (MW102) and BH105 (MW105). Based on the contour plan, MW101A is considered to be in the down-gradient section of the site and would be expected to be indicative of groundwater flowing across (beneath) the site and beyond the down-gradient site boundary. MW105 was positioned in an up-gradient section of the site and would be indicative of groundwater flowing onto (beneath) the site from the west. MW102 was positioned immediately down gradient from the AST, within the area of staining.
Monitoring Well Installation Procedure	The monitoring well construction details are documented on the appropriate borehole logs attached in the appendices. The monitoring wells were installed to depths of approximately 6m below ground level. The wells were generally constructed as follows: • 50mm diameter Class 18 PVC (machine slotted screen) was installed in the lower section of the well to intersect groundwater;

Aspect	Input
	• 50mm diameter Class 18 PVC casing was installed in the upper section of the well (screw fixed); • A 2mm sand filter pack was used around the screen section for groundwater infiltration; • A hydrated bentonite seal/plug was used on top of the sand pack to seal the well; and • A gatic cover was installed at the surface with a concrete plug to limit the inflow of surface water. The monitoring well installation, including the screen lengths, were considered suitable for assessment of general groundwater quality with regards to Table 5 in Schedule B2 of NEPM 2013.
Monitoring Well Development	The monitoring wells were developed for the DGI on 16 July 2024 using a submersible electrical pump. Approximately 18L to 32L was pumped from the wells until they were effectively dry. The field monitoring records and calibration data are attached in the appendices.
Groundwater Sampling	The monitoring wells were allowed to recharge for approximately six days after development. Groundwater samples were obtained on 22 July 2024. Prior to sampling, the monitoring wells were checked for the presence of Light Non-Aqueous Phase Liquids (LNAPLs) using an inter-phase probe electronic dip meter. The monitoring well head space was checked for VOCs using a calibrated PID unit. The samples were obtained using a peristaltic pump/disposable plastic bailer. During sampling, the following parameters were monitored using calibrated field instruments: • Standing water level (SWL) using an electronic dip meter; and • pH, temperature, electrical conductivity (EC), dissolved oxygen (DO) and redox potential (Eh) using a YSI Multi-probe water quality meter. Steady state conditions were considered to have been achieved when the difference in the pH measurements was less than 0.2 units, the difference in conductivity was less than 10%, and when the SWL was not in drawdown. Groundwater samples were obtained directly from the single use PVC tubing and placed in the sample containers. Duplicate samples were obtained by alternate filling of sample containers. This technique was adopted to minimise disturbance of the samples and loss of volatile contaminants associated with mixing of liquids in secondary containers, etc. Groundwater removed from the wells during development and sampling was transported to JKE in jerry cans and stored in holding drums prior to collection by a licensed waste water contractor for off-site disposal. The field monitoring record and calibration data are attached in the appendices.
Decontaminant and Sample Preservation	During development, the pump was flushed between monitoring wells with potable water (single-use tubing was used for each well). The pump tubing was discarded after each sampling event and replaced therefore no decontamination procedure was considered necessary. The samples were preserved with reference to the analytical requirements and placed in an insulated container with ice or ice bricks. On completion of the fieldwork, the samples were temporarily stored in a fridge at the JKE office, before being delivered in the insulated sample container to a NATA registered laboratory for analysis under standard COC procedures.

6.5 HGG Sampling Plan and Methodology

The HGG sampling plan and methodology is outlined in the table below:

Table 6-3: HGG Sampling Plan and Methodology

Aspect	Input
Sampling Plan	HGG monitoring wells were installed along the east (MW201 MW202 and MW203) and north (MW204, MW205, MW206) sides of the proposed basement/building. The wells were positioned to gain an understanding of the HGG conditions in the north-east section of the site and assess potential HGG risks associated with organic material in the deep fill previously encountered in this area.
Exclusion Areas (Data Gaps)	Sampling was initially proposed to occur as close as possible to the proposed building boundaries. This was generally achieved along the north side, however, due to access requirements of the existing business, the wells along the east side were spaced slightly off the building. JKE consider that the wells were appropriately located to adequately assess the HGG risk.
Monitoring Well Installation Procedure	The monitoring well construction details are documented on the appropriate borehole logs attached in the appendices. The monitoring wells were installed to depths of approximately 0.9m to 1.5m below ground level as it was apparent that the previously-observed deep fill was a localised issue and such conditions were not encountered at the well locations. Due to the generally shallow (0.2m to 1.1m) fill encountered, the wells were generally constructed as follows: • 50mm diameter Class 18 PVC (machine slotted screen) was installed across the entire depth of the well to HGG; • A 2mm sand filter pack was used around the screen section through the base of each fill profile for HGG infiltration; • A hydrated bentonite seal/plug was used on top of the sand pack that extended to the surface of the borehole to seal the well; • A landfill gas cap/valve was installed to allow collection of HGG data; and • The wells were completed with a gatic cover installed flush with the surrounding ground surface. The wells were installed and constructed across the fill profiles to allow for the HGG monitoring, given the limitations associated with shallow fill.
HGG Monitoring and Sampling	JKE attended site on the 24 July, 16 and 30 August 2024 to obtain HGG and flow measurements. Screening for HGG was undertaken using a hand held landfill gas analyser GFM436. The instrument is calibrated to measure the following HGG: methane (in %v/v), carbon dioxide (in %v/v), carbon monoxide (in %v/v), hydrogen sulphide (ppm) and oxygen (in %v/v). The HGG and flow measurements were taken by connecting the GFM436 directly to the landfill gas valve. The detailed HGG and flow sampling procedure is outlined in the appendices. The hand held unit was factory calibrated prior to use, the calibration certificate for the GFM436 is attached in the appendices. The field HGG monitoring records are attached in the appendices.

6.5.1 Laboratory Analysis

Samples were analysed by an appropriate, NATA Accredited laboratory using the analytical methods detailed in Schedule B(3) of NEPM 2013. Reference should be made to the laboratory reports attached in the appendices for further details.

Table 6-4: Laboratory Details

Samples	Laboratory	Report Reference
All primary samples and field QA/QC samples including (intra-laboratory duplicates, trip blanks, trip spikes and field rinsate samples)	Envirolab Services Pty Ltd NSW, NATA Accreditation Number – 2901 (ISO/IEC 17025 compliance)	356537 and 357161

7 SITE ASSESSMENT CRITERIA (SAC)

The SAC were derived from the NEPM 2013 and other guidelines as discussed in the following sub-sections. The guideline values for individual contaminants are presented in the attached report tables and further explanation of the various criteria adopted is provided in the appendices.

7.1 Soil

Soil data were compared to relevant Tier 1 screening criteria in accordance with NEPM (2013) as outlined below.

7.1.1 Human Health

- Health Screening Levels (HSLs) for a 'commercial/industrial' exposure scenario (HSL-D). HSLs were calculated based on conservative assumptions including a 'sand' type and a depth interval of 0m to 1m; and
- HSLs for direct contact presented in the CRC Care Technical Report No. 10 – Health screening levels for hydrocarbons in soil and groundwater Part 1: Technical development document (2011)[11].

7.1.2 Environment (Ecological – terrestrial ecosystems)

- Ecological Screening Levels (ESLs) for a 'commercial/industrial' exposure scenario. These have only been applied to the top 2m of soil as outlined in NEPM (2013). The criterion for benzo(a)pyrene has been increased from the value presented in NEPM (2013) based on the Canadian Soil Quality Guidelines[12];
- ESLs were adopted based on the soil type;

7.1.3 Management Limits for Petroleum Hydrocarbons

Management limits for petroleum hydrocarbons (as presented in Schedule B1 of NEPM 2013) were considered.

7.2 Groundwater

Groundwater data were compared to relevant Tier 1 screening criteria in accordance with NEPM (2013), following an assessment of environmental values in accordance with the Guidelines for the Assessment and Management of Groundwater Contamination (2007)[13]. Environmental values for this investigation include human-health risks in non-use scenarios. Aquatic ecosystems and human uses have also been considered for completeness and for screening purposes, despite the nearest down-gradient water body (and it's ecology and/or recreational water users) not being receptors of concern.

[11] Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC Care), (2011). Technical Report No. 10 - *Health screening levels for hydrocarbons in soil and groundwater Part 1: Technical development document*

[12] Canadian Council of Ministers of the Environment, (1999). *Canadian soil quality guidelines for the protection of environmental and human health: Benzo(a)Pyrene (1997)* (referred to as the Canadian Soil Quality Guidelines)

[13] NSW Department of Environment and Conservation, (2007). *Guidelines for the Assessment and Management of Groundwater Contamination.*

7.2.1 Human Health

- The NEPM (2013) HSLs were not applicable for this project as the groundwater was recorded at depths shallower than 2m. On this basis, JKE have undertaken a site-specific assessment (SSA) for the Tier 1 screening of human health risks posed by volatile contaminants in groundwater. The assessment included selection of alternative Tier 1 criteria that were considered suitably protective of human health. These criteria are based on drinking water guidelines and have been referred to as HSL-SSA. The criteria were based on the following (as shown in the attached report tables):
    - Australian Drinking Water Guidelines 2011 (updated 2021)[14] for BTEX compounds and selected VOCs;
    - World Health Organisation (WHO) document titled Petroleum Products in Drinking-water, Background document for the development of WHO Guidelines for Drinking Water Quality (2008)[15] for petroleum hydrocarbons. We have conservatively adopted the value of 100µg/L for TRH F1 and F2;
    - USEPA Region 9 screening levels for naphthalene (threshold value for tap water); and
    - The use of the laboratory PQLs for other contaminants where there were no Australian guidelines.
- The Australian Drinking Water Guidelines 2011 (updated 2021)[16] were multiplied by a factor of 10 to assess potential risks associated with incidental/recreational-type exposure to groundwater (e.g. within down-gradient water bodies). These have been deemed as 'recreational' SAC.

7.2.2 Environment (Ecological - aquatic ecosystems)

Groundwater Investigation Levels (GILs) for 95% protection of freshwater species were adopted based on the Default Guideline Values in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2018)[17]. The 99% trigger values were adopted where required to account for bioaccumulation. Low and moderate reliability trigger values were also adopted for some contaminants where high-reliability trigger values don't exist.

7.3 HGG

HGG data were compared against the Level 2 assessment criteria in accordance with NSW EPA HGG 2020 guidelines. The Level 2 risk-based approach includes calculation of Gas Screening Value (GSV) for each monitoring well and each monitoring round for methane and carbon dioxide. The GSV is calculated by multiplying the maximum borehole flow rate (L/hr) and the maximum methane gas concentration (%v/v). The calculated GSV is then to be assessed against the Modified Wilson and Card Classification (Table 7: NSW EPA HGG 2020) and a Characteristic gas situation (CS) value obtained. The CS can then be used for the subsequent design of HGG protection measures (if required) for the proposed school development. The NSW EPA HGG 2020 do not provide criteria for carbon monoxide.

[14] National Health and Medical Research Council (NHMRC), (2021). *National Water Quality Management Strategy, Australian Drinking Water Guidelines 2011* (referred to as ADWG 2011)

[15] World Health Organisation (WHO), (2008). *Petroleum Products in Drinking-water, Background document for the development of WHO Guidelines for Drinking Water Quality* (referred to as WHO 2008)

[16] National Health and Medical Research Council (NHMRC), (2021). *National Water Quality Management Strategy, Australian Drinking Water Guidelines 2011* (referred to as ADWG 2011)

[17] Australian and New Zealand Governments (ANZG), (2018). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality.* Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia (referred to as ANZG 2018)

7.3.1 Calculated Characteristic Gas Situation (CS) Values

The CS value is determined from the GSV value from the Modified Wilson and Card classification Table 7 of the NSW EPA HGG 2020 guidelines. The table is represented below:

Table 7-1: Characteristic Gas Situations (Wilson and Card Classification)

CS	Risk Classification	GSV	Additional Factors
1	Very Low risk	<0.07	Methane < 1% or carbon dioxide < 5%; otherwise increase to Situation 2
2	Low	<0.7	Flow rate not exceed 70 L/hr, otherwise consider increase to Situation 3
3	Moderate	<3.5	-
4	Moderate to High	<15	Consider need for Level 3 risk assessment
5	High	<70	Level 3 risk assessment required
6	Very High	>70	Level 3 risk assessment required

8 RESULTS

8.1 Summary of Data (QA/QC) Evaluation

The data evaluation is presented in the appendices. In summary, JKE is of the opinion that the data are adequately precise, accurate, representative, comparable and complete to serve as a basis for interpretation to achieve the investigation objectives.

8.2 Subsurface Conditions

A summary of the subsurface conditions encountered during the investigation is presented in the following table. Reference should be made to the borehole logs attached in the appendices for further details.

Table 8-1: Summary of Subsurface Conditions

Profile	Description
Pavement	AC pavement, approximately 40mm to 60mm thick, was encountered at the surface in BH101 to BH105.
Fill	Fill was encountered at the surface or beneath the pavement in all boreholes and extended to depths of approximately 0.2m to 1.1m. BH207 and BH208 were terminated in the fill at a maximum depth of approximately 0.2m. The fill typically comprised clayey sand, sandy clay and gravelly sand in BH201 to BH206 with inclusions of igneous, sandstone and ironstone gravel and concrete and AC fragments. The fill in BH207 and BH208 consisted of sandy gravel (igneous) with a trace of brick fragments.
Natural Soil	Natural clayey sand was encountered beneath the fill in BH101 to BH106 and extended to depths of approximately 0.85m to 1.7m. The boreholes were terminated in the natural soil in BH201 to BH203, BH205 and BH206 at a maximum depth of approximately 1.7m. The natural soil was typically light brown and contained traces of ironstone gravel.
Bedrock	Sandstone bedrock was encountered beneath the natural soil in BH204 and extended to the termination of the borehole at a depth of approximately 0.9m. The sandstone was red-brown and grey.
Groundwater	Groundwater seepage was encountered in BH201, BH203 and BH205 during drilling at depths of approximately 1.2m to 1.4m. No seepage was encountered in the remaining boreholes. The Standing Water Level (SWL) was measured in the three existing groundwater wells at depths of approximately 0.64m to 1.3m.

8.3 Field Screening

A summary of the field screening results is presented in the following table:

Table 8-2: Summary of Field Screening

Aspect	Details
PID Screening of Soil Samples for VOCs	PID soil sample headspace readings are presented in attached report tables and the COC documents attached in the appendices. PID results in samples from BH207 and BH208 ranged from 0.9ppm to 1.4ppm equivalent isobutylene. These samples were analysed for TRH and BTEX.
Groundwater Depth & Flow	The SWL in the three existing groundwater ranged from 0.64m to 1.3m. The survey of the wells and subsequent contour plan indicated that groundwater flows approximately east and south-east beneath the site.
Groundwater Field Parameters	Field measurements recorded during sampling were as follows: - pH ranged from 4.21 to 5.67; - EC ranged from 324.5µS/cm to 504µS/cm; - Eh ranged from 44.3mV to 228mV; and - DO ranged from 0.4ppm to 4.2ppm. The PID readings in the monitoring well headspace recorded during sampling were all 0ppm.

8.4 Soil Laboratory Results

The soil laboratory results were assessed against the SAC presented in Section 7.1. Individual SAC are shown in the report tables attached in the appendices. A summary of the results is presented below:

8.4.1 Human Health and Environmental (Ecological) Assessment

Table 8-3: Summary of Soil Laboratory Results – Human Health and Environmental (Ecological)

Analyte	N	Max. (mg/kg)	N> Human Health SAC	N> Ecological SAC	Comments
TRH F1	2	<25	0	0	-
TRH F2	2	<50	0	0	-
TRH F3	2	200	0	0	
TRH F4	2	180	0	0	-
Benzene	2	<0.2	0	0	-
Toluene	2	<0.5	0	0	-
Ethylbenzene	2	<1	0	0	-
Xylenes	2	<1	0	0	-

Notes:

N: Total number (primary samples)

NSL: No set limit

NL: Not limiting

8.5 Groundwater Laboratory Results

The groundwater laboratory results were assessed against the SAC presented in Section 7.2. Individual SAC are shown in the report tables attached in the appendices. A summary of the results is presented below:

Table 8-4: Summary of Groundwater Laboratory Results – Human Health and Environmental (Ecological)

Analyte	N ^	Max. (µg/L)	N> Human Health SAC	N> Ecological SAC	Comments
TRH F1	3	<10	0	NSL	-
TRH F2	3	<50	0	NSL	-
TRH F3	3	<100	NSL	NSL	-
TRH F4	3	<100	NSL	NSL	-
Benzene	3	<1	0	0	-
Toluene	3	<1	0	0	-

Analyte	N ^	Max. (µg/L)	N> Human Health SAC	N> Ecological SAC	Comments
Ethylbenzene	3	<1	0	0	-
m+p-Xylene	3	<2	0	0	-
o-Xylene	3	<1	0	0	-
Total Xylenes	3	<1	0	0	-

Notes:

^: Primary samples

N: Total number

NSL: No set limit

NL: Not limiting

8.6 HGG Results

The field monitoring records are attached in appendices. A summary of the HGG monitoring data for the monitoring rounds is summarised in the table below.

Table 8-5: Summary of HGG Monitoring Data

HGG/Flow	Monitoring Well and Monitoring Point Concentrations/Measurements
Methane (CH_4)	The CH_4 concentrations were 0%v/v during all monitoring events.
Carbon dioxide (CO_2)	The CO_2 concentrations recorded at the monitoring wells ranged from 0%v/v to 11.7%v/v (peak) across the three monitoring rounds.
Oxygen (O_2)	The O_2 concentrations recorded at the monitoring wells ranged from 0.7%v/v to 20.9%v/v across the three monitoring rounds.
Hydrogen sulphide (H_2S)	The H_2S concentrations recorded at the monitoring wells were all 0ppm.
Carbon monoxide (CO)	The CO concentration in MW203 on 24 July 2024 was 10ppm. The CO concentrations recorded during all other monitoring events were all 0ppm.
Atmospheric Pressure (hPa)	The atmospheric pressure reading during the monitoring events was as follows: • 24 July 2024 ranged from 1010mbar to 1006mbar; • 16 August 2024 ranged from 1002mbar to 995mbar; and • 30 August 2024 ranged from 988mbar to 985mbar. We note that monitoring events typically occurred during falling atmospheric pressure events.
Flow Rates (L/hr)	The flow rates recorded at the monitoring wells generally ranged from 0.6 L/hr to 1.8L/hr. It should be noted that negative flow rate/s (L/hr) encountered during field HGG screening activities have been interpreted as theoretically positive flow rates.

9 DISCUSSION

9.1 Contamination Sources/AEC and Potential for Site Contamination

Data gaps were identified in the RAP associated with:

- Deep fill in the north-east section of the site and the associated potential for HGG in that area. Additional monitoring and risk analysis was considered necessary to meet guideline requirements; and
- The unknown source of the TRH (F2) that was previously detected in the MW101 groundwater sample. The existing AST at the site was identified as a potential TRH source and was targeted for the DGI.

Considering the above, and based on a qualitative assessment of various lines of evidence as discussed throughout this report, JKE is of the opinion that there remained a potential for site contamination. The soil, groundwater and HGG data collected for the investigation is discussed further in the following subsection, as part of the Tier 1 risk assessment.

9.2 Tier 1 Risk Assessment and Review of CSM

For a contaminant to represent a risk to a receptor, the following three conditions must be present:

1. Source – The presence of a contaminant;
2. Pathway – A mechanism or action by which a receptor can become exposed to the contaminant; and
3. Receptor – The human or ecological entity which may be adversely impacted following exposure to contamination.

If one of the above components is missing, the potential for adverse risks is relatively low.

9.2.1 Soil

Two boreholes were drilled in the immediate vicinity of the AST (BH207 and BH208). Samples were obtained from directly beneath the concrete pavement and analysed for TRH and BTEX. The results were less than the SAC. Traces of heavy fraction TRH were detected in both samples, however, these concentrations were relatively low (maximum 200mg/kg) and not considered to represent a risk to receptors.

9.2.2 Groundwater

The three groundwater monitoring wells installed for the DSI were re-sampled for the DGI. Samples were analysed for TRH and BTEX and all of the results were less than the SAC and less than the laboratory detection limits.

Based on the results of the survey and contour plan, MW101A is in the down gradient area of the site. No TRH has been detected in either of the other monitoring wells. These results indicate that the traces of TRH (F2) detected in MW101A during the DSI may have been a sampling anomaly. Based on this, the groundwater at the site is not considered to represent a risk to receptors and no management is considered to be required.

9.3 Level 2 Preliminary Risk Assessment - HGG

The Level 1 qualitative risk assessment undertaken in Section 5 identified a low risk to receptors. However, the risk was further assessed by obtaining additional site specific data and adopting aspects of the Level 2 preliminary semi-quantitative HGG risk assessment approach for the purpose of screening for potential HGG impacts and design implications (potential HGG protection measures) on the proposed development. For the Level 2 preliminary risk assessment JKE has assumed the following:

- Reliable and representative data has been obtained for the site; and
- Sufficient coverage of the site in relation to the areas of fill to remain outside the proposed building and source areas has been considered.

We note that shallow fill (typically less than 1m deep) was encountered during drilling for installation of the HGG monitoring wells and the no organic material was encountered in the fill. These conditions supported the level 1 qualitive risk assessment. It is also noted that the DGI did not identify the same deep fill as was previously encountered in BH101. This confirms that the deep fill in the BH101 area is very localised and not representative of the general site conditions in the north-eastern area of the site

9.3.1 Calculated Gas Screening Values (GSV)

A GSV value is obtained following the Wilson and Card method by multiplying the maximum borehole (monitoring well) flow rate (L/hr) and the maximum HGG concentration (%). A GSV value is calculated for both methane and carbon dioxide and the worst case value adopted. The GSV value is determined by the flow rate.

The maximum (worst case) methane GSV was 0 and the maximum (worst case) GSV for carbon dioxide was 0.15, as shown on the attached tables. Both of these values were less than the GSV threshold of 0.7L/hr for a low risk. The carbon dioxide is considered to be consistent with natural ground conditions and we do not consider that there is a significant source of carbon dioxide-generating material or waste that requires further consideration in the context of the proposed development scenario.

9.3.2 Calculated Characteristic Gas Situation (CS) Values

The maximum (worst case) CS value calculated for the site was 2, which indicated a low risk posed by HGG at the site. It is notable also that the CS values were predominantly 1. The CS values of 2 were generally attributed to sporadic maximum carbon dioxide values exceeding 5%v/v, in which case the guidance states that consideration is to be given to increasing the CS value from 1 to 2.

We note that methane and hydrogen sulfide was not detected during the field screening events and, with the exception of one carbon monoxide result of 10ppm from MW203 on 24 July, no carbon monoxide was detected during the field screening events.

9.3.3 HGG Risk Assessment

Based on the maximum GSV and CS values calculated from the preliminary HGG data, and considering multiple lines of evidence including the fact that the DGI proved that the deep fill previously identified in

BH101 is very localised, the risk posed to potential receptors based on the HGG data is low and HGG protection measures are not considered to be required for the proposed development.

JKE acknowledge that the preliminary HGG assessment did not capture a worst-case meteorological scenario as outlined in Section F of the NSW EPA HGG 2020 guidelines and a full Level 2 HGG risk assessment has not been undertaken. However, the NSW EPA HGG 2020, indicates that for low risk sites, alternative approaches can be considered. We note that HGG monitoring was undertaken across three falling pressure events (although not worst case) and, as such, are considered to provide a reasonable level of confidence in the data obtained.

Given the results of the DGI, which confirmed that the deep fill in BH101 was a very localised occurrence, and where shallow fill without any obvious organic material was encountered, and where concentrations of HGG were very low during all monitoring events, JKE consider that risks posed by HGG in the context of the proposed development are very low and remediation/mitigation to address HGG risks is not necessary.

9.4 Decision Statements

The decision statements are addressed below:

Are any of the laboratory or HGG results above the SAC?

All of the soil and groundwater results for the DGI were less than the SAC. The HGG results indicated a low risk.

Do potential risks associated with contamination or HGG exist, and if so, what are they?

No additional risks have been identified associated with soil or HGG during the DGI and the risk posed by groundwater is considered to remain low.

Is revision of the remediation strategy required?

No, the existing remediation strategy is considered to remain appropriate.

Can the site be made suitable subject to remediation?

JKE is of the opinion that the site can be made suitable for the proposed development via remediation and the implementation of the RAP.

9.5 Data Gaps

An assessment of data gaps is provided in the following table:

Table 9-1: Data Gap Assessment

Data Gap	Assessment
HGG assessment did not meet Level 2 requirements	Given the conditions encountered at the site and the very low HGG results recorded during monitoring, no further work is considered to be required to assess the HGG risk.

10 CONCLUSIONS AND RECOMMENDATIONS

The DGI included soil sampling from two boreholes in the immediate vicinity of the AST, HGG monitoring from six well installed along the east and north sides of the proposed building footprint and groundwater sampling from three previously installed groundwater monitoring wells.

The soil and groundwater results were all less than the SAC. The HGG results indicated that HGG poses a low risk at the site, as discussed in Section 9.3.3.

Previous investigations at the site have identified asbestos in fill that represents a potential risk to human receptors during site development/excavation works and future site use.

The DGI has not identified any additional risks posed by soil or groundwater contamination, nor by HGG, that would require revision of the RAP. We note that the RAP stated that 'the extent of remediation is to be confirmed following the data gap investigation'. Given no additional risks have been identified during the DGI, the extent and detail of remediation in the RAP is considered to remain unchanged.

JKE is of the opinion that the site can be made suitable for the proposed development via remediation and the implementation of the RAP. A site validation report is to be prepared on completion of remediation activities and submitted to the consent authority to demonstrate that the site is suitable for the proposed development. The site will require management via a LTEMP to manage asbestos in soil that is capped during the remediation process. The LTEMP will provide a passive management approach which would not impose any onerous constraints on the day-to-day site use under the proposed development scenario.

At this stage, JKE consider there is no requirement to notify any contamination under the NSW EPA Guidelines on the Duty to Report Contamination under Section 60 of the CLM Act 1997 (2015)[18]. This should be confirmed following completion of remediation and validation.

JKE consider that the report objectives outlined in Section 1.2 have been addressed.

[18] NSW EPA, (2015). *Guidelines on the Duty to Report Contamination under Section 60 of the CLM Act 1997* (referred to as Duty to Report Contamination)

11 LIMITATIONS

The report limitations are outlined below:

- JKE 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 JKE proposal; and terms of contract between JKE 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, JKE has not undertaken any verification process, except where specifically stated in the report;
- JKE 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;
- JKE 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;
- JKE 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. JKE 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.

Important Information About This Report

These notes have been prepared by JKE 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 JKE 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.

JKE will not accept any responsibility whatsoever for situations where one or more of the above factors have changed since completion of the investigation. If the subject site is sold, ownership of the investigation report should be transferred by JKE to the new site owners who will be informed of the conditions and limitations under which the investigation was undertaken. No person should apply an investigation 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 investigation 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 investigations 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 investigation 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.

Investigation Limitations
Although information provided by a site investigation can reduce exposure to the risk of the presence of contamination, no environmental site investigation can eliminate the risk. Even a rigorous professional investigation 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 Investigations by Design Professionals

Costly problems can occur when other design professionals develop plans based on misinterpretation of an investigation 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 Investigation 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 investigation. 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 investigation. 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 investigation 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 investigation 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 investigation, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to any questions.

Appendix A: Report Figures

AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM

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

Title: **SITE LOCATION PLAN**

Location: 277 MONA VALE ROAD, TERREY HILLS, NSW

Project No: E34278PH

Figure No: 1

JKEnvironments

PLOT DATE: 25/10/2021 1:24:06 PM DWG FILE: S:\5 EIS\5C EIS JOBS\34000'S\E34278PH TERREY HILLS\CAD\E34278PH.DWG

LEGEND

APPROXIMATE SITE BOUNDARY	
BH(Fill Depth)	BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, 2021)
BH(Fill Depth)	BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, 2022)
BH/MW(Fill Depth)	BOREHOLE AND GROUNDWATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, 2022)
TP(Fill Depth)	TEST PIT LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, 2022)
BH(Fill Depth)	BOREHOLE AND HAZARDOUS GROUND GAS WELL LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, 2022)
BH208	BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m)
BH/MW201	BOREHOLE AND HAZARDOUS GROUND GAS WELL LOCATION, NUMBER AND DEPTH OF FILL (m)

0 8 16 24 32 40
SCALE 1:800 @A3 METRES

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

Title: **SAMPLE LOCATION PLAN**

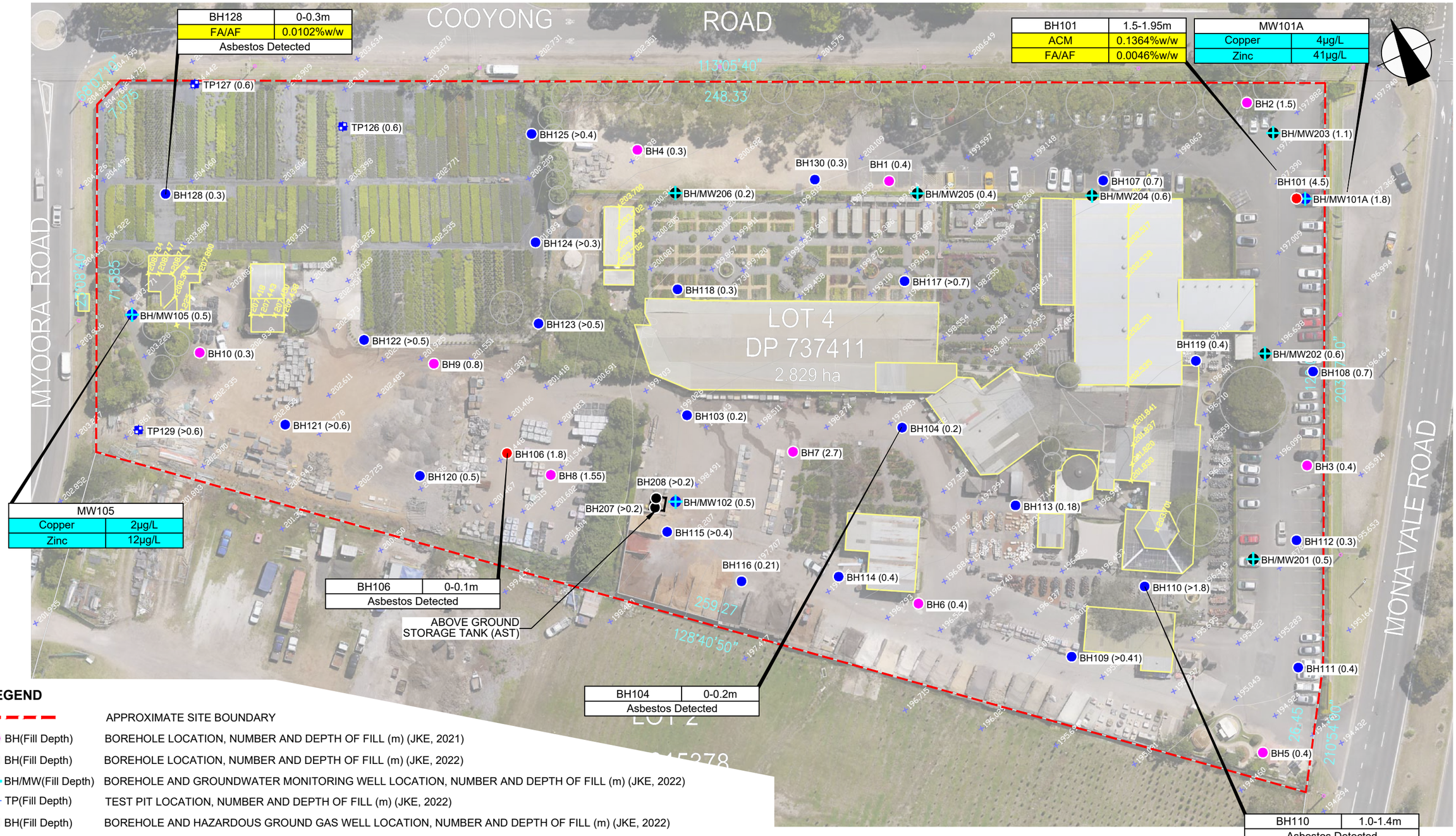
Location: 277 MONA VALE ROAD, TERREY HILLS, NSW

Project No: E34278PH

Figure No: 2

JKEnvironments

PLOT DATE: 18/07/2024 9:34:29 AM DWG FILE: K:\5C EIS JOBS\34000'S\E34278PH TERREY HILLS\CAD\E34278PH.DWG



LEGEND

- APPROXIMATE SITE BOUNDARY
- BH(Fill Depth) — BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, 2021)
- BH(Fill Depth) — BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, 2022)
- BH/MW(Fill Depth) — BOREHOLE AND GROUNDWATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, 2022)
- TP(Fill Depth) — TEST PIT LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, 2022)
- BH(Fill Depth) — BOREHOLE AND HAZARDOUS GROUND GAS WELL LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, 2022)
- BH208 — BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m)
- BH/MW201 — BOREHOLE AND HAZARDOUS GROUND GAS WELL LOCATION, NUMBER AND DEPTH OF FILL (m)

SAMPLE ID	DEPTH (metres)
CHEMICAL	CONCENTRATION

SOIL/SURFACE SAMPLE EXCEEDANCE

SAMPLE ID	-
CHEMICAL	CONCENTRATION (µg/L)

GROUNDWATER SAMPLE EXCEEDANCE

SOIL/SURFACE CONTAMINATION ABOVE SAC FOR HUMAN HEALTH RISK

GROUNDWATER CONTAMINATION ABOVE SAC

0 8 16 24 32 40
SCALE 1:800 @A3 METRES

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

Title: **SAC EXCEEDANCE PLAN**

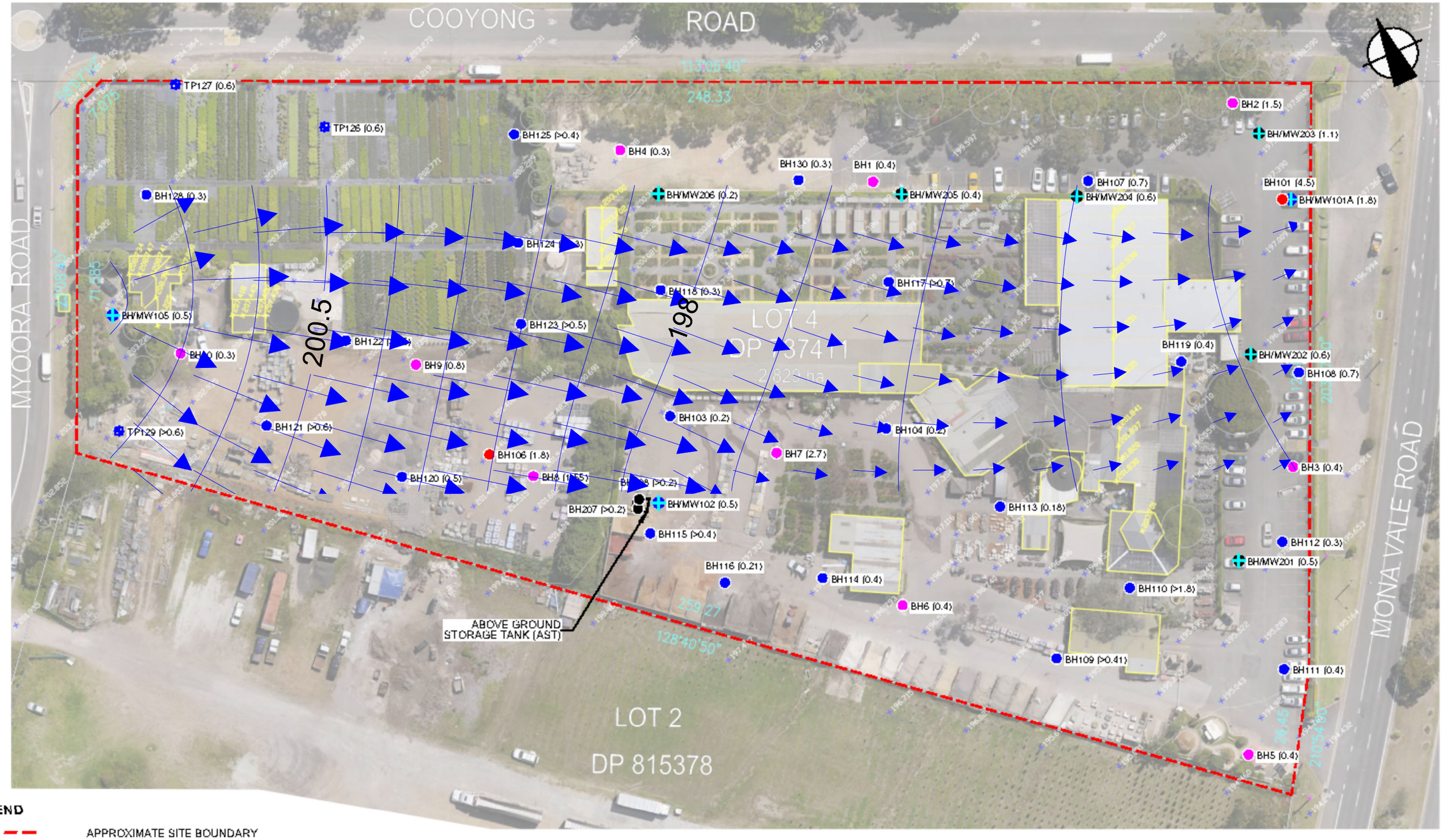
Location: 277 MONA VALE ROAD, TERREY HILLS, NSW

Project No: E34278PH

Figure No: 3

JKEnvironments

PLOT DATE: 17/12/2024 1:08:25 PM DWG FILE: K:\5C EIS JOBS\34000'S\E34278PH TERREY HILLS\CAD\E34278PH.DWG



LEGEND

APPROXIMATE SITE BOUNDARY	
BH(Fill Depth)	BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, 2021)
BH(Fill Depth)	BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, 2022)
BH/MW(Fill Depth)	BOREHOLE AND GROUNDWATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, 2022)
TP(Fill Depth)	TEST PIT LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, 2022)
BH(Fill Depth)	BOREHOLE AND HAZARDOUS GROUND GAS WELL LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, 2022)
BH208	BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m)
BH/MW201	BOREHOLE AND HAZARDOUS GROUND GAS WELL LOCATION, NUMBER AND DEPTH OF FILL (m)

0 8 16 24 32 40
SCALE 1:800 @A3 METRES

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

Title: **GROUNDWATER CONTOUR PLAN**

Location: 277 MONA VALE ROAD, TERREY HILLS, NSW

Project No: E34278PH | Figure No: 4

JKEnvironments

PLOT DATE: 19/7/2024 9:34:29 AM DWG FILE: M:\E\E34278PH TERREY HILLS\CAD\E34278PH.DWG

Appendix B: Site Information

Proposed Development Plans

FLOWER POWER GARDEN CENTRE TERREY HILLS
277 MONA VALE ROAD TERREY HILLS NSW

Member Australian Institute of Architects

ISSUE	AMENDMENT	DATE	CHK'D
P1	ISSUE FOR INFORMATION	17.04.25	CSG
P2	ISSUE FOR INFORMATION	20.05.25	CSG
A	ISSUE FOR DA	11.06.25	CSG

DA - DRAWING LIST

Sheet Number	Current Revision	Sheet Name
DA000	A	COVER SHEET
DA01	A	RENDERED VIEWS
DA10	A	EXISTING CONDITIONS PLAN
DA11	A	DEMOLITION PLAN
DA12	A	SITE ANALYSIS PLAN
DA14	A	SITE COVERAGE AREA PLAN
DA15	A	PROPOSED SITE PLAN
DA17	A	SHADOW DIAGRAMS
DA19	A	HEIGHT NON-COMPLIANCE
DA100	A	FLOOR PLAN
DA120	A	OVERALL ROOF PLAN
DA150	A	ELEVATION- SHEET 1
DA151	A	ELEVATION- SHEET 2
DA160	A	SECTIONS- SHEET 1
Total: 14		

flowerpower

COVER SHEET

LEFFLER SIMES PTY LTD
ABN 39 001 043 992
SYDNEY 7 YOUNG ST, NEUTRAL BAY, NSW 2089 T:+61 2 99093344
MELBOURNE LEVEL 2 - 370 LT BOURKE ST, VIC 3000 T:+61 3 96546344
WEB: www.lefflersimes.com.au BRISBANE L5 U39 131 LEICHHARDT ST, SPRING HILL, QLD 4000 T:+61 7 31235544

SCALE NTS @ A1

FLOWER POWER GARDEN CENTRE TERREY HILLS
277 MONA VALE RD, TERREY HILLS NSW

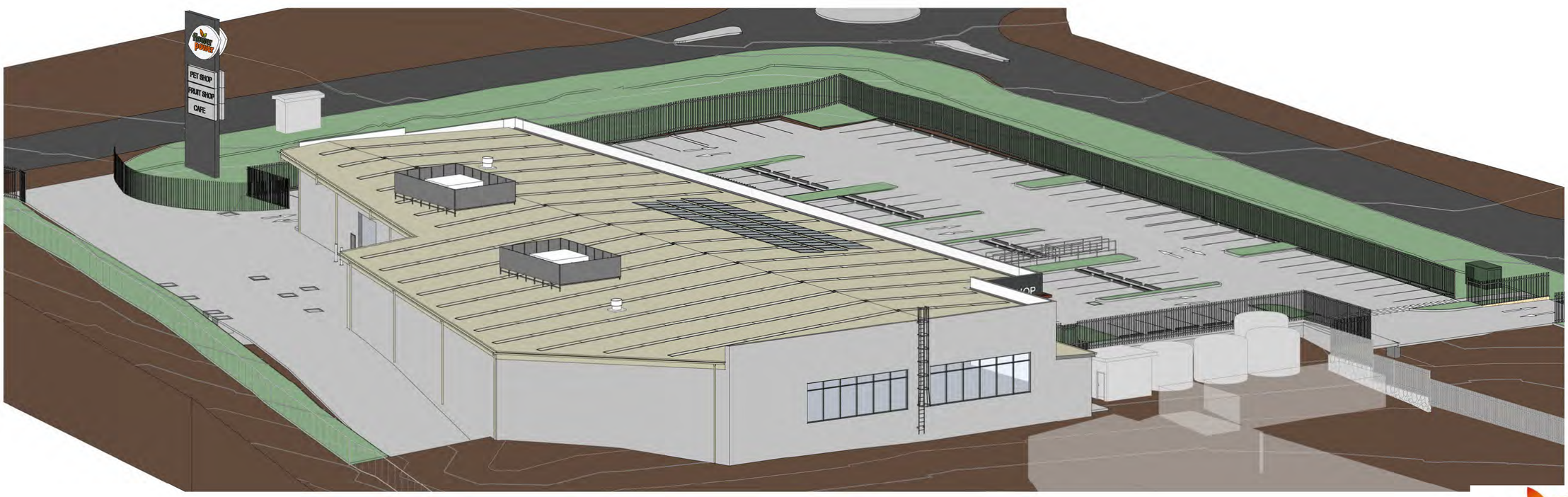
JOB NO: 5405
DATE: MAR 2025
DRAWN: DG
DWG NO. DA000
REV. A

LEFFLER SIMES ARCHITECTS

Member
Australian Institute of Architects

ISSUE	AMENDMENT	DATE	CHK'D
P1	ISSUE FOR INFORMATION	02.04.25	CSG
P2	ISSUE FOR INFORMATION	17.04.25	CSG
P3	ISSUE FOR INFORMATION	20.05.25	CSG
A	ISSUE FOR DA	11.06.25	CSG

3D VIEW 1



3D VIEW 2

flowerpower

RENDERED VIEWS

LEFFLER SIMES PTY LTD
ABN 39 001 043 992
WEB: www.lefflersimes.com.au
SYDNEY 7 YOUNG ST, NEUTRAL BAY, NSW 2089 T:+61 2 99093344
MELBOURNE LEVEL 2 - 370 LT BOURKE ST, VIC 3000 T:+61 3 96546344
BRISBANE L5 U39 131 LEICHHARDT ST, SPRING HILL, QLD 4000 T:+61 7 31235544

SCALE NTS @ A1

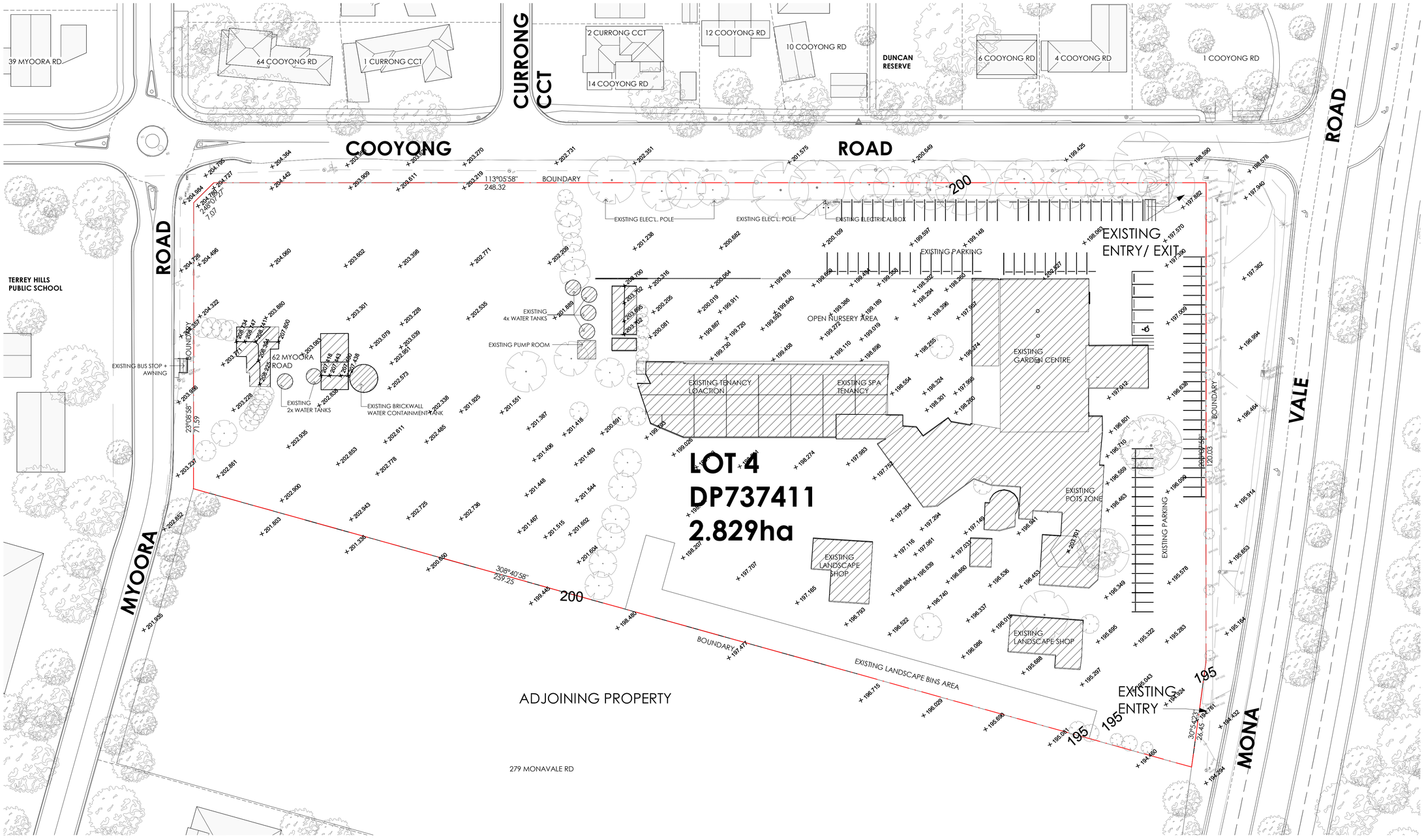
FLOWER POWER GARDEN CENTRE TERREY HILLS
277 MONA VALE RD, TERREY HILLS NSW

JOB NO: 5405
DATE: MAR 2025
DRAWN: DG
DWG NO. DA01
REV. A

LEFFLER SIMES ARCHITECTS

Member
Australian Institute of Architects

ISSUE	AMENDMENT	DATE	CHK'D
P1	ISSUE FOR INFORMATION	17.04.25	CSG
P2	ISSUE FOR INFORMATION	20.05.25	CSG
A	ISSUE FOR DA	11.06.25	CSG



flowerpower

EXISTING CONDITIONS PLAN

LEFFLER SIMES PTY LTD
ABN 39 001 043 992
WEB: www.lefflersimes.com.au
SYDNEY 7 YOUNG ST, NEUTRAL BAY, NSW 2089 T:+61 2 99093344
MELBOURNE LEVEL 2 - 370 LT BOURKE ST, VIC 3000 T:+61 3 96546344
BRISBANE L5 U39 131 LEICHHARDT ST, SPRING HILL, QLD 4000 T:+61 7 31235544

SCALE 1:500 @ A1

FLOWER POWER GARDEN CENTRE TERREY HILLS
277 MONA VALE RD, TERREY HILLS NSW

JOB NO: 5405
DATE: MAR 2025
DRAWN: DG
DWG NO. DA10
REV. A

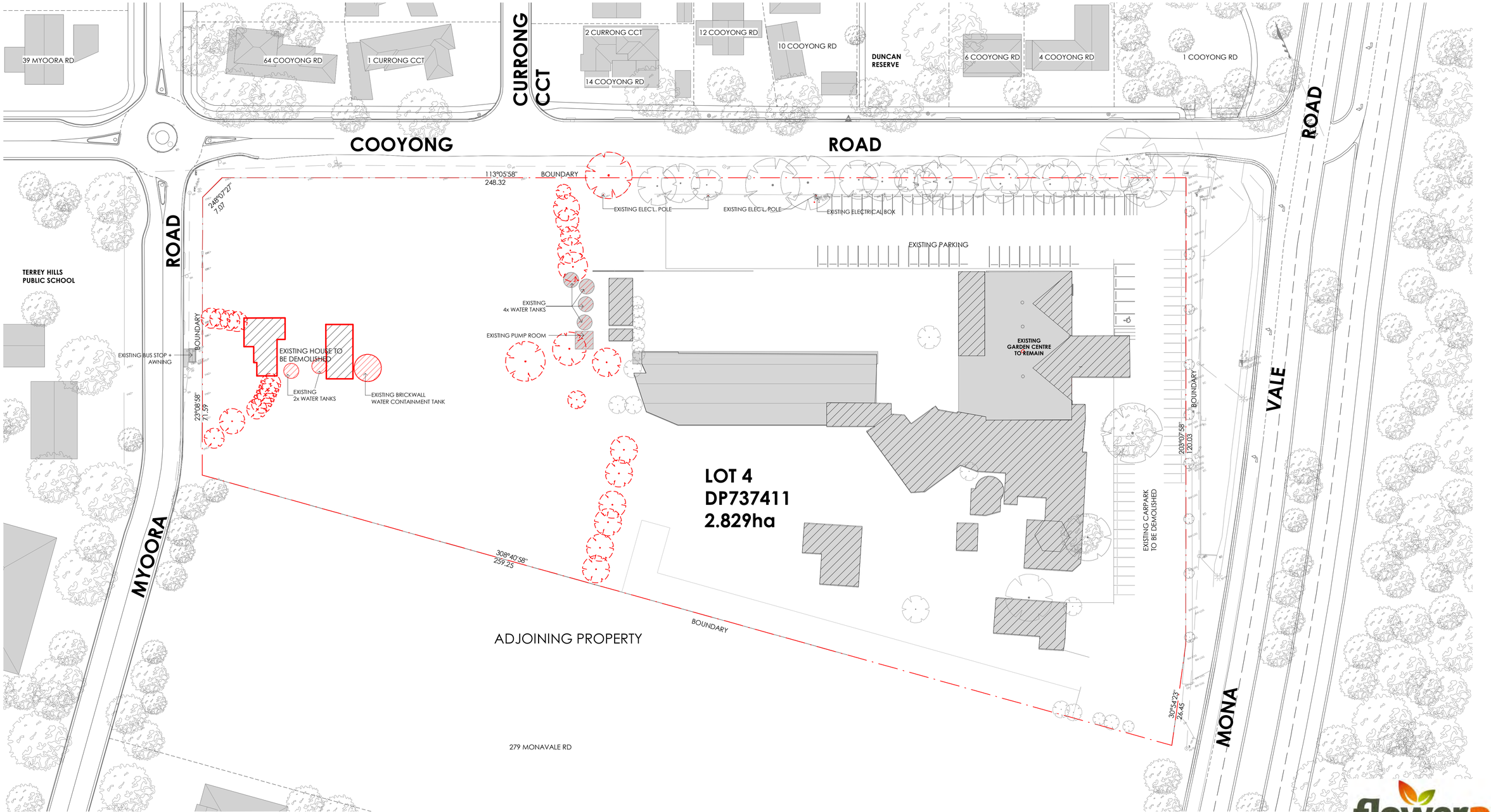
LEFFLER SIMES ARCHITECTS

DEMOLITION KEY:

- TO BE DEMOLISHED
- EXISTING TREES TO BE RETAINED
- TREES TO BE REMOVED

Member Australian Institute of Architects

ISSUE	AMENDMENT	DATE	CHK'D
P1	ISSUE FOR INFORMATION	17.04.25	CSG
P2	ISSUE FOR INFORMATION	20.05.25	CSG
A	ISSUE FOR DA	11.06.25	CSG



flowerpower

DEMOLITION PLAN

LEFFLER SIMES PTY LTD SYDNEY 7 YOUNG ST, NEUTRAL BAY, NSW 2089 T:+61 2 99093344
ABN 39 001 043 992 MELBOURNE LEVEL 2 - 370 LT BOURKE ST, VIC 3000 T:+61 3 96546344
WEB: www.lefflersimes.com.au BRISBANE L5 U39 131 LEICHHARDT ST, SPRING HILL, QLD 4000 T:+61 7 31235544

SCALE 1:500 @ A1

0 10 20 30 40 50

FLOWER POWER GARDEN CENTRE TERREY HILLS
277 MONA VALE RD, TERREY HILLS NSW

JOB NO: 5405 DWG NO. REV.
DATE: MAR 2025 DA11 A
DRAWN: DG

LEFFLER SIMES ARCHITECTS

LEGEND:

EXISTING TREES TO BE RETAINED

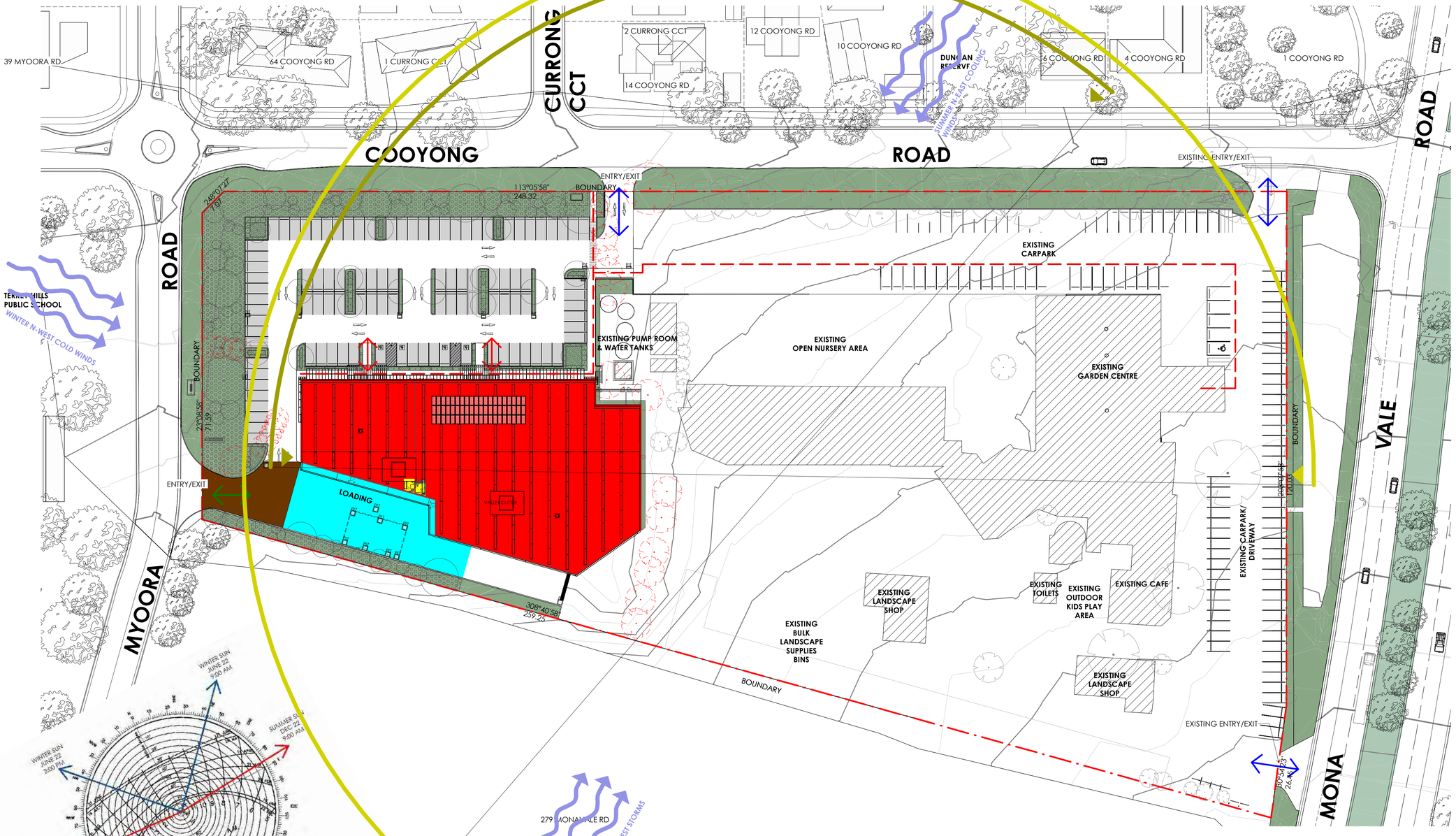
TREES TO BE REMOVED

NOTE:

EXISTING BUILDINGS

Member Australian Institute of Architects

ISSUE	AMENDMENT	DATE	CHK'D
P1	ISSUE FOR INFORMATION	17.04.25	CSG
P2	ISSUE FOR INFORMATION	20.05.25	CSG
A	ISSUE FOR DA	11.06.25	CSG



SUNPATH DIAGRAM

SITE ANALYSIS KEY:

- FRUIT SHOP / PETSHOP
- SERVICE DRIVEWAY
- LOADING AREA
- SERVICE ACCESS
- AMENITIES
- PARKING
- LANDSCAPING
- SERVICE VEHICLE ACCESS WAY
- VEHICULAR ACCESS WAY
- PEDESTRIAN ACCESS WAY
- PEDESTRIAN FLOW
- SUN PATH - SUMMER
- SUN PATH - WINTER
- PREVAILING WINDS

flowerpower

SITE ANALYSIS PLAN

LEFFLER SIMES PTY LTD
ABN 39 001 043 992
SYDNEY 7 YOUNG ST, NEUTRAL BAY, NSW 2089 T:+61 2 99093344
MELBOURNE LEVEL 2 - 370 LT BOURKE ST, VIC 3000 T:+61 3 96546344
WEB: www.lefflersimes.com.au BRISBANE L5 U39 131 LEICHHARDT ST, SPRING HILL, QLD 4000 T:+61 7 31235544

SCALE 1:500 @ A1

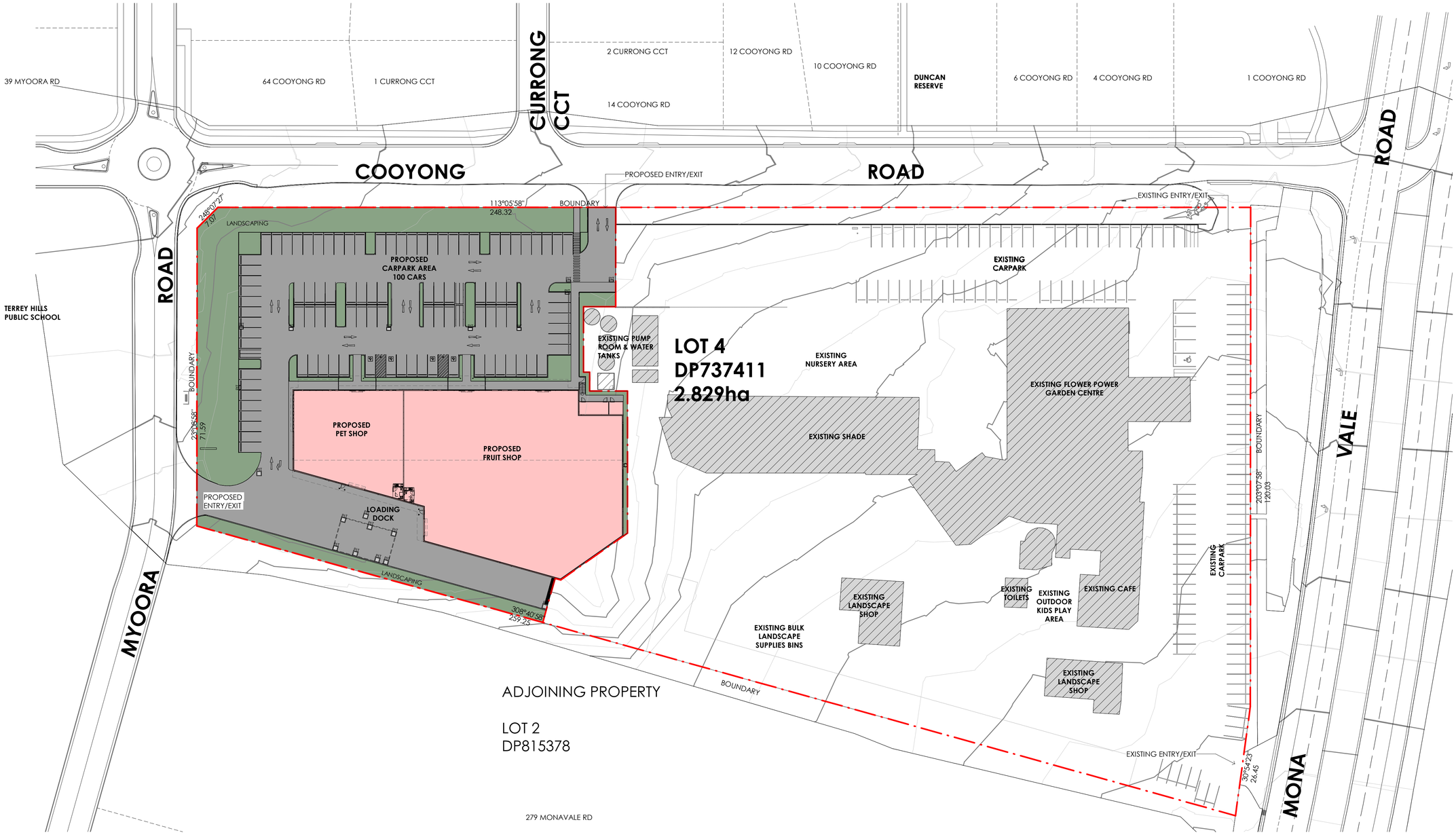
FLOWER POWER GARDEN CENTRE TERREY HILLS
277 MONA VALE RD, TERREY HILLS NSW

JOB NO: 5405 DATE: MAR 2025 DRAWN: DG
DWG NO. DA12 REV. A

LEFFLER SIMES ARCHITECTS

Member Australian Institute of Architects

ISSUE	AMENDMENT	DATE	CHK'D
P1	ISSUE FOR INFORMATION	17.04.25	CSG
P2	ISSUE FOR INFORMATION	20.05.25	CSG
A	ISSUE FOR DA	11.06.25	CSG



SITE AREA	28,289 m²
CONSTRUCTION ZONE	8,793 m²
SITE COVERAGE AREA	2,690 m²

	DA AS SUBMITTED 8,490 m²	(30.0 %)
PERMEABLE AREA	1,798 m²	(20.4%)
	DA AS SUBMITTED 13,691 m²	(48.3 %)
IMPERMEABLE AREA	4,304 m²	(48.9 %)
	DA AS SUBMITTED 6,108 m²	(21.6 %)
BUILDING FOOTPRINT AREA	2,690 m²	(30.5 %)

flowerpower

SITE COVERAGE AREA PLAN

LEFFLER SIMES PTY LTD
ABN 39 001 043 992
SYDNEY 7 YOUNG ST, NEUTRAL BAY, NSW 2089 T:+61 2 99093344
MELBOURNE LEVEL 2 - 370 LT BOURKE ST, VIC 3000 T:+61 3 96546344
WEB: www.lefflersimes.com.au BRISBANE L5 U39 131 LEICHHARDT ST, SPRING HILL, QLD 4000 T:+61 7 31235544

SCALE 1:500 @ A1

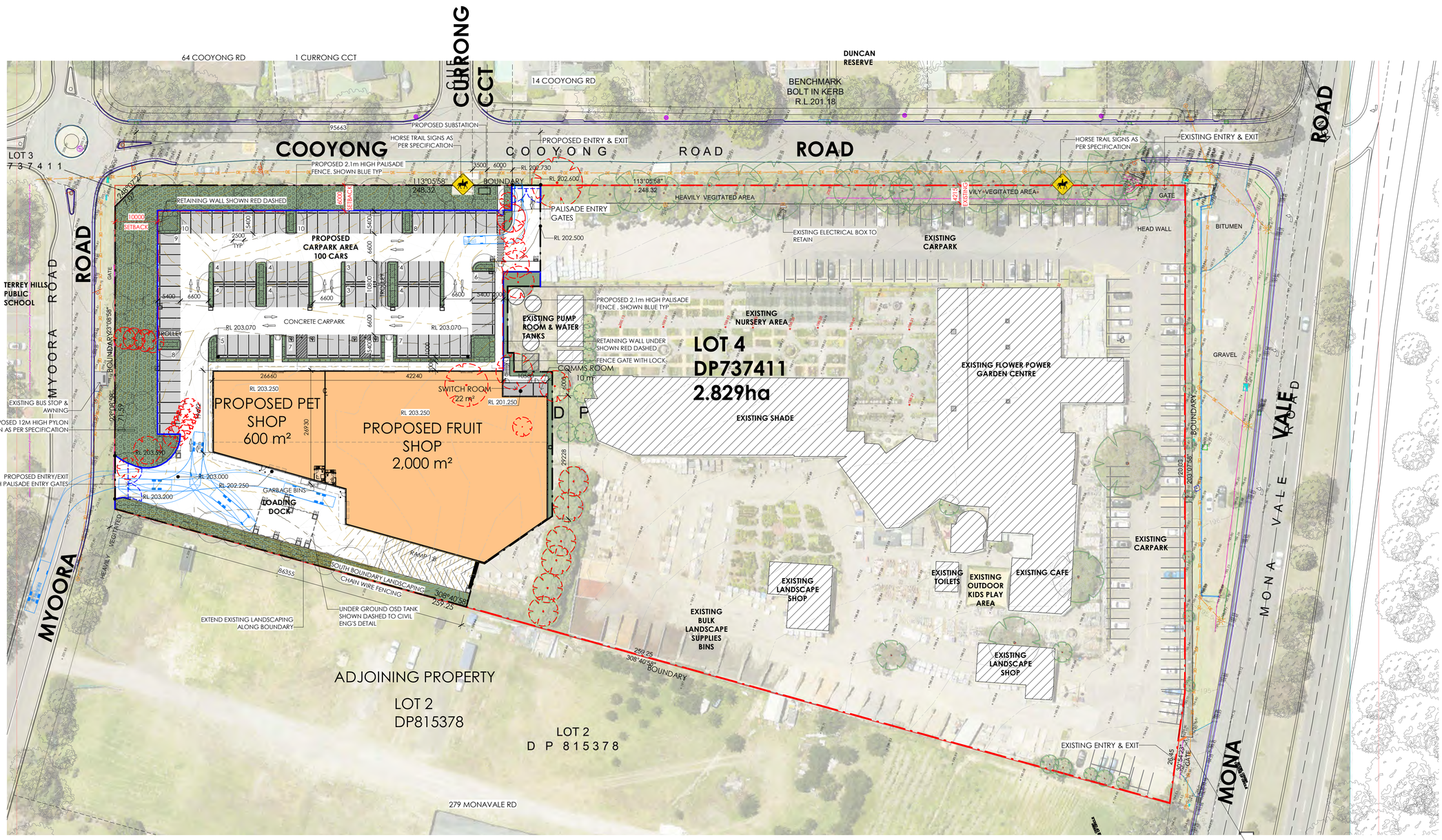
FLOWER POWER GARDEN CENTRE TERREY HILLS
277 MONA VALE RD, TERREY HILLS NSW

JOB NO: 5405 DWG NO. REV.
DATE: MAR 2025 DA14 A
DRAWN: DG

LEFFLER SIMES ARCHITECTS

Member Australian Institute of Architects

ISSUE	AMENDMENT	DATE	CHK'D
P1	ISSUE FOR INFORMATION	02.04.25	CSG
P2	ISSUE FOR INFORMATION	17.04.25	CSG
P3	ISSUE FOR INFORMATION	13.05.25	CSG
P4	ISSUE FOR INFORMATION	20.05.25	CSG
P5	CARPARK ENTRY AMENDED	28.05.25	CSG
A	ISSUE FOR DA	11.06.25	CSG



Parking Schedule	
ACCESSIBLE CAR SPACES	4
CAR SPACES	96
TOTAL	**100**

Site Area 28,289m²

TERRY HILLS	GFA (m²)
Pet Shop	600
Fruit Shop	2,000
Switch Room	22
Comms Room	10
TOTAL GFA	**2,632**

LEGEND:

EXISTING TREES TO BE RETAINED

TREES TO BE REMOVED

NOTE:

EXISTING BUILDINGS

flowerpower

PROPOSED SITE PLAN

LEFFLER SIMES PTY LTD ABN 39 001 043 992
SYDNEY 7 YOUNG ST, NEUTRAL BAY, NSW 2089 T:+61 2 99093344
MELBOURNE LEVEL 2 - 370 LT BOURKE ST, VIC 3000 T:+61 3 96546344
WEB: www.lefflersimes.com.au BRISBANE L5 U39 131 LEICHHARDT ST, SPRING HILL, QLD 4000 T:+61 7 31235544

SCALE 1:500 @ A1

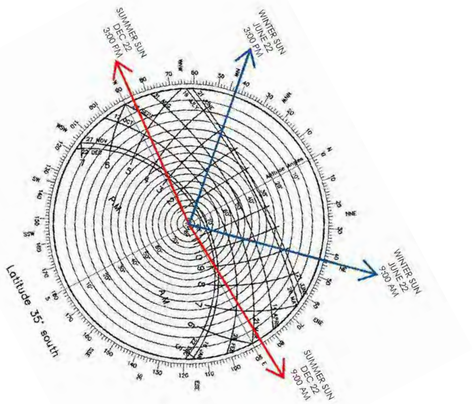
FLOWER POWER GARDEN CENTRE TERREY HILLS
277 MONA VALE RD, TERREY HILLS NSW

JOB NO: 5405 DATE: MAR 2025 DRAWN: DG
DWG NO. DA15 REV. A

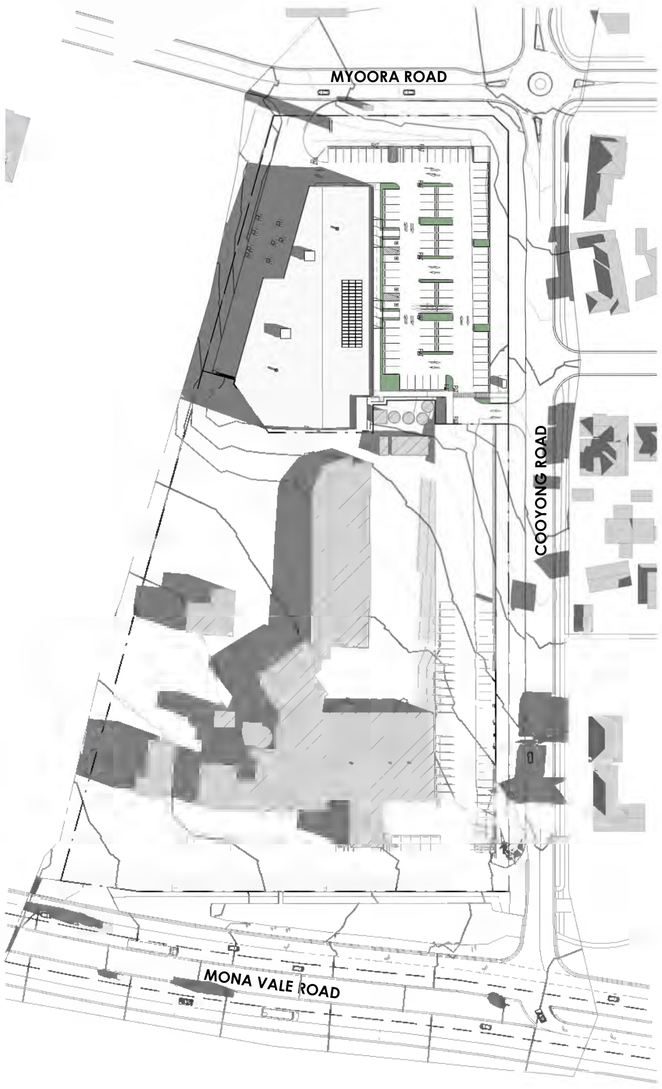
LEFFLER SIMES ARCHITECTS

Member
Australian Institute of Architects

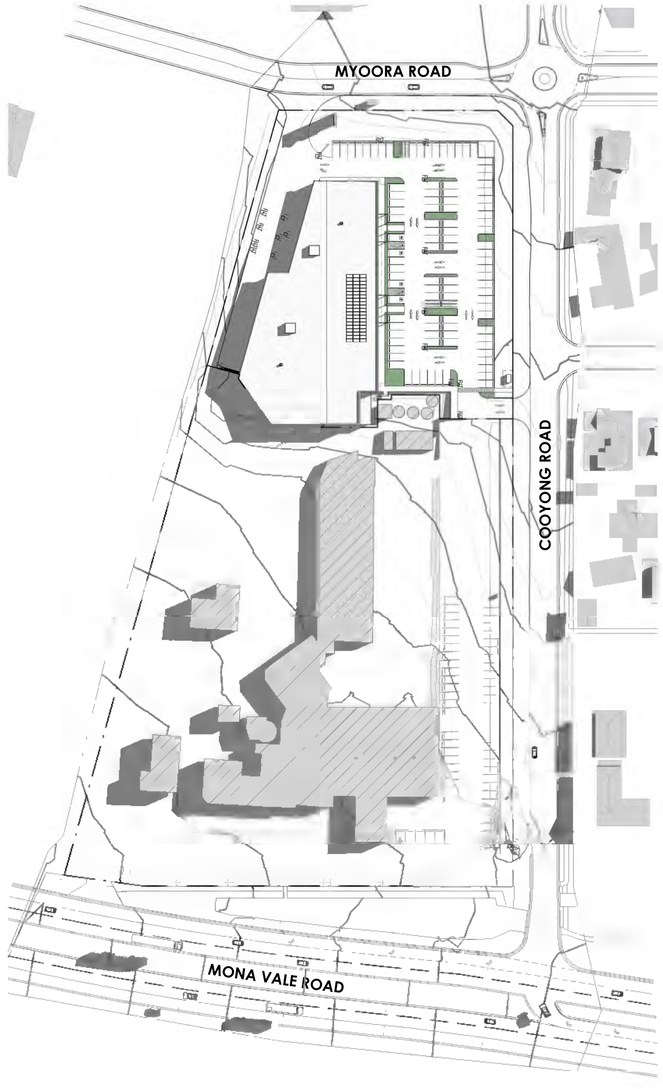
ISSUE	AMENDMENT	DATE	CHK'D
P1	ISSUE FOR INFORMATION	17.04.25	CSG
P2	ISSUE FOR INFORMATION	20.05.25	CSG
A	ISSUE FOR DA	11.06.25	CSG



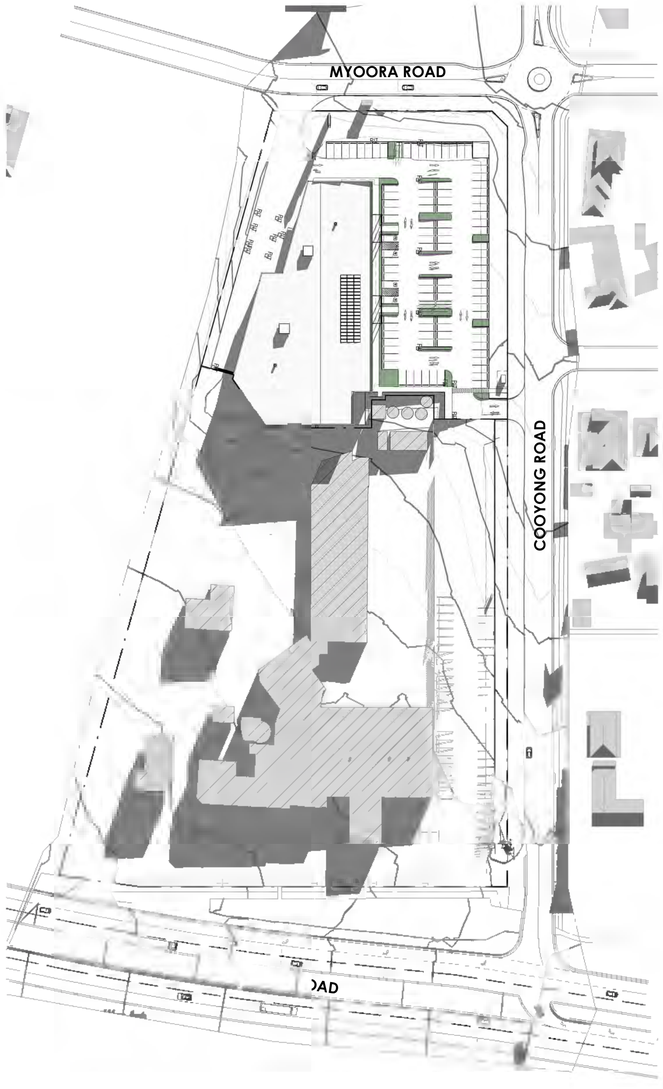
SUNPATH DIAGRAM



1 A400 **JUNE 22nd - 9am**
Scale: 1 : 1000



2 A400 **JUNE 22nd - 12pm**
Scale: 1 : 1000



3 A400 **JUNE 22nd - 3pm**
Scale: 1 : 1000

flowerpower

SHADOW DIAGRAMS

LEFFLER SIMES PTY LTD SYDNEY 7 YOUNG ST, NEUTRAL BAY, NSW 2089 T:+61 2 99093344
ABN 39 001 043 992 MELBOURNE LEVEL 2 - 370 LT BOURKE ST, VIC 3000 T:+61 3 96546344
WEB: www.lefflersimes.com.au BRISBANE L5 U39 131 LEICHHARDT ST, SPRING HILL, QLD 4000 T:+61 7 31235544

0 20 40 60 80 100 SCALE 1:1000 @ A1

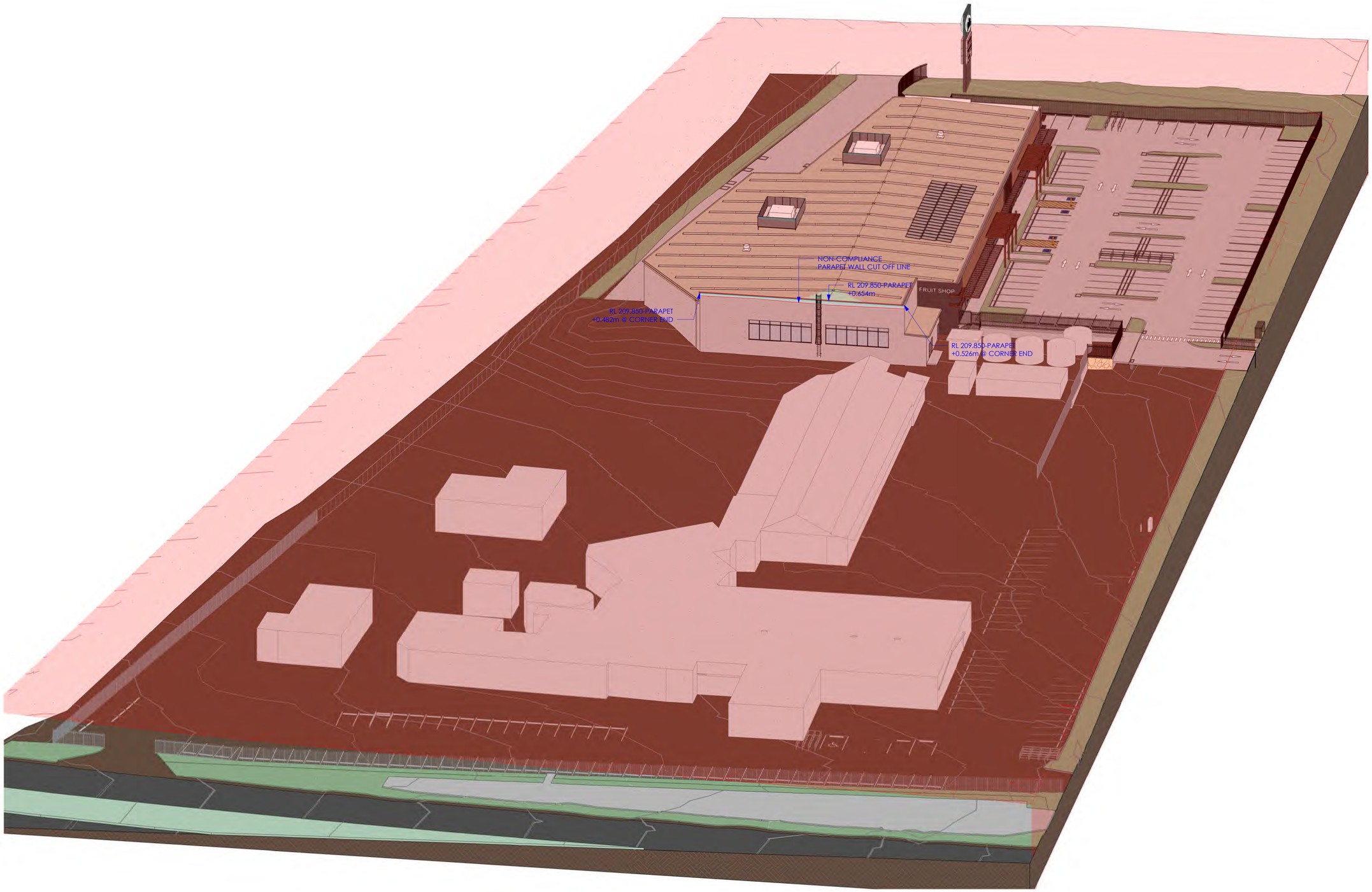
FLOWER POWER GARDEN CENTRE TERREY HILLS
277 MONA VALE RD, TERREY HILLS NSW

JOB NO: 5405 DWG NO. REV.
DATE: APR 2025 DA17 A
DRAWN: DG

LEFFLER SIMES ARCHITECTS

Member
Australian Institute of Architects

ISSUE	AMENDMENT	DATE	CHK'D
P1	ISSUE FOR INFORMATION	17.04.25	CSG
P2	ISSUE FOR INFORMATION	20.05.25	CSG
A	ISSUE FOR DA	11.06.25	CSG



flowerpower

HEIGHT NON-COMPLIANCE

LEFFLER SIMES PTY LTD
ABN 39 001 043 992
WEB: www.lefflersimes.com.au
SYDNEY 7 YOUNG ST, NEUTRAL BAY, NSW 2089 T:+61 2 99093344
MELBOURNE LEVEL 2 - 370 LT BOURKE ST, VIC 3000 T:+61 3 96546344
BRISBANE L5 U39 131 LEICHHARDT ST, SPRING HILL, QLD 4000 T:+61 7 31235544

SCALE NTS @ A1

FLOWER POWER GARDEN CENTRE TERREY HILLS
277 MONA VALE RD, TERREY HILLS NSW

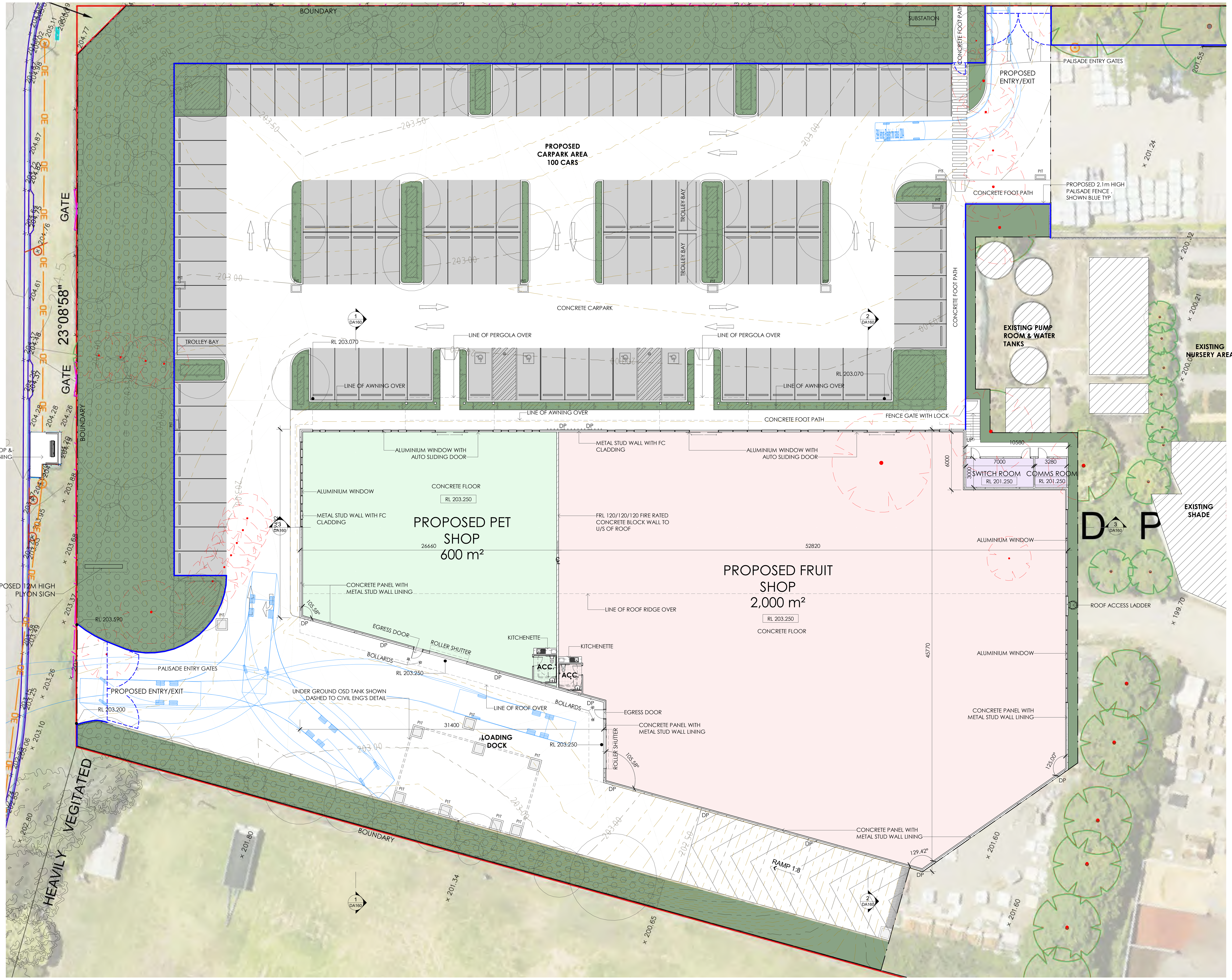
JOB NO: 5405
DATE: APR 2025
DRAWN: DG
DWG NO. DA19
REV. A

LEFFLER SIMES ARCHITECTS

THIS DRAWING AND DESIGN IS SUBJECT TO COPYRIGHT AND MAY NOT BE REPRODUCED WITHOUT PRIOR WRITTENCONSENT OF LEFFLER SIMES PTY LTD

Member Australian Institute of Architects

ISSUE	AMENDMENT	DATE	CHK'D
P1	ISSUE FOR INFORMATION	02.04.25	CSG
P2	ISSUE FOR INFORMATION	17.04.25	CSG
P3	ISSUE FOR INFORMATION	20.05.25	CSG
A	ISSUE FOR DA	11.06.25	CSG



LEGEND:

- EXISTING TREES TO BE RETAINED
- TREES TO BE REMOVED

NOTE:

- EXISTING BUILDINGS

flowerpower

FLOOR PLAN

LEFFLER SIMES PTY LTD
ABN 39 001 043 992
WEB: www.lefflersimes.com.au

SYDNEY 7 YOUNG ST, NEUTRAL BAY, NSW 2089 T:+61 2 99093344
MELBOURNE LEVEL 2 - 370 LT BOURKE ST, VIC 3000 T:+61 3 96546344
BRISBANE L5 U39 131 LEICHHARDT ST, SPRING HILL, QLD 4000 T:+61 7 31235544

SCALE 1:200 @ A1

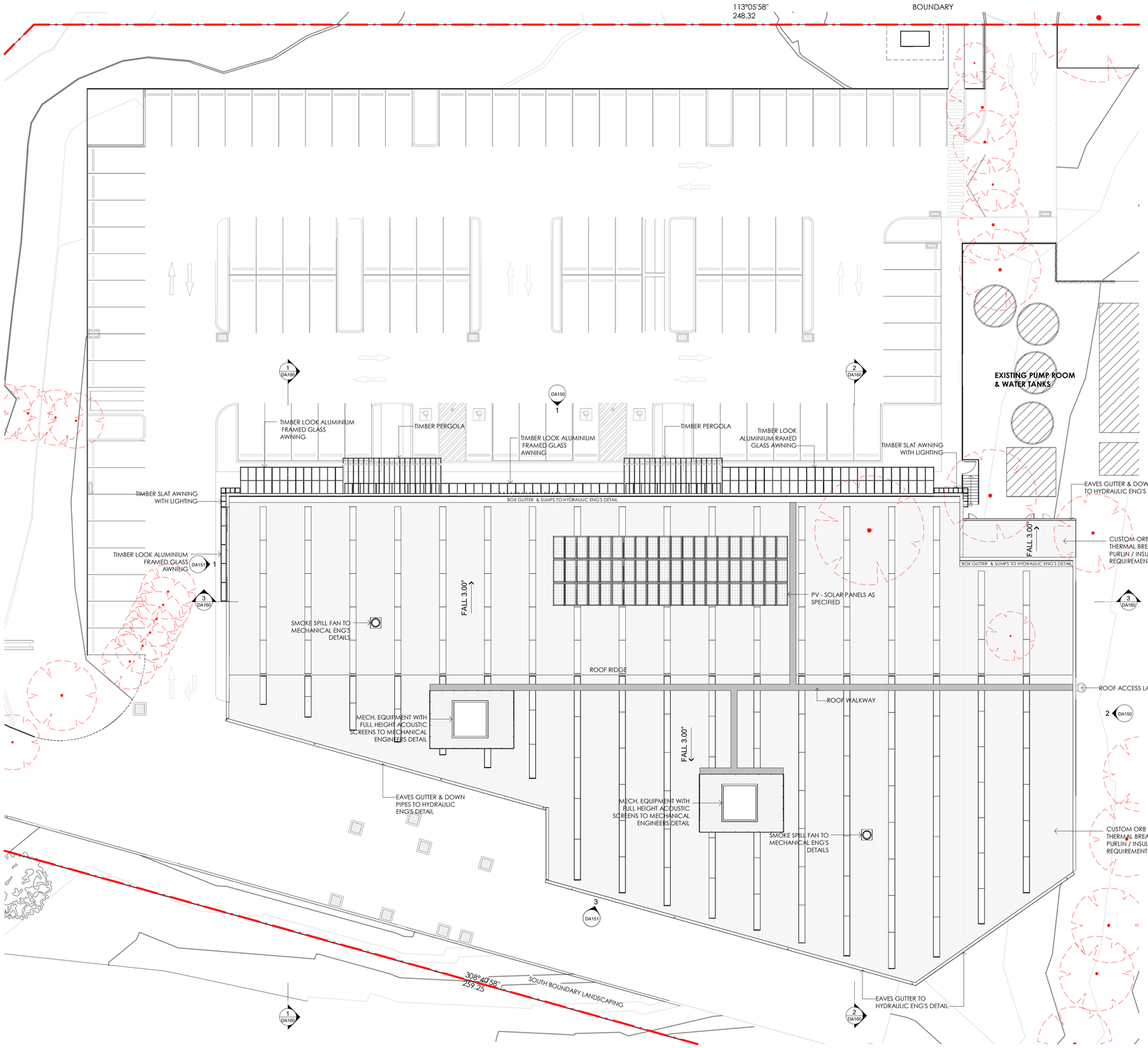
FLOWER POWER GARDEN CENTRE TERREY HILLS
277 MONA VALE RD, TERREY HILLS NSW

JOB NO: 5405
DATE: MAR 2025
DRAWN: DG
DWG NO. DA100
REV. A

LEFFLER SIMES ARCHITECTS

Member Australian Institute of Architects

ISSUE	AMENDMENT	DATE	CHK'D
P1	ISSUE FOR INFORMATION	17.04.25	CSG
P2	ISSUE FOR INFORMATION	20.05.25	CSG
A	ISSUE FOR DA	11.06.25	CSG



LEGEND:

EXISTING TREES TO BE RETAINED

TREES TO BE REMOVED

NOTE:

EXISTING BUILDINGS

SOLAR PANELS SCHEDULE		
SOLAR PANELS		60
TOTAL SOLAR PANELS (TBC)	=	60

flowerpower

OVERALL ROOF PLAN

LEFFLER SIMES PTY LTD
ABN 39 001 043 992
WEB: www.lefflersimes.com.au
SYDNEY 7 YOUNG ST, NEUTRAL BAY, NSW 2089 T:+61 2 99093344
MELBOURNE LEVEL 2 - 370 LT BOURKE ST, VIC 3000 T:+61 3 96546344
BRISBANE L5 U39 131 LEICHHARDT ST, SPRING HILL, QLD 4000 T:+61 7 31235544

SCALE 1:200 @ A1

0 4 8 12 16 20

FLOWER POWER GARDEN CENTRE TERREY HILLS
277 MONA VALE RD, TERREY HILLS NSW

JOB NO: 5405
DATE: APR 2025
DRAWN: DG
DWG NO. DA120
REV. A

LEFFLER SIMES ARCHITECTS

FINISHES SCHEDULE

REFERENCE		TYPE	SELECTION	
M01	WALL TYPE 1	PRECAST CONCRETE PANELS	PAINT FINISH 1 DULUX DIESKAU SN4H1 MATT	
M02	WALL TYPE 2	PRECAST CONCRETE PANELS	PAINT FINISH 2 DULUX COLORBOND MONUMENT	
M03	WALL CLADDING 1	FC SHEETS WITH VERTICAL GROOVES	CEMINTEL TERRITORY WOODLANDS TEAK TIMBER SHADE	
M04	WALL CLADDING 2	100 x 40 ALUMINIUM SECTIONS	POWDERCOAT DULUX DURATEC ETERNITY BRONZE PEARL SATIN	

REFERENCE		TYPE	SELECTION	
M06	ALUMINIUM GLASS AWNING	200 x 50 ALUMINIUM SECTIONS	TIMBER LOOK ALUMINIUM WITH CLEAR GLASS	
M07	ALUMINIUM WINDOW FRAME	ALUMINIUM FRAMES	POWDERCOAT DURATEC NICKEL PEARL MATT 90T7763Q	
M08	TIMBER PERGOLA	200 x 200 TIMBER POSTS 200 x 50 TIMBER SLATS	SOLID TIMBER	
M09	TIMBER SLAT AWNING WITH LIGHTING	200 x 50 TIMBER SLATS	SOLID TIMBER	

REFERENCE		TYPE	SELECTION	
M10	ROOF SKYLIGHT	POLYCARBONATE	DANPAL 600W POLYCARBONATE CLEAR	
M11	GUTTERS	AS DOCUMENTED	COLORBOND EVENING HAZE/COLORBOND MONUMENT	
M12	DOWNPIPES	AS DOCUMENTED	COLORBOND EVENING HAZE	
M13	PALISADE FENCE	METAL	POWDERCOAT DURALLOY WALLABY SATIN 2607474S	

Member Australian Institute of Architects

ISSUE	AMENDMENT	DATE	CHK'D
P1	ISSUE FOR INFORMATION	17.04.25	CSG
P2	ISSUE FOR INFORMATION	20.05.25	CSG
A	ISSUE FOR DA	11.06.25	CSG

1 DA120 **NORTH ELEVATION**
Scale: 1 : 100

2 DA120 **EAST ELEVATION**
Scale: 1 : 100

flowerpower

ELEVATION- SHEET 1

LEFFLER SIMES PTY LTD
ABN 39 001 043 992
WEB: www.lefflersimes.com.au
SYDNEY 7 YOUNG ST, NEUTRAL BAY, NSW 2089 T:+61 2 99093344
MELBOURNE LEVEL 2 - 370 LT BOURKE ST, VIC 3000 T:+61 3 96546344
BRISBANE L5 U39 131 LEICHHARDT ST, SPRING HILL, QLD 4000 T:+61 7 31235544

0 2 4 6 8 10 SCALE 1:100 @ A1

FLOWER POWER GARDEN CENTRE TERREY HILLS
277 MONA VALE RD, TERREY HILLS NSW

JOB NO: 5405 DWG NO. REV.
DATE: APR 2025 DA150 A
DRAWN: DG

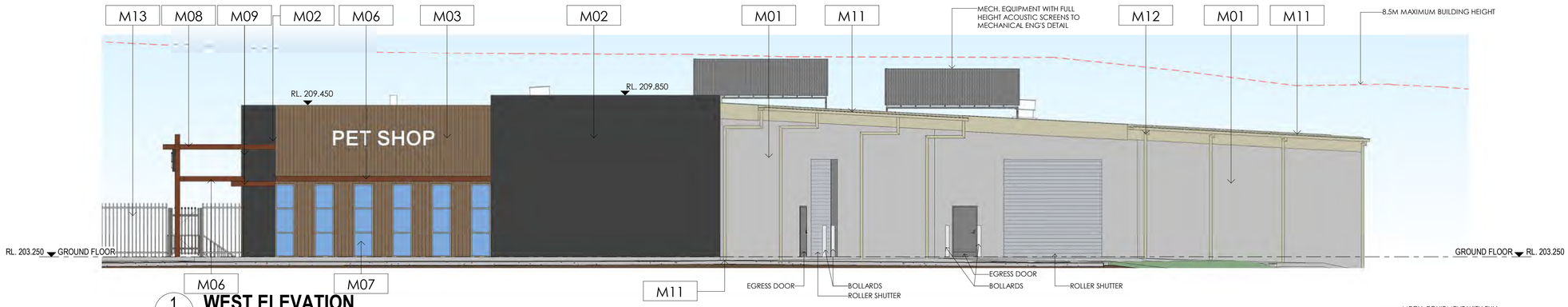
LEFFLER SIMES ARCHITECTS

FINISHES SCHEDULE

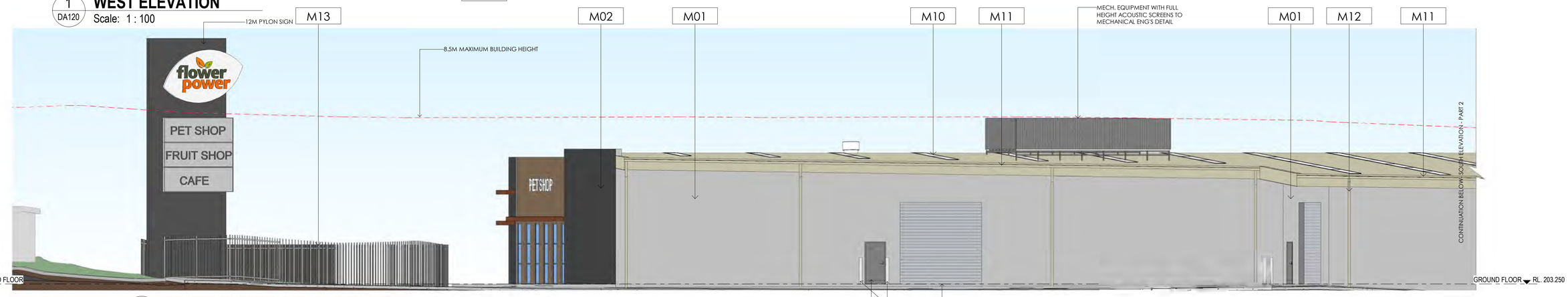
REFERENCE		TYPE	SELECTION	
M01	WALL TYPE 1	PRECAST CONCRETE PANELS	PAINT FINISH 1 DULUX DIESKAU SN4H1 MATT	
M02	WALL TYPE 2	PRECAST CONCRETE PANELS	PAINT FINISH 2 DULUX COLORBOND MONUMENT	
M03	WALL CLADDING 1	FC SHEETS WITH VERTICAL GROOVES	CEMINTEL TERRITORY WOODLANDS TEAK TIMBER SHADE	
M04	WALL CLADDING 2	100 x 40 ALUMINIUM SECTIONS	POWDERCOAT DULUX DURATEC ETERNITY BRONZE PEARL SATIN	

REFERENCE		TYPE	SELECTION	
M06	ALUMINIUM GLASS AWNING	200 x 50 ALUMINIUM SECTIONS	TIMBER LOOK ALUMINIUM WITH CLEAR GLASS	
M07	ALUMINIUM WINDOW FRAME	ALUMINIUM FRAMES	POWDERCOAT DURATEC NICKEL PEARL MATT 90T7763Q	
M08	TIMBER PERGOLA	200 x 200 TIMBER POSTS 200 x 50 TIMBER SLATS	SOLID TIMBER	
M09	TIMBER SLAT AWNING WITH LIGHTING	200 x 50 TIMBER SLATS	SOLID TIMBER	

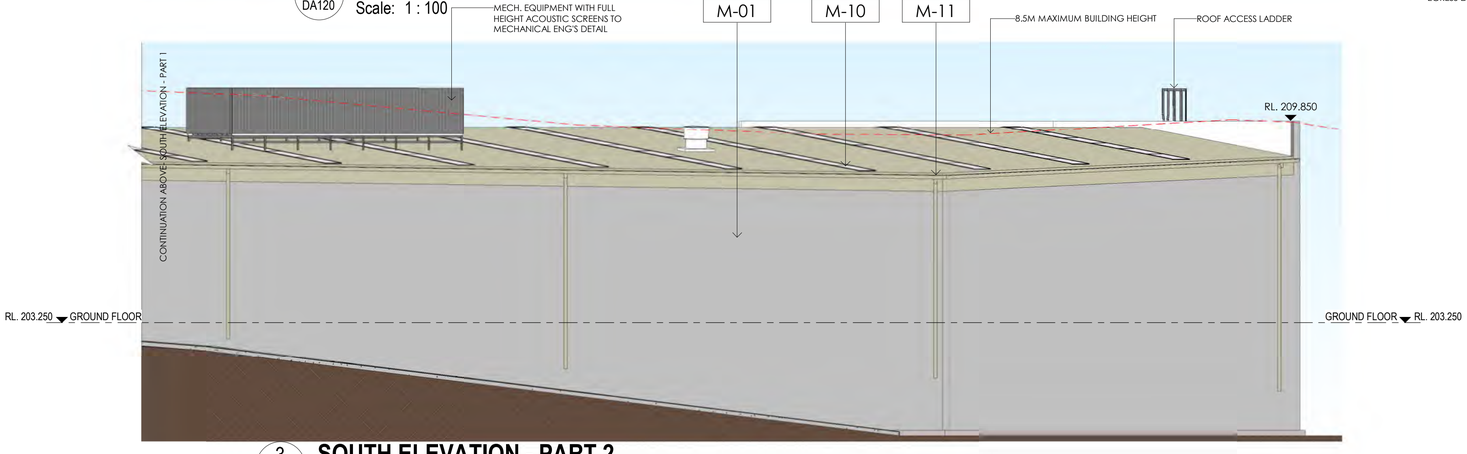
REFERENCE		TYPE	SELECTION	
M10	ROOF SKYLIGHT	POLYCARBONATE	DANPAL 600W POLYCARBONATE CLEAR	
M11	GUTTERS	AS DOCUMENTED	COLORBOND EVENING HAZE/COLORBOND MONUMENT	
M12	DOWNPIPES	AS DOCUMENTED	COLORBOND EVENING HAZE	
M13	PALISADE FENCE	METAL	POWDERCOAT DURALLOY WALLABY SATIN 2607474S	



1 DA120 **WEST ELEVATION**
Scale: 1 : 100



2 DA120 **SOUTH ELEVATION - PART 1**
Scale: 1 : 100



3 DA120 **SOUTH ELEVATION - PART 2**
Scale: 1 : 100

Member Australian Institute of Architects

ISSUE	AMENDMENT	DATE	CHK'D
P1	ISSUE FOR INFORMATION	17.04.25	CSG
P2	ISSUE FOR INFORMATION	20.05.25	CSG
A	ISSUE FOR DA	11.06.25	CSG

flowerpower

ELEVATION- SHEET 2

LEFFLER SIMES PTY LTD
ABN 39 001 043 992
WEB: www.lefflersimes.com.au
SYDNEY 7 YOUNG ST, NEUTRAL BAY, NSW 2089 T:+61 2 99093344
MELBOURNE LEVEL 2 - 370 LT BOURKE ST, VIC 3000 T:+61 3 96546344
BRISBANE L5 U39 131 LEICHHARDT ST, SPRING HILL, QLD 4000 T:+61 7 31235544

SCALE 1:100 @ A1

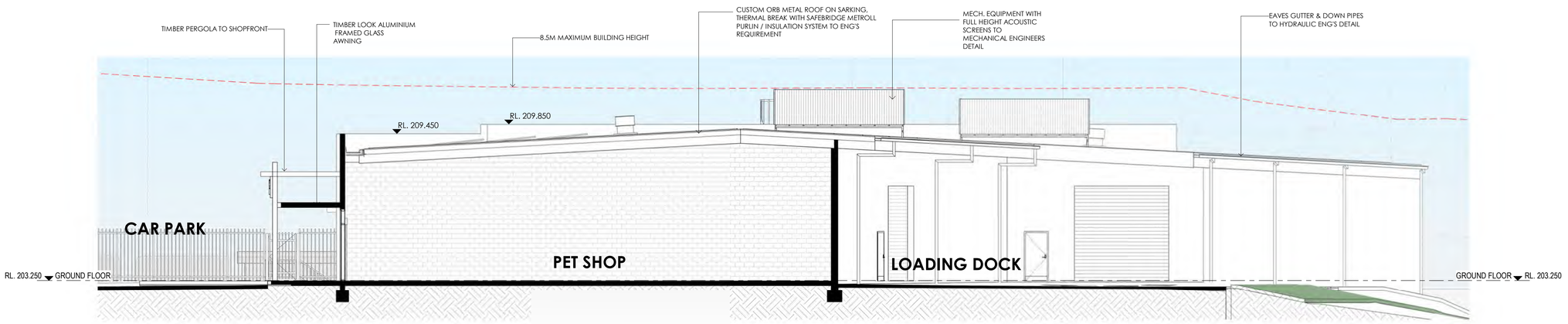
FLOWER POWER GARDEN CENTRE TERREY HILLS
277 MONA VALE RD, TERREY HILLS NSW

JOB NO: 5405 DWG NO. REV.
DATE: APR 2025 DA151 A
DRAWN: DG

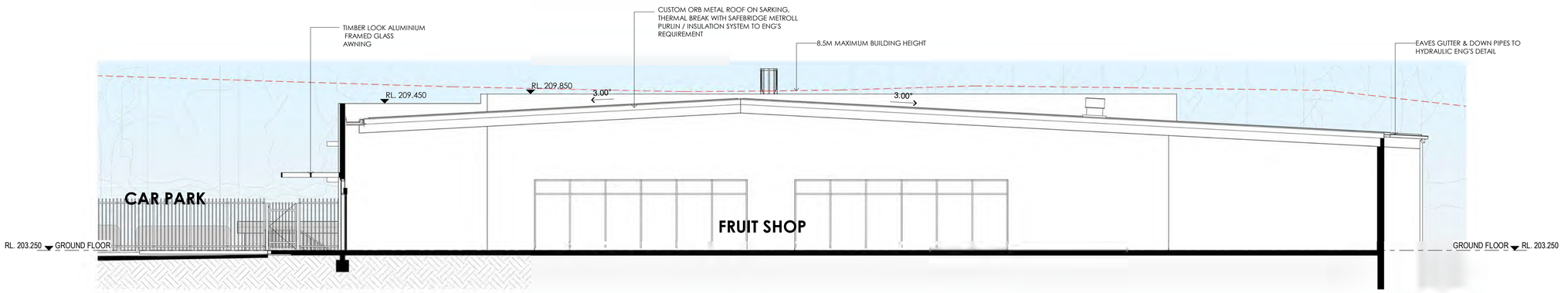
LEFFLER SIMES ARCHITECTS

Member Australian Institute of Architects

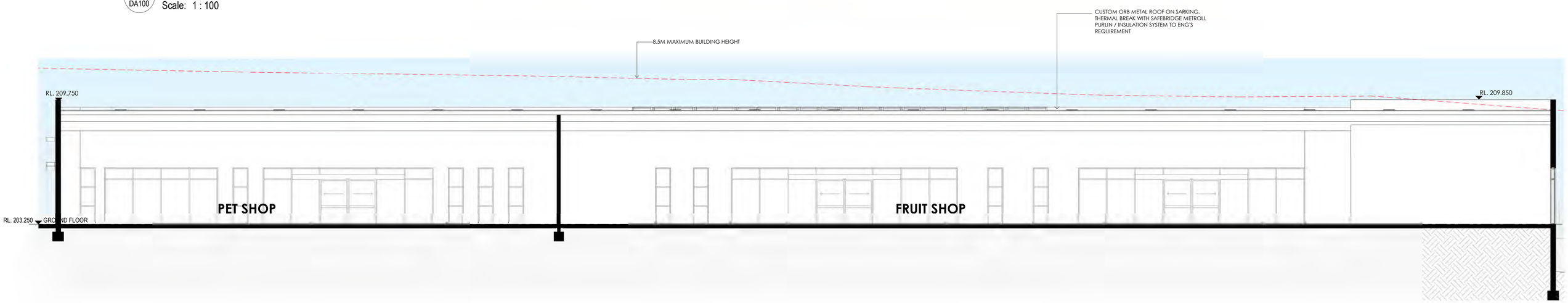
ISSUE	AMENDMENT	DATE	CHK'D
P1	ISSUE FOR INFORMATION	17.04.25	CSG
P2	ISSUE FOR INFORMATION	20.05.25	CSG
A	ISSUE FOR DA	11.06.25	CSG



1 DA100 **SECTION 1**
Scale: 1 : 100



2 DA100 **SECTION 2**
Scale: 1 : 100



3 DA100 **SECTION 3**
Scale: 1 : 100

flowerpower

SECTIONS- SHEET 1

LEFFLER SIMES PTY LTD SYDNEY 7 YOUNG ST, NEUTRAL BAY, NSW 2089 T:+61 2 99093344
ABN 39 001 043 992 MELBOURNE LEVEL 2 - 370 LT BOURKE ST, VIC 3000 T:+61 3 96546344
WEB: www.lefflersimes.com.au BRISBANE L5 U39 131 LEICHHARDT ST, SPRING HILL, QLD 4000 T:+61 7 31235544

0 2 4 6 8 10 SCALE 1:100 @ A1

FLOWER POWER GARDEN CENTRE TERREY HILLS
277 MONA VALE RD, TERREY HILLS NSW

JOB NO: 5405 DWG NO. REV.
DATE: APR 2025 DA160 A
DRAWN: DG

LEFFLER SIMES ARCHITECTS

Appendix C: Laboratory Results Summary Tables

ABBREVIATIONS AND EXPLANATIONS

Abbreviations used in the Tables:

ABC:	Ambient Background Concentration
ACM:	Asbestos Containing Material
ADWG:	AustralianDrinking Water Guidelines
AF:	Asbestos Fines
ANZG	Australian and New Zealand Guidelines
B(a)P:	Benzo(a)pyrene
CEC:	Cation Exchange Capacity
CRC:	Cooperative Research Centre
CT:	Contaminant Threshold
EILs:	Ecological Investigation Levels
ESLs:	Ecological Screening Levels
FA:	Fibrous Asbestos
GIL:	Groundwater Investigation Levels
GSW:	General Solid Waste
HILs:	Health Investigation Levels
HSLs:	Health Screening Levels
HSL-SSA:	Health Screening Level-SiteSpecific Assessment
kg/L	kilograms per litre
NA:	Not Analysed
NC:	Not Calculated
NEPM:	National Environmental Protection Measure
NHMRC:	National Health and Medical Research Council
NL:	Not Limiting
NSL:	No Set Limit
OCP:	Organochlorine Pesticides
OPP:	Organophosphorus Pesticides
PAHs:	Polycyclic Aromatic Hydrocarbons
%w/w:	weight per weight
ppm:	Parts per million
PCBs:	Polychlorinated Biphenyls
PCE:	Perchloroethylene (Tetrachloroethylene or Teterachloroethene)
pH_{KCL} :	pH of filtered 1:20, 1M KCL extract, shaken overnight
pH_{ox} :	pH of filtered 1:20 1M KCl after peroxide digestion
PQL:	Practical Quantitation Limit
RS:	Rinsate Sample
RSL:	Regional Screening Levels
RSW:	Restricted Solid Waste
SAC:	Site Assessment Criteria
SCC:	Specific Contaminant Concentration
S_{Cr}:	Chromium reducible sulfur
S_{POS}:	Peroxide oxidisable Sulfur
SSA:	Site Specific Assessment
SSHSLs:	Site Specific Health Screening Levels
TAA:	Total Actual Acidity in 1M KCL extract titrated to pH6.5
TB:	Trip Blank
TCA:	1,1,1 Trichloroethane (methyl chloroform)
TCE:	Trichloroethylene (Trichloroethene)
TCLP:	Toxicity Characteristics Leaching Procedure
TPA:	Total Potential Acidity, 1M KCL peroxide digest
TS:	Trip Spike
TRH:	Total Recoverable Hydrocarbons
TSA:	Total Sulfide Acidity (TPA-TAA)
UCL:	Upper Level Confidence Limit on Mean Value
USEPA	United States Environmental Protection Agency
VOCC:	Volatile Organic Chlorinated Compounds
WHO:	World Health Organisation

Table Specific Explanations:

EIL/ESL Table:

- ABC Values for selected metals have been adopted from the published background concentrations presented in Olszowy et. al., (1995), Trace Element Concentrations in Soils from Rural and Urban New South Wales (the 25th percentile values for old suburbs with high traffic have been quoted).

QA/QC Table:

- Field blank, Inter and Intra laboratory duplicate results are reported in mg/kg.
- Trip spike results are reported as percentage recovery.
- Field rinsate results are reported in µg/L.

TABLE S1
SOIL LABORATORY RESULTS COMPARED TO HSLs
All data in mg/kg unless stated otherwise

					C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene	Field PID Measurement
PQL - Envirolab Services					25	50	0.2	0.5	1	1	1	ppm
NEPM 2013 HSL Land Use Category					**HSL-D: COMMERCIAL/INDUSTRIAL**							
Sample Reference	**Sample Depth**	**Sample Description**	**Depth Category**	**Soil Category**								
BH207	0.1-0.2	Fill: sandy gravel	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0.9
BH208	0.1-0.2	Fill: sandy gravel	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	1.4
Total Number of Samples					2	2	2	2	2	2	2	2
Maximum Value					<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	1.4

Concentration above the SAC **VALUE**
Concentration above the PQL **Bold**
The guideline corresponding to the concentration above the SAC is highlighted in grey in the Site Assessment Criteria Table below

HSL SOIL ASSESSMENT CRITERIA

Sample Reference	**Sample Depth**	**Sample Description**	**Depth Category**	**Soil Category**	C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene
BH207	0.1-0.2	Fill: sandy gravel	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
BH208	0.1-0.2	Fill: sandy gravel	0m to <1m	Sand	260	NL	3	NL	NL	230	NL

TABLE S2
SOIL LABORATORY RESULTS COMPARED TO MANAGEMENT LIMITS
All data in mg/kg unless stated otherwise

			C_6-C_{10} (F1) plus BTEX	>C_{10}-C_{16} (F2) plus napthalene	>C_{16}-C_{34} (F3)	>C_{34}-C_{40} (F4)
PQL - Envirolab Services			25	50	100	100
NEPM 2013 Land Use Category			**COMMERCIAL/INDUSTRIAL**			
Sample Reference	**Sample Depth**	**Soil Texture**				
BH207	0.1-0.2	Coarse	<25	<50	**200**	**140**
BH208	0.1-0.2	Coarse	<25	<50	**180**	**180**
Total Number of Samples			2	2	2	2
Maximum Value			<PQL	<PQL	200	180

Concentration above the SAC **VALUE**
Concentration above the PQL **Bold**

MANAGEMENT LIMIT ASSESSMENT CRITERIA

Sample Reference	**Sample Depth**	**Soil Texture**	C_6-C_{10} (F1) plus BTEX	>C_{10}-C_{16} (F2) plus napthalene	>C_{16}-C_{34} (F3)	>C_{34}-C_{40} (F4)
BH207	0.1-0.2	Coarse	700	1000	3500	10000
BH208	0.1-0.2	Coarse	700	1000	3500	10000

TABLE S3
SOIL LABORATORY RESULTS COMPARED T0 DIRECT CONTACT CRITERIA
All data in mg/kg unless stated otherwise

Analyte		C_6-C_{10}	>C_{10}-C_{16}	>C_{16}-C_{34}	>C_{34}-C_{40}	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene	PID
PQL - Envirolab Services		25	50	100	100	0.2	0.5	1	1	1	
CRC 2011 -Direct contact Criteria		26,000	20,000	27,000	38,000	430	99,000	27,000	81,000	11,000	
Site Use		**COMMERCIAL/INDUSTRIAL - DIRECT SOIL CONTACT**									
Sample Reference	**Sample Depth**										
BH207	0.1-0.2	<25	<50	**200**	**140**	<0.2	<0.5	<1	<1	<1	**0.9**
BH208	0.1-0.2	<25	<50	**180**	**180**	<0.2	<0.5	<1	<1	<1	**1.4**
Total Number of Samples		2	2	2	2	2	2	2	2	2	2
Maximum Value		<PQL	<PQL	200	180	<PQL	<PQL	<PQL	<PQL	<PQL	1.4

Concentration above the SAC **VALUE**
Concentration above the PQL **Bold**

TABLE S4
SOIL LABORATORY RESULTS COMPARED TO NEPM 2013 EILs AND ESLs
All data in mg/kg unless stated otherwise

Land Use Category				**COMMERCIAL/INDUSTRIAL**																
							AGED HEAVY METALS-EILs						EILs		ESLs							
				pH	CEC (cmolc/kg)	Clay Content (% clay)	Arsenic	Chromium	Copper	Lead	Nickel	Zinc	Naphthalene	DDT	C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	>C_{16}-C_{34} (F3)	>C_{34}-C_{40} (F4)	Benzene	Toluene	Ethylbenzene	Total Xylenes	B(a)P
PQL - Envirolab Services				-	1	-	4	1	1	1	1	1	1	0.1	25	50	100	100	0.2	0.5	1	1	0.05
Ambient Background Concentration (ABC)				-	-	-	NSL	13	28	163	5	122	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL
Sample Reference	**Sample Depth**	**Sample Description**	**Soil Texture**																			
BH207	0.1-0.2	Fill: sandy gravel	Coarse	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	NA	<25	<50	**200**	**140**	<0.2	<0.5	<1	<1	NA
BH208	0.1-0.2	Fill: sandy gravel	Coarse	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	NA	<25	<50	**180**	**180**	<0.2	<0.5	<1	<1	NA
Total Number of Samples				0	0	0	0	0	0	0	0	0	2	0	2	2	2	2	2	2	2	2	0
Maximum Value				NA	NA	NA	NA	NA	NA	NA	NA	NA	<PQL	NA	<PQL	<PQL	200	180	<PQL	<PQL	<PQL	<PQL	NA

Concentration above the SAC **VALUE**
Concentration above the PQL **Bold**
The guideline corresponding to the elevated value is highlighted in grey in the EIL and ESL Assessment Criteria Table below

EIL AND ESL ASSESSMENT CRITERIA

Sample Reference	**Sample Depth**	**Sample Description**	**Soil Texture**	pH	CEC (cmolc/kg)	Clay Content (% clay)	Arsenic	Chromium	Copper	Lead	Nickel	Zinc	Naphthalene	DDT	C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	>C_{16}-C_{34} (F3)	>C_{34}-C_{40} (F4)	Benzene	Toluene	Ethylbenzene	Total Xylenes	B(a)P
BH207	0.1-0.2	Fill: sandy gravel	Coarse	NA	NA	NA	--	--	--	--	--	--	370	--	215	170	1700	3300	75	135	165	180	--
BH208	0.1-0.2	Fill: sandy gravel	Coarse	NA	NA	NA	--	--	--	--	--	--	370	--	215	170	1700	3300	75	135	165	180	--

TABLE S5
SOIL QA/QC SUMMARY

			TRH C6 - C10	TRH >C10-C16	TRH >C16-C34	TRH >C34-C40	Benzene	Toluene	Ethylbenzene	m+p-xylene	o-Xylene
	PQL Envirolab SYD		*25*	*50*	*100*	*100*	*0.2*	*0.5*	*1*	*2*	*1*
	PQL Envirolab VIC		*25*	*50*	*100*	*100*	*0.2*	*0.5*	*1.0*	*2.0*	*1.0*
Field	TB-S201	-	<25	NA	NA	NA	<0.2	<0.5	<1	<2	<1
Blank	12/07/24										
Field	FR201-HA	µg/L	NA	NA	NA	NA	<1	<1	<1	<2	<1
Rinsate	12/07/24										
Trip	TS-S201		-	-	-	-	98%	99%	97%	96%	97%
Spike	12/07/24										

Result outside of QA/QC acceptance criteria

ABBREVIATIONS AND EXPLANATIONS

Abbreviations used in the Tables:

ADWG: AustralianDrinking Water Guidelines
ANZG Australian and New Zealand Guidelines
B(a)P: Benzo(a)pyrene
CRC: Cooperative Research Centre
ESLs: Ecological Screening Levels
GIL: Groundwater Investigation Levels
HILs: Health Investigation Levels
HSLs: Health Screening Levels
HSL-SSA: Health Screening Level-SiteSpecific Assessment
NA: Not Analysed
NC: Not Calculated
NEPM: National Environmental Protection Measure
NHMRC: National Health and Medical Research Council
NL: Not Limiting
NSL: No Set Limit
OCP: Organochlorine Pesticides
OPP: Organophosphorus Pesticides
PAHs: Polycyclic Aromatic Hydrocarbons
ppm: Parts per million
PCBs: Polychlorinated Biphenyls
PCE: Perchloroethylene (Tetrachloroethylene or Tetrachloroethene)
PQL: Practical Quantitation Limit
RS: Rinsate Sample
RSL: Regional Screening Levels
SAC: Site Assessment Criteria
SSA: Site Specific Assessment
SSHSLs Site Specific Health Screening Levels
TB: Trip Blank
TCA: 1,1,1 Trichloroethane (methyl chloroform)
TCE: Trichloroethylene (Trichloroethene)
TS: Trip Spike
TRH: Total Recoverable Hydrocarbons
UCL: Upper Level Confidence Limit on Mean Value
USEPA United States Environmental Protection Agency
VOCC: Volatile Organic Chlorinated Compounds
WHO: World Health Organisation

TABLE G1
SUMMARY OF GROUNDWATER LABORATORY RESULTS COMPARED TO ECOLOGICAL GILs SAC
All results in µg/L unless stated otherwise.

	PQL Envirolab Services	ANZG 2018 Fresh Waters	SAMPLES				
			MW101a	MW101a [LAB_DUP]	MW102	MW105	WDUP201
Monocyclic Aromatic Hydrocarbons (BTEX Compounds)							
Benzene	1	950	<1	<1	<1	<1	<1
Toluene	1	180	<1	<1	<1	<1	<1
Ethylbenzene	1	80	<1	<1	<1	<1	<1
m+p-xylene	2	75	<2	<2	<2	<2	<2
o-xylene	1	350	<1	<1	<1	<1	<1
Total xylenes	2	NSL	<2	<2	<2	<2	<2

Concentration above the SAC	**VALUE**
Concentration above the PQL	**Bold**
GIL >PQL	Red

TABLE G2
SUMMARY OF GROUNDWATER LABORATORY RESULTS COMPARED TO HUMAN CONTACT GILs
All results in µg/L unless stated otherwise.

	PQL Envirolab Services	Recreational (10 x NHMRC ADWG)	SAMPLES				
			MW101a	MW101a [LAB_DUP]	MW102	MW105	WDUP201
Monocyclic Aromatic Hydrocarbons (BTEX Compounds)							
Benzene	1	10	<1	<1	<1	<1	<1
Toluene	1	8000	<1	<1	<1	<1	<1
Ethylbenzene	1	3000	<1	<1	<1	<1	<1
m+p-xylene	2	NSL	<2	<2	<2	<2	<2
o-xylene	1	NSL	<1	<1	<1	<1	<1
Total xylenes	2	6000	<2	<2	<2	<2	<2

Concentration above the SAC — **VALUE**
Concentration above the PQL — **Bold**
GIL >PQL — Red

TABLE G3
GROUNDWATER LABORATORY RESULTS COMPARED TO SITE SPECIFIC HSLs - RISK ASSESSMENT
All results in µg/L unless stated otherwise.

	PQL Envirolab Services	NHMRC ADWG 2011	WHO 2008	USEPA RSL Tapwater 2017	SAMPLES				
					MW101a	MW101a [LAB_DUP]	MW102	MW105	WDUP201
Total Recoverable Hydrocarbons (TRH)									
C_6-C_9 Aliphatics (assessed using F1)	10	-	100	-	<10	<10	<10	<10	<10
>C_9-C_{14} Aliphatics (assessed using F2)	50	-	100	-	<50	NA	<50	<50	<50
Monocyclic Aromatic Hydrocarbons (BTEX Compounds)									
Benzene	1	1	-	-	<1	<1	<1	<1	<1
Toluene	1	800	-	-	<1	<1	<1	<1	<1
Ethylbenzene	1	300	-	-	<1	<1	<1	<1	<1
Total xylenes	2	600	-	-	<2	<2	<2	<2	<2
Polycyclic Aromatic Hydrocarbons (PAHs)									
Naphthalene	1	-	-	6.1	<1	<1	<1	<1	<1

Concentration above the SAC	**VALUE**
Concentration above the PQL	**Bold**
GIL >PQL	Red

TABLE G4
GROUNDWATER QA/QC SUMMARY

		TRH C6 - C10	TRH >C10-C16	TRH >C16-C34	TRH >C34-C40	Benzene	Toluene	Ethylbenzene	m+p-xylene	o-Xylene
	PQL Envirolab SYD	*10*	*50*	*100*	*100*	*1*	*1*	*1*	*2*	*1*
	PQL Envirolab VIC	*10*	*50*	*100*	*100*	*1.0*	*1.0*	*1.0*	*2.0*	*1.0*
Intra	MW101a	<10	<50	<100	<100	<1	<1	<1	<2	<1
laboratory	WDUP201	<10	<50	<100	<100	<1	<1	<1	<2	<1
duplicate	MEAN	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %	nc	nc	nc	nc	nc	nc	nc	nc	nc
Field	TB-W201	<10	NA	NA	NA	<1	<1	<1	<2	<1
Blank	22/07/2024									
Trip	TS-W201	-	-	-	-	106%	105%	103%	101%	107%
Spike	22/07/2024									

Result outside of QA/QC acceptance criteria Value

Data Gap Investigation (DGI)
277 Mona Vale Road, Terrey Hills, NSW
E34278PH

ABBREVIATIONS AND EXPLANATIONS

Abbreviations used in the Tables:

CS	Characteristic Situation
CH_4	Methane
CO	Carbon Monoxide
CO_2	Carbon Dioxide
GSV	Gas Screening Value
H_2S	Hydrogen Sulfide
LEL	Lower Explosive Limit
O_2	Oxygen
>>>	Measured LEL greater than 100%

Flow rates

- If the flow rate measured in the field was zero this has been adjusted to 0.1 L/hr (the minimum measurable flow rate of the instrument). The adjustment is indicated by a green font.
- If the measured flow rate was a negative value this has been converted to a positive value to account for potential flow rates. The adjustment is indicated by a green font.

GSV and CS Values

GSV and CS value calculated using the Modified Wilson Card Classification detailed in the *Assessment and Management* of *Hazardous Ground Gases, NSW EPA 2019* . Table 7 of the guidelines suggests the following adjustments:

- If methane >1% and/or carbon dioxide > 5% for CS1 then CS increased to 2 (adjustment indicated by blue italic font);
- If borehole flow rate > 70L/hr for CS2 then CS increased to 3 (adjustment indicated by blue italic font).

Gas Protection Values

Gas Protection Values derived from Table 8 of the *Assessment and Management of Hazardous Ground Gases, NSW EPA 2020.*

- For large commercial developments if Gas protection value equals 1 and methane concentration >20% then increase to CS3 (adjustment indicated by blue italic font).

GSV, CS and Gas Protection values for the entire Site

These values are calculated using the maximum values ecountered at the site and are not borehole specific.

TABLE HGG1
SUMMARY OF FIELD GAS MEASUREMENTS

Site Use: **Public Buildings**		Peak HGG (Hazardous Ground Gas) Measurements							Standing Water Level (SWL)	Atmospheric pressure	Calculated Methane Gas Screening Value (GSV)	Calculated Carbon Dioxide Gas Screening Value (GSV)	Methane Characteristic Gas Situtation (CS)	Carbon Dioxide Characteristic Gas Situtation (CS)	Maximum CS value	Gas Protection Guidance Value
		CH_4 (max)	CO_2 (max)	O_2 (min)	CH_4 LEL (max)	H_2S (max)	CO (max)	Flow (max)								
Well Reference	**Sampling Round & Date**	% v/v	% v/v	% v/v	%LEL	ppm	ppm	L/hr	m	mBar	-	-	-	-	-	-
MW201	Round 1 - 24 July 2024	0	4.7	14.6	0	0	0	1.8	1.5	1010	0.00	0.08	1	2	2	3
MW202	Round 1 - 24 July 2024	0	2.1	18.6	0	0	0	1.6	-	1007	0.00	0.03	1	1	1	0
MW203	Round 1 - 24 July 2024	0	9.3	0.7	0	0	10	1.6	1.49	1007	0.00	0.15	1	2	2	3
MW204	Round 1 - 24 July 2024	0	0.6	19.4	0	0	0	1.7	-	1006	0.00	0.01	1	1	1	0
MW205	Round 1 - 24 July 2024	0	0.4	20.1	0	0	0	1.6	1.27	1006	0.00	0.01	1	1	1	0
MW206	Round 1 - 24 July 2024	0	0.1	20.5	0	0	0	1.6	0.8	1006	0.00	0.00	1	1	1	0
MW201	Round 2 - 16 August 2024	0	8.7	7.1	0	0	0	1.6	1.49	1002	0.00	0.14	1	2	2	3
MW202	Round 2 - 16 August 2024	0	7	10.4	0	0	0	1.3	-	1001	0.00	0.09	1	2	2	3
MW203	Round 2 - 16 August 2024	0	11.7	11.2	0	0	0	0.8	-	999	0.00	0.09	1	2	2	3
MW204	Round 2 - 16 August 2024	0	4.7	13.3	0	0	0	0.6	-	996	0.00	0.03	1	1	1	0
MW205	Round 2 - 16 August 2024	0	1.6	15.8	0	0	0	0.6	1.21	997	0.00	0.01	1	1	1	0
MW206	Round 2 - 16 August 2024	0	1.2	17.9	0	0	0	0.9	0.75	995	0.00	0.01	1	1	1	0
MW201	Round 3 - 30 August 2024	0	0.9	19.1	0	0	0	1.6	0.99	988	0.00	0.01	1	1	1	0
MW202	Round 3 - 30 August 2024	0	0	20.7	0	0	0	1.1	-	987	0.00	0.00	1	1	1	0
MW203	Round 3 - 30 August 2024	0	0	20.8	0	0	0	0.9	-	987	0.00	0.00	1	1	1	0
MW204	Round 3 - 30 August 2024	0	0	20.9	0	0	0	0.9	-	987	0.00	0.00	1	1	1	0
MW205	Round 3 - 30 August 2024	0	0	20.9	0	0	0	0.7	0.86	986	0.00	0.00	1	1	1	0
MW206	Round 3 - 30 August 2024	0	0.1	20.8	0	0	0	0.7	0.56	985	0.00	0.00	1	1	1	0
Total Number of Measurements		18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
Minimum Value		0	0	0.7	0	0	0	0.6	0.56	985	0	0	1	1	1	0
Maximum Value		0	11.7	20.9	0	0	10	1.8	1.5	1010	0.0	0.1	1	2	2	3
								GSV, CS and Gas Protection values for the entire Site			0.00	0.21	1	2	2	3

Residential not recomended without high level intervention and management
Level 3 Risk Assessment
Consider evacuation and social risks

Level 3 RA

Appendix D: Borehole Logs

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH201** **1/1**

Client: SYESUN PTY LTD - FLOWER POWER TERRY HILLS

Project: PROPOSED REDEVELOPMENT OF GARDEN CENTRE

Location: 277 MONA VALE ROAD, TERRY HILLS, NSW

Job No.: E34278PH **Method:** SPIRAL AUGER **R.L. Surface:** 195.74m

Date: 12/7/24 **Datum:** AHD

Plant Type: JK205 **Logged/Checked by:** A.D./T.H.

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		-	ASPHALTIC CONCRETE: 40mm.t FILL: Clayey sand, fine to medium grained, brown, trace of igneous gravel and asphalt fragments.	M			
▼						N = 2 2,1,1	1		SC	Clayey SAND: fine to medium grained, light brown, trace of decomposed bark and roots.	M			RESIDUAL
										END OF BORHEOLE AT 1.5m				HAZARDOUS GROUND GAS MONITORING WELL INSTALLED TO 1.5m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 1.5m TO 0m. 2mm SAND FILTER PACK 0.5m TO 0.1m. BENTONITE SEAL 0.1m TO SURFACE. COMPLETED WITH A CONCRETED GATIC COVER.
							2							
							3							
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH202** **1/1**

Client: SYESUN PTY LTD - FLOWER POWER TERRY HILLS

Project: PROPOSED REDEVELOPMENT OF GARDEN CENTRE

Location: 277 MONA VALE ROAD, TERRY HILLS, NSW

Job No.: E34278PH **Method:** SPIRAL AUGER **R.L. Surface:** 196.56m

Date: 12/7/24 **Datum:** AHD

Plant Type: JK205 **Logged/Checked by:** A.D./T.H.

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		-	ASPHALTIC CONCRETE: 40mm.t FILL: Clayey sand, fine to medium grained, brown, trace of igneous gravel.	M			
						N = 5 3,3,2			SC	Clayey SAND: fine to medium grained, light brown, trace of ironstone gravel.	M			RESIDUAL
							1			END OF BOREHOLE AT 1.0m				HAZARDOUS GROUND GAS MONITORING WELL INSTALLED TO 1.0m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 1.0m TO 0m. 2mm SAND FILTER PACK 1.0m TO 0.3m. BENTONITE SEAL 0.3m TO SURFACE. COMPLETED WITH A CONCRETED GATIC COVER.
							2							
							3							
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH203** **1/1**

Client: SYESUN PTY LTD - FLOWER POWER TERRY HILLS

Project: PROPOSED REDEVELOPMENT OF GARDEN CENTRE

Location: 277 MONA VALE ROAD, TERRY HILLS, NSW

Job No.: E34278PH **Method:** SPIRAL AUGER **R.L. Surface:** 197.71m

Date: 12/7/24 **Datum:** AHD

Plant Type: JK205 **Logged/Checked by:** A.D./T.H.

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		-	ASPHALTIC CONCRETE: 50mm.t				
										FILL: Clayey sand, fine to medium grained, brown, trace of igneous gravel and asphalt fragments.	M			
						N = 5 5,2,3				FILL: Sandy clay, low to medium plasticity, brown and grey, trace of ironstone, igneous and sandstone gravel.	w≈PL			
▼							1		SC	Clayey SAND: fine to medium grained, light brown, trace of ironstone gravel.	M			RESIDUAL
										END OF BOREHOLE AT 1.7m				HAZARDOUS GROUND GAS MONITORING WELL INSTALLED TO 1.7m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 1.7m TO 0m. 2mm SAND FILTER PACK 1.7m TO 0.3m. BENTONITE SEAL 0.3m TO SURFACE. COMPLETED WITH A CONCRETED GATIC COVER.
							2							
							3							
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH204** **1/1**

Client: SYESUN PTY LTD - FLOWER POWER TERRY HILLS

Project: PROPOSED REDEVELOPMENT OF GARDEN CENTRE

Location: 277 MONA VALE ROAD, TERRY HILLS, NSW

Job No.: E34278PH **Method:** SPIRAL AUGER **R.L. Surface:** 198.51m

Date: 12/7/24 **Datum:** AHD

Plant Type: JK205 **Logged/Checked by:** A.D./T.H.

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 COMPLE-TION						N > 11 3,5,6/ 50mm REFUSAL	0		-	ASPHALTIC CONCRETE: 50mm.t	M			
										FILL: Clayey sand, fine to medium grained, brown, trace of igneous and ironstone gravel and concrete fragments.				
									SC	Clayey SAND: fine to medium grained, red brown, with fine to coarse grained ironstone gravel.	M			RESIDUAL
							1		-	Extremely Weathered sandstone: sandy CLAY, low to medium plasticity red brown and grey.	XW			HAWKESBURY SANDSTONE
										END OF BOREHOLE AT 0.9m				REFUSAL HAZARDOUS GROUND GAS MONITORING WELL INSTALLED TO 0.9m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 0.9m TO 0m. 2mm SAND FILTER PACK 0.9m TO 0.2m. BENTONITE SEAL 0.2m TO SURFACE. COMPLETED WITH A CONCRETED GATIC COVER.
							2							
							3							
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No.
BH205
1/1

Client: SYESUN PTY LTD - FLOWER POWER TERRY HILLS

Project: PROPOSED REDEVELOPMENT OF GARDEN CENTRE

Location: 277 MONA VALE ROAD, TERRY HILLS, NSW

Job No.: E34278PH **Method:** SPIRAL AUGER **R.L. Surface:** 199.59m

Date: 12/7/24 **Datum:** AHD

Plant Type: JK205 **Logged/Checked by:** A.D./T.H.

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		-	ASPHALTIC CONCRETE: 60mm.t				
									-	FILL: Clayey sand, fine to medium grained, brown, trace of igneous and	M			
									SC	ironstone gravel.	M			RESIDUAL
▼						N = 2 1,1,1	1			Clayey SAND: fine to medium grained, light brown, trace of ironstone gravel.				
										as above, but light grey.	W			
										END OF BOREHOLE AT 1.5m				HAZARDOUS GROUND GAS MONITORING WELL INSTALLED TO 1.5m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 1.5m TO 0m. 2mm SAND FILTER PACK 0.5m TO 0.2m. BENTONITE SEAL 0.2m TO SURFACE. COMPLETED WITH A CONCRETED GATIC COVER.
							2							
							3							
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH206** **1/1**

Client: SYESUN PTY LTD - FLOWER POWER TERRY HILLS

Project: PROPOSED REDEVELOPMENT OF GARDEN CENTRE

Location: 277 MONA VALE ROAD, TERRY HILLS, NSW

Job No.: E34278PH **Method:** SPIRAL AUGER **R.L. Surface:** 200.90m

Date: 12/7/24 **Datum:** AHD

Plant Type: JK205 **Logged/Checked by:** A.D./T.H.

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 COMPLE-TION							0			FILL: Gravelly sand, fine to medium grained, brown and grey, fine to coarse grained igneous gravel, trace of asphalt fragments.	M			GRAVEL COVER
						N = 8 5,5,3			SC	Clayey SAND: fine to medium grained, light brown and grey, trace of ironstone gravel.	M			RESIDUAL
							1			END OF BOREHOLE AT 1.0m				HAZARDOUS GROUND GAS MONITORING WELL INSTALLED TO 1.0m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 1.0m TO 0m. 2mm SAND FILTER PACK 0.3m TO 0.1m. BENTONITE SEAL 0.1m TO SURFACE. COMPLETED WITH A CONCRETED GATIC COVER.
							2							
							3							
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH207** **1/1**

Client: SYESUN PTY LTD - FLOWER POWER TERRY HILLS

Project: PROPOSED REDEVELOPMENT OF GARDEN CENTRE

Location: 277 MONA VALE ROAD, TERRY HILLS, NSW

Job No.: E34278PH **Method:** HAND AUGER **R.L. Surface:** N/A

Date: 12/7/24 **Datum:** -

Plant Type: - **Logged/Checked by:** A.D./T.H.

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			CONCRETE: 100mm.t				
									-	FILL: Sandy gravel, fine to coarse grained, igneous, brown, fine to medium grained sand, trace of brick fragments.	M			REFUSAL ON OBSTRUCTIONS IN FILL
										END OF BOREHOLE AT 0.2m				
							1							
							2							
							3							
							4							
							5							
							6							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH208** **1/1**

Client: SYESUN PTY LTD - FLOWER POWER TERRY HILLS

Project: PROPOSED REDEVELOPMENT OF GARDEN CENTRE

Location: 277 MONA VALE ROAD, TERRY HILLS, NSW

Job No.: E34278PH **Method:** HAND AUGER **R.L. Surface:** N/A

Date: 12/7/24 **Datum:** -

Plant Type: - **Logged/Checked by:** A.D./T.H.

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			CONCRETE: 100mm.t				
									-	FILL: Sandy gravel, fine to coarse grained, igneous, brown, fine to medium grained sand, trace of brick fragments.	M			REFUSAL ON OBSTRUCTIONS IN FILL
										END OF BOREHOLE AT 0.2m				
							1							
							2							
							3							
							4							
							5							
							6							
							7							

ENVIRONMENTAL LOGS EXPLANATION 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.

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:

$$C_U = \frac{D_{60}}{D_{10}} \qquad and \qquad C_C = \frac{(D_{30})^2}{D_{10}\, D_{60}}$$

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:

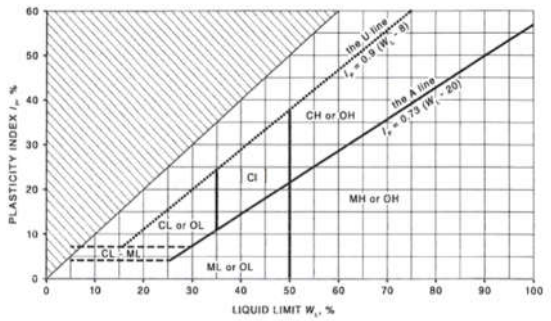
1 For a coarse grained soil with a fines content between 5% and 12%, the soil is given a dual classification comprising the two group symbols separated by a dash; for example, for a poorly graded gravel with between 5% and 12% silt fines, the classification is GP-GM.

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.
	PFAS	Soil sample taken over depth indicated, for analysis of Per- and Polyfluoroalkyl Substances.
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 PID = 100	Vane shear reading in kPa of undrained shear strength. Photoionisation detector reading in ppm (soil sample headspace test).
Moisture Condition (Fine Grained Soils)	w > PL $w \approx$ PL w < PL $w \approx$ LL w > LL	Moisture content estimated to be greater than plastic limit. Moisture content estimated to be approximately equal to plastic limit. Moisture content estimated to be less than plastic limit. Moisture content estimated to be near liquid limit. Moisture content estimated to be wet of liquid limit.
(Coarse Grained Soils)	D M W	DRY – runs freely through fingers. MOIST – does not run freely but no free water visible on soil surface. WET – free water visible on soil surface.
Strength (Consistency) Cohesive Soils	VS S F St VSt Hd Fr ( )	VERY SOFT – unconfined compressive strength ≤ 25kPa. SOFT – unconfined compressive strength > 25kPa and ≤ 50kPa. FIRM – unconfined compressive strength > 50kPa and ≤ 100kPa. STIFF – unconfined compressive strength > 100kPa and ≤ 200kPa. VERY STIFF – unconfined compressive strength > 200kPa and ≤ 400kPa. HARD – unconfined compressive strength > 400kPa. 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 L MD D VD ( )	**Density Index (I_D) Range (%)** / **SPT 'N' Value Range (Blows/300mm)** VERY LOOSE ≤ 15 / 0 – 4 LOOSE > 15 and ≤ 35 / 4 – 10 MEDIUM DENSE > 35 and ≤ 65 / 10 – 30 DENSE > 65 and ≤ 85 / 30 – 50 VERY DENSE > 85 / > 50 Bracketed symbol indicates estimated density based on ease of drilling or other assessment.

Log Column	Symbol	Definition
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.
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 E: Laboratory Report(s) & COC Documents

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 356537

Client Details

Client	JK Environments
Attention	Todd Hore
Address	PO Box 976, North Ryde BC, NSW, 1670

Sample Details

Your Reference	**E34278PH Terrey Hills**
Number of Samples	4 Soil, 1 Water
Date samples received	15/07/2024
Date completed instructions received	15/07/2024

Analysis Details

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

Samples were analysed as received from the client. Results relate specifically to the samples as received.

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

Report Details

Date results requested by	22/07/2024
Date of Issue	22/07/2024

NATA Accreditation Number 2901. This document shall not be reproduced except in full.

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

Results Approved By
Liam Timmins, Organics Supervisor
Timothy Toll, Senior Chemist

Authorised By
Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil					
Our Reference		356537-1	356537-2	356537-3	356537-4
Your Reference	UNITS	BH207	BH208	TB-S201	TS-S201
Depth		0.1-0.2	0.1-0.2	-	-
Date Sampled		12/07/2024	12/07/2024	12/07/2024	12/07/2024
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	16/07/2024	16/07/2024	16/07/2024	16/07/2024
Date analysed	-	17/07/2024	17/07/2024	17/07/2024	17/07/2024
TRH C_6 - C_9	mg/kg	<25	<25	<25	[NA]
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	[NA]
vTRH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	[NA]
Benzene	mg/kg	<0.2	<0.2	<0.2	98%
Toluene	mg/kg	<0.5	<0.5	<0.5	99%
Ethylbenzene	mg/kg	<1	<1	<1	97%
m+p-xylene	mg/kg	<2	<2	<2	96%
o-Xylene	mg/kg	<1	<1	<1	97%
Naphthalene	mg/kg	<1	<1	<1	[NA]
Total +ve Xylenes	mg/kg	<1	<1	<1	[NA]
Surrogate aaa-Trifluorotoluene	%	75	117	121	116

svTRH (C10-C40) in Soil			
Our Reference		356537-1	356537-2
Your Reference	UNITS	BH207	BH208
Depth		0.1-0.2	0.1-0.2
Date Sampled		12/07/2024	12/07/2024
Type of sample		Soil	Soil
Date extracted	-	16/07/2024	16/07/2024
Date analysed	-	17/07/2024	17/07/2024
TRH C_{10} - C_{14}	mg/kg	<50	<50
TRH C_{15} - C_{28}	mg/kg	100	100
TRH C_{29} - C_{36}	mg/kg	150	130
Total +ve TRH (C10-C36)	mg/kg	250	240
TRH >C_{10} -C_{16}	mg/kg	<50	<50
TRH >C_{10} -C_{16} less Naphthalene (F2)	mg/kg	<50	<50
TRH >C_{16} -C_{34}	mg/kg	200	180
TRH >C_{34} -C_{40}	mg/kg	140	180
Total +ve TRH (>C10-C40)	mg/kg	340	360
Surrogate o-Terphenyl	%	80	83

Moisture			
Our Reference		356537-1	356537-2
Your Reference	UNITS	BH207	BH208
Depth		0.1-0.2	0.1-0.2
Date Sampled		12/07/2024	12/07/2024
Type of sample		Soil	Soil
Date prepared	-	16/07/2024	16/07/2024
Date analysed	-	17/07/2024	17/07/2024
Moisture	%	5.7	10

BTEX in Water		
Our Reference		356537-5
Your Reference	UNITS	FR201-HA
Depth		-
Date Sampled		12/07/2024
Type of sample		Water
Date extracted	-	19/07/2024
Date analysed	-	22/07/2024
Benzene	µg/L	<1
Toluene	µg/L	<1
Ethylbenzene	µg/L	<1
m+p-xylene	µg/L	<2
o-xylene	µg/L	<1
Surrogate Dibromofluoromethane	%	99
Surrogate Toluene-d8	%	99
Surrogate 4-Bromofluorobenzene	%	95

Method ID	Methodology Summary
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Org-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater. Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-5	[NT]
Date extracted	-			16/07/2024	[NT]	[NT]	[NT]	[NT]	16/07/2024	[NT]
Date analysed	-			17/07/2024	[NT]	[NT]	[NT]	[NT]	17/07/2024	[NT]
TRH C_6 - C_9	mg/kg	25	Org-023	<25	[NT]	[NT]	[NT]	[NT]	112	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-023	<25	[NT]	[NT]	[NT]	[NT]	112	[NT]
Benzene	mg/kg	0.2	Org-023	<0.2	[NT]	[NT]	[NT]	[NT]	111	[NT]
Toluene	mg/kg	0.5	Org-023	<0.5	[NT]	[NT]	[NT]	[NT]	112	[NT]
Ethylbenzene	mg/kg	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	110	[NT]
m+p-xylene	mg/kg	2	Org-023	<2	[NT]	[NT]	[NT]	[NT]	113	[NT]
o-Xylene	mg/kg	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	112	[NT]
Naphthalene	mg/kg	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-023	107	[NT]	[NT]	[NT]	[NT]	122	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-5	[NT]
Date extracted	-			16/07/2024	[NT]	[NT]	[NT]	[NT]	16/07/2024	[NT]
Date analysed	-			17/07/2024	[NT]	[NT]	[NT]	[NT]	17/07/2024	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	106	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	93	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	100	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	106	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	93	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	100	[NT]
Surrogate o-Terphenyl	%		Org-020	80	[NT]	[NT]	[NT]	[NT]	84	[NT]

QUALITY CONTROL: BTEX in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date extracted	-			19/07/2024	[NT]	[NT]	[NT]	[NT]	19/07/2024	[NT]
Date analysed	-			22/07/2024	[NT]	[NT]	[NT]	[NT]	22/07/2024	[NT]
Benzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	99	[NT]
Toluene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	98	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	103	[NT]
m+p-xylene	µg/L	2	Org-023	<2	[NT]	[NT]	[NT]	[NT]	104	[NT]
o-xylene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Surrogate Dibromofluoromethane	%		Org-023	93	[NT]	[NT]	[NT]	[NT]	96	[NT]
Surrogate Toluene-d8	%		Org-023	96	[NT]	[NT]	[NT]	[NT]	98	[NT]
Surrogate 4-Bromofluorobenzene	%		Org-023	95	[NT]	[NT]	[NT]	[NT]	102	[NT]

Result Definitions

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

Quality Control Definitions

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

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

The recommended maximums for analytes in urine are taken from “2018 TLVs and BEIs”, as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.

Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

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

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

SAMPLE RECEIPT ADVICE

Client Details

Client	JK Environments
Attention	Todd Hore

Sample Login Details

Your reference	E34278PH Terrey Hills
Envirolab Reference	356537
Date Sample Received	15/07/2024
Date Instructions Received	15/07/2024
Date Results Expected to be Reported	22/07/2024

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	4 Soil, 1 Water
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	11
Cooling Method	Ice Pack
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

Aileen Hie	Jacinta Hurst
Phone: 02 9910 6200	**Phone: 02 9910 6200**
Fax: 02 9910 6201	**Fax: 02 9910 6201**
Email: ahie@envirolab.com.au	**Email: jhurst@envirolab.com.au**

Analysis Underway, details on the following page:

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

Sample ID	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	BTEX in Water
BH207-0.1-0.2	✓	✓	
BH208-0.1-0.2	✓	✓	
TB-S201	✓		
TS-201	✓		
FR201-HA			✓

The '✓' indicates the testing you have requested. **THIS IS NOT A REPORT OF THE RESULTS.**

Additional Info

Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.
Requests for longer term sample storage must be received in writing.
Please contact the laboratory immediately if observed settled sediment present in water samples is to be included in the extraction and/or analysis (exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS analysis where solids are included by default.
TAT for Micro is dependent on incubation. This varies from 3 to 6 days.

SAMPLE AND CHAIN OF CUSTODY FORM

TO:		FROM:
ENVIROLAB SERVICES PTY LTD 12 ASHLEY STREET CHATSWOOD NSW 2067 P: (02) 99106200 F: (02) 99106201 Attention: Aileen	JKE Job Number: E34278PH Date Results Required: STANDARD Page: 1 of 1	JKEnvironments REAR OF 115 WICKS ROAD MACQUARIE PARK, NSW 2113 P: 02-9888 5000 F: 02-9888 5001 Attention: Todd Hore thore@jkenvironments.com.au

Location:	Terrey Hills	Sample Preserved in Esky on Ice
Sampler:	AD/VR	Tests Required

Date Sampled	Lab Ref:	Sample Number	Depth (m)	Sample Container	PID	Sample Description	TRH/BTEX	BTEX										
12/07/2024	1	BH207	0.1-0.2	G, A	0.9	F: Sandy Gravel	X											
12/07/2024	2	BH208	0.1-0.2	G, A	1.4	F: Sandy Gravel	X											
12/07/2024	3	TB-S201	–	V	–	Trip Blank		X										
12/07/2024	4	TS-S201	–	V	–	Trip Spike		X										
12/07/2024	5	FR201- HA	–	Vx2	–	Field Rinsate		X										
		–																
					–													
					–													
					–													
					–													
					–													
				ENVIROLAB GROUP		Envirolab Services 12 Ashley St Chatswood NSW 2067 Ph: (02) 9910 6200												
						Job No: 356537												
						Date Received: 15/7/24												
						Time Received: 1440												
						Received By: DC												
						Temp: Cool/Ambient												
						Cooling: Ice/Icepack												
						Security: Intact/Broken/None												
					–													

Remarks (comments/detection limits required):	Sample Containers: G - 250mg Glass Jar A - Ziplock Asbestos Bag V - Vial

Relinquished By:	Date: 15/7/24	Time: 10am	Received By:	Date:
thore				

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 357161

Client Details

Client	JK Environments
Attention	Todd Hore
Address	PO Box 976, North Ryde BC, NSW, 1670

Sample Details

Your Reference	**E34278PH, Terrey Hills**
Number of Samples	6 Water
Date samples received	22/07/2024
Date completed instructions received	22/07/2024

Analysis Details

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

Samples were analysed as received from the client. Results relate specifically to the samples as received.

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

Report Details

Date results requested by	29/07/2024
Date of Issue	26/07/2024

NATA Accreditation Number 2901. This document shall not be reproduced except in full.

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

Results Approved By
Dragana Tomas, Senior Chemist

Authorised By
Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Water						
Our Reference		357161-1	357161-2	357161-3	357161-4	357161-5
Your Reference	UNITS	MW101a	MW102	MW105	WDUP201	TB-W201
Date Sampled		22/07/2024	22/07/2024	22/07/2024	22/07/2024	22/07/2024
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	24/07/2024	24/07/2024	24/07/2024	24/07/2024	24/07/2024
Date analysed	-	25/07/2024	25/07/2024	25/07/2024	25/07/2024	25/07/2024
TRH C_6 - C_9	µg/L	<10	<10	<10	<10	<10
TRH C_6 - C_{10}	µg/L	<10	<10	<10	<10	<10
TRH C_6 - C_{10} less BTEX (F1)	µg/L	<10	<10	<10	<10	<10
Benzene	µg/L	<1	<1	<1	<1	<1
Toluene	µg/L	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<1	<1
m+p-xylene	µg/L	<2	<2	<2	<2	<2
o-xylene	µg/L	<1	<1	<1	<1	<1
Naphthalene	µg/L	<1	<1	<1	<1	<1
Surrogate Dibromofluoromethane	%	100	101	102	102	101
Surrogate Toluene-d8	%	98	99	101	99	98
Surrogate 4-Bromofluorobenzene	%	98	98	98	100	98

vTRH(C6-C10)/BTEXN in Water		
Our Reference		357161-6
Your Reference	UNITS	TS-W201
Date Sampled		22/07/2024
Type of sample		Water
Date extracted	-	25/07/2024
Date analysed	-	26/07/2024
Benzene	µg/L	106%
Toluene	µg/L	105%
Ethylbenzene	µg/L	103%
m+p-xylene	µg/L	101%
o-xylene	µg/L	107%
Surrogate Dibromofluoromethane	%	101
Surrogate Toluene-d8	%	100
Surrogate 4-Bromofluorobenzene	%	98

svTRH (C10-C40) in Water					
Our Reference		357161-1	357161-2	357161-3	357161-4
Your Reference	UNITS	MW101a	MW102	MW105	WDUP201
Date Sampled		22/07/2024	22/07/2024	22/07/2024	22/07/2024
Type of sample		Water	Water	Water	Water
Date extracted	-	23/07/2024	23/07/2024	23/07/2024	23/07/2024
Date analysed	-	24/07/2024	24/07/2024	24/07/2024	24/07/2024
TRH C_{10} - C_{14}	µg/L	<50	<50	<50	<50
TRH C_{15} - C_{28}	µg/L	<100	<100	<100	<100
TRH C_{29} - C_{36}	µg/L	<100	<100	<100	<100
Total +ve TRH (C10-C36)	µg/L	<50	<50	<50	<50
TRH >C_{10} - C_{16}	µg/L	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	µg/L	<50	<50	<50	<50
TRH >C_{16} - C_{34}	µg/L	<100	<100	<100	<100
TRH >C_{34} - C_{40}	µg/L	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	µg/L	<50	<50	<50	<50
Surrogate o-Terphenyl	%	80	93	100	63

Method ID	Methodology Summary
Org-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-023	Water samples are analysed directly by purge and trap GC-MS.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date extracted	-			24/07/2024	1	24/07/2024	25/07/2024		24/07/2024	[NT]
Date analysed	-			25/07/2024	1	25/07/2024	26/07/2024		25/07/2024	[NT]
TRH C_6 - C_9	µg/L	10	Org-023	<10	1	<10	<10	0	107	[NT]
TRH C_6 - C_{10}	µg/L	10	Org-023	<10	1	<10	<10	0	107	[NT]
Benzene	µg/L	1	Org-023	<1	1	<1	<1	0	108	[NT]
Toluene	µg/L	1	Org-023	<1	1	<1	<1	0	107	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	1	<1	<1	0	105	[NT]
m+p-xylene	µg/L	2	Org-023	<2	1	<2	<2	0	107	[NT]
o-xylene	µg/L	1	Org-023	<1	1	<1	<1	0	107	[NT]
Naphthalene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	100	1	100	102	2	105	[NT]
Surrogate Toluene-d8	%		Org-023	99	1	98	100	2	101	[NT]
Surrogate 4-Bromofluorobenzene	%		Org-023	96	1	98	96	2	101	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			23/07/2024	[NT]	[NT]	[NT]	[NT]	23/07/2024	[NT]
Date analysed	-			24/07/2024	[NT]	[NT]	[NT]	[NT]	24/07/2024	[NT]
TRH C_{10} - C_{14}	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	104	[NT]
TRH C_{15} - C_{28}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	102	[NT]
TRH C_{29} - C_{36}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	85	[NT]
TRH >C_{10} - C_{16}	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	104	[NT]
TRH >C_{16} - C_{34}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	102	[NT]
TRH >C_{34} - C_{40}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	85	[NT]
Surrogate o-Terphenyl	%		Org-020	129	[NT]	[NT]	[NT]	[NT]	99	[NT]

Result Definitions

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

Quality Control Definitions

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

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

The recommended maximums for analytes in urine are taken from “2018 TLVs and BEIs”, as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.

Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

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

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

SAMPLE RECEIPT ADVICE

Client Details

Client	JK Environments
Attention	Todd Hore

Sample Login Details

Your reference	E34278PH, Terrey Hills
Envirolab Reference	357161
Date Sample Received	22/07/2024
Date Instructions Received	22/07/2024
Date Results Expected to be Reported	29/07/2024

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	6 Water
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	8
Cooling Method	Ice Pack
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

Aileen Hie	Jacinta Hurst
Phone: 02 9910 6200	**Phone: 02 9910 6200**
Fax: 02 9910 6201	**Fax: 02 9910 6201**
Email: ahie@envirolab.com.au	**Email: jhurst@envirolab.com.au**

Analysis Underway, details on the following page:

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

Sample ID	vTRH(C6-C10)/BTEXN in Water	svTRH (C10-C40) in Water
MW101a	✓	✓
MW102	✓	✓
MW105	✓	✓
WDUP201	✓	✓
TB-W201	✓	
TS-W201	✓	

The '✓' indicates the testing you have requested. **THIS IS NOT A REPORT OF THE RESULTS.**

Additional Info

Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.
Requests for longer term sample storage must be received in writing.
Please contact the laboratory immediately if observed settled sediment present in water samples is to be included in the extraction and/or analysis (exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS analysis where solids are included by default.
TAT for Micro is dependent on incubation. This varies from 3 to 6 days.

SAMPLE AND CHAIN OF CUSTODY FORM

TO:		FROM:
ENVIROLAB SERVICES PTY LTD 12 ASHLEY STREET CHATSWOOD NSW 2067 P: (02) 99106200 F: (02) 99106201 Attention: Aileen	JKE Job Number: E34278PH Date Results Required: STANDARD Page: 1 of 1	JKEnvironments REAR OF 115 WICKS ROAD MACQUARIE PARK, NSW 2113 P: 02-9888 5000 F: 02-9888 5001 Attention: Todd Hore thore@jkenvironments.com.au

Location:	Terrey Hills	Sample Preserved in Esky on Ice
Sampler:	AD	Tests Required

Date Sampled	Lab Ref:	Sample Number	Sample Containers	PID	Sample Description	TRH/BTEXN	BTEX										
22/07/2024	1	MW101a	2x amber, 2x BTEX	0	Water	X											
22/07/2024	2	MW102	2x amber, 2x BTEX	0	Water	X											
22/07/2024	3	MW105	2x amber, 2x BTEX	0	Water	X											
22/07/2024	4	WDUP201	2x amber, 2x BTEX	–	Duplicate	X											
22/07/2024	5	TB-W201	2x BTEX	–	Trip Blank		X										
22/07/2024	6	TS-W201	1x BTEX	–	Trip Spike		X										
				–													
				–													

ENVIROLAB GROUP
Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200
Job No: 357161
Date Received: 22/7/24
Time Received: 1530
Received By: CW
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

Remarks (comments/detection limits required):

All analysis PQLs to ANZECC (2000) Detection Limits Please

Sample Containers:
G1 - 500mL Amber Glass Bottle G2 - 1L Amber Glass Bottle
V - BTEX Vial H - HNO3 Wash PVC
PVC - HDPE Plastic Bottles

Relinquished By:	Date: 22/7/24	Time: 12:30pm	Received By:	Date:
thore				

Appendix F: Report Explanatory Notes

QA/QC Definitions

The QA/QC terms used in this report are defined below. The definitions are in accordance with US EPA publication SW-846, entitled *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (1994)[19] methods and those described in *Environmental Sampling and Analysis, A Practical Guide,* (1991)[20]. The NEPM (2013) is consistent with these documents.

A. Practical Quantitation Limit (PQL), Limit of Reporting (LOR) & Estimated Quantitation Limit (EQL)

These terms all refer to the concentration above which results can be expressed with a minimum 95% confidence level. The laboratory reporting limits are generally set at ten times the standard deviation for the Method Detection Limit for each specific analyte. For the purposes of this report the LOR, PQL, and EQL are considered to be equivalent.

When assessing laboratory data it should be borne in mind that values at or near the PQL have two important limitations: *"The uncertainty of the measurement value can approach, and even equal, the reported value. Secondly, confirmation of the analytes reported is virtually impossible unless identification uses highly selective methods. These issues diminish when reliably measurable amounts of analytes are present. Accordingly, legal and regulatory actions should be limited to data at or above the reliable detection limit*" (Keith, 1991).

B. Precision

The degree to which data generated from repeated measurements differ from one another due to random errors. Precision is measured using the standard deviation or Relative Percent Difference (RPD).

C. Accuracy

Accuracy is a measure of the agreement between an experimental result and the true value of the parameter being measured (i.e. the proximity of an averaged result to the true value, where all random errors have been statistically removed). The assessment of accuracy for an analysis can be achieved through the analysis of known reference materials or assessed by the analysis of surrogates, field blanks, trip spikes and matrix spikes. Accuracy is typically reported as percent recovery.

D. Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Representativeness is primarily dependent upon the design and implementation of the sampling program. Representativeness of the data is partially ensured by the avoidance of contamination, adherence to sample handing and analysis protocols and use of proper chain-of-custody and documentation procedures.

E. Completeness

Completeness is a measure of the number of valid measurements in a data set compared to the total number of measurements made and overall performance against DQIs. The following information is assessed for completeness:

- Chain-of-custody forms;
- Sample receipt form;
- All sample results reported;
- All blank data reported;

[19] US EPA, (1994). *SW-846: Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.* (US EPA SW-846)

[20] Keith., H, (1991). *Environmental Sampling and Analysis, A Practical Guide*

- All laboratory duplicate and RPDs calculated;
- All surrogate spike data reported;
- All matrix spike and lab control spike (LCS) data reported and RPDs calculated;
- Spike recovery acceptable limits reported; and
- NATA stamp on reports.

F. Comparability

Comparability is the evaluation of the similarity of conditions (e.g. sample depth, sample homogeneity) under which separate sets of data are produced. Data comparability checks include a bias assessment that may arise from the following sources:

- Collection and analysis of samples by different personnel; Use of different techniques;
- Collection and analysis by the same personnel using the same methods but at different times; and
- Spatial and temporal changes (due to environmental dynamics).

G. Blanks

The purpose of laboratory and field blanks is to check for artefacts and interferences that may arise during sampling, transport and analysis.

H. Matrix Spikes

Samples are spiked with laboratory grade standards to detect interactive effects between the sample matrix and the analytes being measured. Matrix Spikes are reported as a percent recovery and are prepared for 1 in every 20 samples. Sample batches that contain less than 20 samples may be reported with a Matrix Spike from another batch. The percent recovery is calculated using the formula below. Acceptable recovery limits are 70% to 130%.

$$\frac{\text{(Spike Sample Result – Sample Result) x 100}}{\text{Concentration of Spike Added}}$$

I. Surrogate Spikes

Samples are spiked with a known concentration of compounds that are chemically related to the analyte being investigated but unlikely to be detected in the environment. The purpose of the Surrogate Spikes is to check the accuracy of the analytical technique. Surrogate Spikes are reported as percent recovery.

J. Duplicates

Laboratory duplicates measure precision, expressed as Relative Percent Difference. Duplicates are prepared from a single field sample and analysed as two separate extraction procedures in the laboratory. The RPD is calculated using the formula where D1 is the sample concentration and D2 is the duplicate sample concentration:

$$\frac{(D1 - D2) \times 100}{\{(D1 + D2)/2\}}$$

Appendix G: Data (QA/QC) Evaluation

Data (QA/QC) Evaluation

A. INTRODUCTION

This Data (QA/QC) Evaluation forms part of the validation process for the DQOs documented in Section 6.1 of this report. Checks were made to assess the data in terms of precision, accuracy, representativeness, comparability and completeness. These 'PARCC' parameters are referred to collectively as DQIs and are defined in the Report Explanatory Notes attached in the report appendices.

1. Field and Laboratory Considerations

The quality of the analytical data produced for this project has been considered in relation to the following:

- Sample collection, storage, transport and analysis;
- Laboratory PQLs;
- Field QA/QC results; and
- Laboratory QA/QC results.

2. Field QA/QC Samples and Analysis

The results for the field QA/QC samples are detailed in the laboratory summary tables (Table S5 and Table G4) attached to the investigation report and are discussed in the subsequent sections of this Data (QA/QC) Evaluation report. A summary of the field QA/QC samples collected and analysed for this investigation is provided in the following table:

Sample Type	Number Analysed	Frequency (of Sample Type)
Intra-laboratory duplicate (groundwater)	1	Approximately 33% of primary samples.
Trip spikes Soil Water	 1 1	One per day of soil sampling and one per day of groundwater sampling to demonstrate adequacy of preservation, storage and transport methods
Trip blanks Soil Water	 1 1	One per day of soil sampling and one per day of groundwater sampling to demonstrate adequacy of storage and transport methods
Rinsate (Hand Auger)	1	One per day of soil sampling to demonstrate adequacy of decontamination methods

3. Data Assessment Criteria

JKE adopted the following criteria for assessing the field and laboratory QA/QC analytical results:

Field Duplicates

Acceptable targets for precision of field duplicates in this report will be 30% or less, consistent with NEPM (2013). RPD failures will be considered qualitatively on a case-by-case basis taking into account factors such as the concentrations used to calculate the RPD (i.e. RPD exceedance where concentrations are close to the PQL are typically not as significant as those where concentrations are reported at least five or 10 times the PQL), sample type, collection methods and the specific analyte where the RPD exceedance was reported.

Field/Trip Blanks and Rinsates

Acceptable targets for field blank and rinsate samples in this report will be less than the PQL for organic analytes.

Trip Spikes

Acceptable targets for trip spike samples in this report will be 70% to 130%.

Laboratory QA/QC

The suitability of the laboratory data is assessed against the laboratory QA/QC criteria which is outlined in the laboratory reports. These criteria were developed and implemented in accordance with the laboratory's NATA accreditation and align with the acceptable limits for QA/QC samples as outlined in NEPM (2013) and other relevant guidelines.

A summary of the acceptable limits adopted by the primary laboratory (Envirolab) is provided below:

RPDs

- Results that are <5 times the PQL, any RPD is acceptable; and
- Results >5 times the PQL, RPDs between 0-50% are acceptable.

Laboratory Control Samples (LCS) and Matrix Spikes

- 70-130% recovery acceptable for metals and inorganics;
- 60-140% recovery acceptable for organics; and
- 10-140% recovery acceptable for VOCs.

Surrogate Spikes

- 60-140% recovery acceptable for general organics; and
- 10-140% recovery acceptable for VOCs.

Method Blanks

- All results less than PQL.

B. DATA EVALUATION

1. Sample Collection, Storage, Transport and Analysis

Samples were collected by trained field staff in accordance with our standard sampling procedures. Field sampling procedures were designed to be consistent with relevant guidelines, including NEPM (2013) and other guidelines made under the CLM Act 1997.

Appropriate sample preservation, handling and storage procedures were adopted. Laboratory analysis was undertaken within specified holding times in accordance with Schedule B(3) of NEPM (2013) and the laboratory NATA accredited methodologies.

JKE note that the temperature on receipt of soil samples was reported to be up to 11°C. JKE understand that the temperature is measured at the laboratory using an infrared temperature probe by scanning the outside of the sample container (i.e. one sample jar/container at the time of registering the samples). This procedure is not considered to be robust as there is a potential for the outside of the jar to warm to ambient temperature, or at least to increase from that of the internal contents, relatively quickly. On this basis, JKE is of the opinion that the temperatures reported on the Sample Receipts are unlikely to be reliable or representative of the overall batch. This is further supported by the trip spike recovery results (discussed further below) which reported adequate recovery in the range of 97% to 107%.

Review of the project data also indicated that:

- COC documentation was adequately maintained;
- Sample receipt advice documentation was provided for all sample batches;
- All analytical results were reported; and
- Consistent units were used to report the analysis results.

2. Laboratory PQLs

Appropriate PQLs were adopted for the analysis and all PQLs were below the SAC.

3. Field QA/QC Sample Results

Field Duplicates

The results indicated that field precision was acceptable.

Field/Trip Blanks

During the investigation, one soil and one groundwater trip blank was placed in the esky during sampling and transported back to the laboratory. The results were all less than the PQLs, therefore cross contamination between samples that may have significance for data validity did not occur.

Rinsates

All results were below the PQL. This indicated that cross-contamination artefacts associated with sampling equipment were not present and the potential for cross-contamination to have occurred was low.

Trip Spikes

The results ranged from 97% to 107% and indicated that field preservation methods were appropriate.

4. Laboratory QA/QC

The analytical methods implemented by the laboratory were performed in accordance with their NATA accreditation and were consistent with Schedule B(3) of NEPM (2013). The frequency of data reported for the laboratory QA/QC (i.e. duplicates, spikes, blanks, LCS) was considered to be acceptable for the purpose of this investigation. JKE note that due to the limited number of samples submitted for analysis, matrix spikes were not reported. This is not considered to have an impact on the data quality for this investigation.

C. DATA QUALITY SUMMARY

JKE is of the opinion that the data are adequately precise, accurate, representative, comparable and complete to serve as a basis for interpretation to achieve the investigation objectives.

The uncertainty around comparability of the HGG data in different climatic conditions is acknowledged in the report.

Appendix H: Field Work Documents

JKEnvironments

PID FIELD CALIBRATION FORM

Client:	Syesun Pty Ltd - Flower Power Terrey Hills
Project:	Proposed Redevelopment of Garden Centre
Location:	277 Mona Vale Road, TERREY HILLS, NSW
Job Number:	E34278PH

PID

Make: MiniRaeLite+	Model: PGM7300	Unit: PID4	Date of last factory calibration: 25/01/24
Date of calibration: 16/07/24		Name of Calibrator:	
Calibration gas: Iso-butylene		Calibration Gas Concentration:	100.0 ppm
Measured reading: 100.1 ppm		Error in measured reading: ±	ppm
Measured reading Acceptable (Yes/No):			

PID

Make: MiniRaeLite+	Model: PGM7350	Unit: PID2	Date of last factory calibration: 18/07/24
Date of calibration: 22/07/24		Name of Calibrator: AD	
Calibration gas: Iso-butylene		Calibration Gas Concentration:	100.0 ppm
Measured reading: 100.1 ppm		Error in measured reading: ±	ppm
Measured reading Acceptable (Yes/No):			

PID

Make: MiniRaeLite+	Model: PGM7300	Unit: PID4	Date of last factory calibration: 23/07/24
Date of calibration: 24/07/24		Name of Calibrator:	
Calibration gas: Iso-butylene		Calibration Gas Concentration:	100.0 ppm
Measured reading: 100.1 ppm		Error in measured reading: ±	ppm
Measured reading Acceptable (Yes/No):			

PID

Make:	Model:	Unit:	Date of last factory calibration:
Date of calibration:		Name of Calibrator:	
Calibration gas: Iso-butylene		Calibration Gas Concentration:	100.0 ppm
Measured reading: ppm		Error in measured reading: ±	ppm
Measured reading Acceptable (Yes/No):			

PID

Make:	Model:	Unit:	Date of last factory calibration:
Date of calibration:		Name of Calibrator:	
Calibration gas: Iso-butylene		Calibration Gas Concentration:	100.0 ppm
Measured reading: ppm		Error in measured reading: ±	ppm
Measured reading Acceptable (Yes/No):			

JKEnvironments

WATER QUALITY METER CALIBRATION FORM

Client:	Syesun Pty Ltd - Flower Power Terrey Hills		
Project:	Proposed Redevelopment of Garden Centre		
Location:	277 Mona Vale Road, TERREY HILLS, NSW		
Job Number:	E34278PH		
DISSOLVED OXYGEN			
Make: YSI 4	Model:		
Date of calibration: 16/07/24	Name of Calibrator: AD		
Span value: 70% to 130%			
Measured value: 101%			
Measured reading Acceptable (Yes/No):			
pH			
Make: YSI 4	Model:		
Date of calibration: 16/07/24	Name of Calibrator: AD		
Buffer 1: Theoretical pH = 7.01± 0.01	Expiry date: 11/24	Lot No: DK100123	
Buffer 2: Theoretical pH = 4.01± 0.01	Expiry date: 01/25	Lot No: CC180523	
Measured reading of Buffer 1: 7.03			
Measured reading of Buffer 2: 4.04			
Slope:	Measured reading Acceptable (Yes/No):		
EC			
Make: YSI 4	Model:		
Date: 16/07/24	Name of Calibrator: AD	Temperature: 13.8 °C	
Calibration solution: Conductivity Standard	Expiry date: 11/24	Lot No: CV040923	
Theoretical conductivity at temperature (see solution container): 1116 µS/cm			
Measured conductivity: 1127 µS/cm	Measured reading Acceptable (Yes/No):		
REDOX			
Make: YSI 4	Model:		
Date of calibration: 16/07/24	Name of Calibrator: AD		
Calibration solution: ORP Test Solution	Expiry date: 02/29	Lot No: 9759	
Theoretical redox value: 240mV			
Measured redox reading: 240.2 mV	Measured reading Acceptable (Yes/No):		

JKEnvironments

WATER QUALITY METER CALIBRATION FORM

Client:	Syesun Pty Ltd - Flower Power Terrey Hills		
Project:	Proposed Redevelopment of Garden Centre		
Location:	277 Mona Vale Road, TERREY HILLS, NSW		
Job Number:	E34278PH		
DISSOLVED OXYGEN			
Make: YSI 4	Model:		
Date of calibration: 22/07/24	Name of Calibrator: AD		
Span value: 70% to 130%			
Measured value: 101%			
Measured reading Acceptable (Yes/No):			
pH			
Make: YSI 4	Model:		
Date of calibration: 22/07/24	Name of Calibrator: AD		
Buffer 1: Theoretical pH = 7.01± 0.01	Expiry date: 11/24	Lot No: DK100123	
Buffer 2: Theoretical pH = 4.01± 0.01	Expiry date: 01/25	Lot No: CC180523	
Measured reading of Buffer 1: 7.07			
Measured reading of Buffer 2: 4.03			
Slope:	Measured reading Acceptable (Yes/No):		
EC			
Make: YSI 4	Model:		
Date: 22/07/24	Name of Calibrator: AD	Temperature: 14.0 °C	
Calibration solution: conductivity standard	Expiry date: 11/24	Lot No: CV040923	
Theoretical conductivity at temperature (see solution container): 1116 µS/cm			
Measured conductivity: 1112 µS/cm	Measured reading Acceptable (Yes/No):		
REDOX			
Make: YSI 4	Model:		
Date of calibration: 22/07/24	Name of Calibrator: AD		
Calibration solution: ORP Test Solution	Expiry date: 02/29	Lot No: 9759	
Theoretical redox value: 240mV			
Measured redox reading: 248 mV	Measured reading Acceptable (Yes/No):		

JKEnvironments

Client:	Syesun Pty Ltd - Flower Power Terrey Hills	Job No.:	E34278PH
Project:	Proposed Redevelopment of Garden Centre	Well No.:	MW101a
Location:	277 Mona Vale Road, TERREY HILLS, NSW	Depth (m):	6m

WELL FINISH DETAILS

	Gatic Cover ☒	Standpipe ☐	Other (describe) ☐

~10L

WELL DEVELOPMENT DETAILS

Method:	Development pump	SWL – Before (m):	1.05m
Date:	16/07/24	Time – Before:	10:57am
Undertaken By:	AD	SWL – After (m):	5.72m
Total Vol. Removed:	~32L	Time – After:	11:14am
PID Reading (ppm):	0		

Comments:

DEVELOPMENT MEASUREMENTS

Volume Removed (L)	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
2	17.3	6.3	276.7	5.55	91.8
4	18.9	3.3	268.6	5.34	56.8
6	18.5	2.6	268.3	5.35	46.0
8	18.1	1.9	287.6	5.34	43.7
10	18.5	1.2	336.7	5.31	42.6
12	18.8	0.8	380.2	5.34	39.6
14	19.0	0.8	446.2	5.46	34.6
16	19.1	0.8	481.7	5.55	25.0
18	0.7 19.2	44 0.7	442.4	5.53	22.0
20	19.2	2.9	575	5.71	9.3
22	19.4	4.6	526	5.61	8.5
24	19.5	2.0	498.2	5.57	7.0
26	19.6	3.3	545	5.76	-2.0
28	19.5	3.0	422	5.61	-3.5
30	19.6	6.4	619	5.85	-10.9
32	19.8	2.5	588	5.92	-8.1
		well effectively dry			

Comments: Odours (YES / (NO)), NAPL/PSH (YES / (NO)), Sheen (YES / (NO)), Steady State Achieved (YES / (NO))

YSI Used: 4 Moderate silt load, recharge observed

Tested By:	AD
Date Tested:	16/07/24
Checked By:	TH
Date:	22/11/24

Remarks:

- Steady state conditions
- Difference in the pH less than 0.2 units, difference in the conductiveity less than 10% and SWL stable/not in drawdown
- Minimum 3 monitoring well volumes purged, unless well purged until it is effectively dry

JKEnvironments

Client:	Syesun Pty Ltd - Flower Power Terrey Hills	**Job No.:**	E34278PH
Project:	Proposed Redevelopment of Garden Centre	**Well No.:**	MW102
Location:	277 Mona Vale Road, TERREY HILLS, NSW	**Depth (m):**	6m

WELL FINISH DETAILS

	Gatic Cover ☒	Standpipe ☐	Other (describe) ☐

WELL DEVELOPMENT DETAILS

Method:	Development pump	**SWL – Before (m):**	0.42m
Date:	16/07/24	**Time – Before:**	11:35am
Undertaken By:	AD	**SWL – After (m):**	5.51m
Total Vol. Removed:	~18L	**Time – After:**	11:50am
PID Reading (ppm):	0		

Comments:

DEVELOPMENT MEASUREMENTS

Volume Removed (L)	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
2	17.0	1.8	486.2	4.88	89.1
4	16.7	1.6	478.1	4.88	90.9
6	16.1	1.6	470.2	4.86	91.9
8	15.6	1.7	463.2	4.85	93.2
10	15.0	1.3	442.7	4.63	102.6
12	16.2	0.6	471.8	4.73	100.7
14	16.7	0.6	477.0	4.68	100.5
16	16.8	0.7	477.6	4.71	99.8
18	16.8	2.6	470.8	4.57	106.1
		Well effectively dry			

Comments: Odours (YES / (NO)), NAPL/PSH (YES / (NO)), Sheen (YES / (NO)), Steady State Achieved (YES / (NO))

YSI Used: 4

Moderate silt load, recharge observed

Tested By:	AD
Date Tested:	16/07/24
Checked By:	TH
Date:	22/11/24

Remarks:

- Steady state conditions
- Difference in the pH less than 0.2 units, difference in the conductiveity less than 10% and SWL stable/not in drawdown
- Minimum 3 monitoring well volumes purged, unless well purged until it is effectively dry

JKEnvironments

Client:	Syesun Pty Ltd - Flower Power Terrey Hills	**Job No.:**	E34278PH
Project:	Proposed Redevelopment of Garden Centre	**Well No.:**	MW105
Location:	277 Mona Vale Road, TERREY HILLS, NSW	**Depth (m):**	6m

WELL FINISH DETAILS

	Gatic Cover ☒	Standpipe ☐	Other (describe) ☐

WELL DEVELOPMENT DETAILS

Method:	Development pump	**SWL – Before (m):**	0.78m
Date:	16/07/24	**Time – Before:**	12:17pm
Undertaken By:	AD	**SWL – After (m):**	5.76m
Total Vol. Removed:	~18L	**Time – After:**	12:32pm
PID Reading (ppm):	0		

Comments:

DEVELOPMENT MEASUREMENTS

Volume Removed (L)	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
2	16.6	7.2	964	4.21	124.2
4	16.2	6.8	951	4.23	126.3
6	15.7	6.8	938	4.25	127.2
8	15.3	6.7	929	4.27	127.6
10	16.6	5.9	1017	4.33	129.8
12	16.8	6.4	1027	4.35	129.8
14	16.9	6.7	1036	4.36	129.6
16	17.0	7.0	1035	4.37	129.2
18	16.9	8.2	1007	4.41	128.3
		well effectively dry			

Comments: Odours (YES / (NO)), NAPL/PSH (YES / (NO)), Sheen (YES / (NO)), Steady State Achieved (YES / (NO))

YSI Used: 4 Moderate silt load, recharge observed

Tested By:	AD
Date Tested:	16/07/24
Checked By:	TH
Date:	22/11/24

Remarks:

- Steady state conditions
- Difference in the pH less than 0.2 units, difference in the conductiveity less than 10% and SWL stable/not in drawdown
- Minimum 3 monitoring well volumes purged, unless well purged until it is effectively dry

JKEnvironments

Client:	Syesun Pty Ltd - Flower Power Terrey Hills	**Job No.:**	E34278PH
Project:	Proposed Redevelopment of Garden Centre	**Well No.:**	MW101a
Location:	277 Mona Vale Road, TERREY HILLS, NSW	**Depth (m):**	6m

WELL FINISH

X	Gatic Cover		Standpipe		Other (describe)

WELL PURGE DETAILS:

Method:	Peristaltic pump	**SWL – Before:**	1.30m
Date:	22/07/24	**Time – Before:**	7:54am
Undertaken By:	AD	**Total Vol Removed:**	~6L
Pump Program No:	-	**PID (ppm):**	0

PURGING / SAMPLING MEASUREMENTS

Time (min)	SWL (m)	Vol (L)	Notes	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
8:00	1.52	0.5		16.9	2.2	433.6	5.47	124.2
8:04	1.57	1.5		17.0	0.9	431.4	5.52	103.9
8:08	1.60	2.0		17.1	0.5	447.7	5.56	89.1
8:12	1.57	3.0		16.8	0.5	458.8	5.60	70.0
8:16	1.55	4.0		16.7	0.5	472.5	5.63	55.0
8:20	1.55	5.0		16.7	0.4	479.0	5.67	44.3
			Started sampling					

Comments: Odours (YES / (NO)), NAPL/PSH (YES / (NO)), Sheen (YES / (NO)), Steady State Achieved ((YES) / NO)

Sampling Containers Used: 2 x glass amber, 2 x BTEX vials, x HNO3 plastic, x H2SO4 plastic, x unpreserved plastic

YSI used: 4 WOUP201 = 2x amber, 2x BTEX

Tested By: Alexis Diodati	**Remarks:**
Date Tested: 22/07/24	- Steady state conditions - difference in the pH less than 0.2 units, difference in conductivity less than 10%
Checked By: TH	10% and SWL stable/not in drawdown
Date: 22/11/24	

JKEnvironments

Client:	Syesun Pty Ltd - Flower Power Terrey Hills	**Job No.:**	E34278PH
Project:	Proposed Redevelopment of Garden Centre	**Well No.:**	MW102
Location:	277 Mona Vale Road, TERREY HILLS, NSW	**Depth (m):**	6m

WELL FINISH

X	Gatic Cover		Standpipe		Other (describe)

WELL PURGE DETAILS:

Method:	Peristaltic Pump	**SWL – Before:**	0.64
Date:	22/07/24	**Time – Before:**	8:39am
Undertaken By:	AD	**Total Vol Removed:**	~4L
Pump Program No:	-	**PID (ppm):**	0

PURGING / SAMPLING MEASUREMENTS

Time (min)	SWL (m)	Vol (L)	Notes	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
8:46	0.77	0.5		14.4	1.2	318.8	4.26	81.1
8:50	0.82	1.5		14.8	0.8	322.4	4.26	82.1
8:54	0.82	2.5		14.8	0.7	323.8	4.21	86.9
8:58	0.82	3.5		14.7	0.6	324.5	4.21	90.6
			Started sampling					

Comments: Odours (YES / (NO)), NAPL/PSH (YES / (NO)), Sheen (YES / (NO)), Steady State Achieved ((YES) / NO)

Sampling Containers Used: 2x glass amber, 2x BTEX vials, x HNO3 plastic, x H2SO4 plastic, x unpreserved plastic

YSI used: 4

Tested By: Alexis Diodati	**Remarks:**
Date Tested: 22/07/24	- Steady state conditions - difference in the pH less than 0.2 units, difference in conductivity less than 10%
Checked By: TH	10% and SWL stable/not in drawdown
Date: 22/11/24	

JKEnvironments

Client:	Syesun Pty Ltd - Flower Power Terrey Hills	**Job No.:**	E34278PH
Project:	Proposed Redevelopment of Garden Centre	**Well No.:**	MW105
Location:	277 Mona Vale Road, TERREY HILLS, NSW	**Depth (m):**	6m

WELL FINISH

X	Gatic Cover		Standpipe		Other (describe)

WELL PURGE DETAILS:

Method:	Peristaltic Pump	**SWL – Before:**	1.12
Date:	22/07/24	**Time – Before:**	9:15am
Undertaken By:	AD	**Total Vol Removed:**	~5L
Pump Program No:	-	**PID (ppm):**	0

PURGING / SAMPLING MEASUREMENTS

Time (min)	SWL (m)	Vol (L)	Notes	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
9:22	1.32	0.5		15.3	4.4	522	4.27	122.4
9:26	1.31	1.5		15.1	4.4	514	4.27	121.6
9:30	1.35	2.5		15.2	4.2	514	4.29	122.0
9:34	1.32	30		14.9	4.1	509	4.30	124.1
9:38	1.32	3.5		14.9	4.2	505	4.30	126.2
9:42	1.32	4.0		14.9	4.2	504	4.31	228.0
			started sampling					

Comments: Odours (YES / (NO)), NAPL/PSH (YES / (NO)), Sheen (YES / (NO)), Steady State Achieved ((YES) / NO)

Sampling Containers Used: 2 x glass amber, 2 x BTEX vials, x HNO3 plastic, x H2SO4 plastic, x unpreserved plastic

YSI used: 4

Tested By: Alexis Diodati	**Remarks:**
Date Tested: 22/07/24	- Steady state conditions - difference in the pH less than 0.2 units, difference in conductivity less than 10% 10% and SWL stable/not in drawdown
Checked By: TH	
Date: 22/11/24	

JK Environments Pty Ltd

Survey Sheet

Job Number: E34278PH	Date: 16/7/24
Client: Syesun Pty Ltd	Read by: HW
Project: Data Gap Investigation (DGI)	Reduced by: HW
Location: Flower Power, 277 Mona Vale Road, Terrey Hills	Checked by: TH

Purpose of Survey: Groundwater contours

BM: 197.88m
Datum: AHD

From:	To:	Back Sight (BS)	Intermediate Sight (IS)	Foresight (FS)	Rise If FS/IS<BS (BS-IS/FS)	Fall If FS/IS>BS (IS/FS-BS)	Reduced Level	Comments
~~1~~	~~BM~~	~~1.416~~						
2	BM	1.159					197.88	
2	MW101A			2.047		-0.884	196.996	
3	MW101A	1.316						
3	pt 1			1.917		-0.601	196.395	
4	pt 1	1.410						
4	pt 2			1.958		-0.548	195.847	
5	pt 2	1.254						
5	pt 3			1.867		-0.613	195.234	
6	pt 3	1.436						
6	pt 4			1.787		-0.351	194.883	
7	pt 4	1.963						
7	pt 5			1.240	0.723		195.606	
8	p5	1.985						
8	pt 6			1.118	0.867		196.473	
9	pt 6	2.112						
9	pt 7			1.054	1.058		197.531	
10	pt 7	1.924						
10	MW102			1.096	0.828		198.359	
11	MW102	1.810						
11	pt 8			0.725	1.085		199.444	
12	pt 8	2.008						
12	pt 9			1.324	1.684		201.128	
13	pt 9	2.142						
13	pt 10			1.200	0.942		202.07	
14	pt 10	1.893						
14	pt 11			1.391	0.504		202.574	
15	pt 11	1.918						
15	MW105		1.265		0.653		203.227	
15	pt 12			1.923		-0.005	202.569	
16	pt 12	1.394						
16	pt 13			1.910		-0.516	202.053	
17	pt 13	1.100						
17	pt 14			2.231		-1.131	200.922	
18	pt 14	1.488						Misclose:

JK Environments Pty Ltd

Survey Sheet

Job Number: E34278PH	Date: 16/7/24
Client: Syesun Pty Ltd	Read by: MJ
Project: Data Gap Investigation (DGI)	Reduced by: MJ
Location: Flower Power, 277 Mona Vale Road, Terry Hills	Checked by: TH

Purpose of Survey: Groundwater contours

BM: 197.88m
Datum: AHD

From:	To:	Back Sight (BS)	Intermediate Sight (IS)	Foresight (FS)	Rise If FS/IS<BS (BS-IS/FS)	Fall If FS/IS>BS (IS/FS-BS)	Reduced Level	Comments
18	15			3.385		-1.897	199.025	
19	15	0.845						
19	16			2.084		-1.239	197.786	
20	16	1.480						
20	17			2.033		-0.553	197.233	
21	17	1.174						
21	18			2.064		-0.890	196.343	
22	18	1.390						
22	19			2.258		-0.868	195.475	
23	19	1.620						
23	20			2.194		-0.574	194.901	
24	20	1.688						
24	21			1.335	0.353		195.254	
25	21	2.065						
25	22			1.314	0.746		196	
26	22	1.884						
26	23			1.192	0.692		196.842	
27	23	2.150						
27	BM			0.954	1.196		197.888	

Misclose: 5mm

JKEnvironments

HAZARDOUS GROUND GAS MONITORING WELL FIELD SHEET

Client:	Syesun Pty Ltd - Flower Power Terrey Hills	Monitoring Well No:	MW201
Project:	Proposed Redevelopment of Garden Centre	Weather Conditions:	Sunny
Location:	277 Mona Vale Road, TERREY HILLS, NSW	SWL (m)^:	1.5m
Job Number:	E34278PH	PID (ppm):	0.3
		Start Time and Atmospheric Pressure (mbar):	12:01pm, 1010
		Completion Time and Atmopsheric Pressure (mbar):	12:32pm, 1007

Time (min)#	Differential Pressure (Pa)	Flow (L/H)
0.5	-11	-1.8
1	-10	-1.7
1.5	-11	-1.8
2	-11	-1.8
2.5	-11	-1.8
3	-10	-1.7
3.5	-11	-1.8
4	-11	-1.8
4.5	-11	-1.8
5	-10	-1.7
Initial	-11	-1.8
Peak	-11	-1.8

Time (min)#	CH_4 (%v/v)	CO_2 (%v/v)	O_2 (%v/v)	CH_4 (%LEL)	H_2S (ppm)	CO (ppm)	Hexane (%)	PID Cf (ppm)
0.5	0	3.4	14.6	0	0	0	0.032	1.0
1	0	2.3	16.2	0	0	0	0.032	1.0
1.5	0	2.2	16.6	0	0	0	0.032	1.0
2	0	2.1	16.8	0	0	0	0.032	1.0
2.5	0	2.1	16.8	0	0	0	0.032	1.0
3	0	1.8	17.1	0	0	0	0.032	1.0
3.5	0	2.4	16.5	0	0	0	0.032	1.0
4	0	2.2	16.5	0	0	0	0.032	1.0
4.5	0	2.8	15.7	0	0	0	0.032	1.0
5	0	2.6	15.9	0	0	0	0.032	1.0
Initial	0	4.7	12.3	0	0	0	0.032	1.0
Peak	0	4.7	17.1	0	0	0	0.032	1.0

Notes:

^ Standing Water Level (SWL) in meters below ground level. Recorded on completion of monitoring.

HGG measurements recorded at least 5 minuites following flow measurements.

Recorded by:	AD
Date:	24/07/24
Checked by:	TH
Date:	17/12/24

JKEnvironments

HAZARDOUS GROUND GAS MONITORING WELL FIELD SHEET

Client:	Syesun Pty Ltd - Flower Power Terrey Hills	Monitoring Well No:	MW202
Project:	Proposed Redevelopment of Garden Centre	Weather Conditions:	Sunny
Location:	277 Mona Vale Road, TERREY HILLS, NSW	SWL (m)^:	Well Dry
Job Number:	E34278PH	PID (ppm):	0.7
		Start Time and Atmospheric Pressure (mbar):	12:37pm, 1007
		Completion Time and Atmopsheric Pressure (mbar):	12:54pm, 1006

Time (min)#	Differential Pressure (Pa)	Flow (L/H)
0.5	-9	-1.5
1	-9	-1.5
1.5	-9	-1.5
2	-9	-1.5
2.5	-9	-1.5
3	-10	-1.6
3.5	-9	-1.5
4	-9	-1.5
4.5	-9	-1.5
5	-9	-1.5
Initial	-9	-1.6
Peak	-10	-1.6

Time (min)#	CH_4 (%v/v)	CO_2 (%v/v)	O_2 (%v/v)	CH_4 (%LEL)	H_2S (ppm)	CO (ppm)	Hexane (%)	PID Cf (ppm)
0.5	0	2.1	18.6	0	0	0	0.032	1.0
1	0	1.6	19.1	0	0	0	0.032	1.0
1.5	0	1.4	19.4	0	0	0	0.032	1.0
2	0	1.2	19.5	0	0	0	0.032	1.0
2.5	0	1.1	19.6	0	0	0	0.032	1.0
3	0	1.0	19.7	0	0	6	0.032	1.0
3.5	0	0.9	19.8	0	0	0	0.032	1.0
4	0	0.9	19.8	0	0	0	0.032	1.0
4.5	0	0.9	19.9	0	0	0	0.031	1.0
5	0	0.9	19.9	0	0	0	0.032	1.0
Initial	0	0.7	20.5	0	0	0	0.032	1.0
Peak	0	2.1	20.5	0	0	0	0.032	1.0

Notes:

^ Standing Water Level (SWL) in meters below ground level. Recorded on completion of monitoring.

HGG measurements recorded at least 5 minuites following flow measurements.

Recorded by:	~~GB~~ AD
Date:	24/07/24
Checked by:	TH
Date:	17/12/24

JKEnvironments

HAZARDOUS GROUND GAS MONITORING WELL FIELD SHEET

Client:	Syesun Pty Ltd - Flower Power Terrey Hills	Monitoring Well No:	MW203
Project:	Proposed Redevelopment of Garden Centre	Weather Conditions:	Sunny
Location:	277 Mona Vale Road, TERREY HILLS, NSW	SWL (m)^:	1.49m
Job Number:	E34278PH	PID (ppm):	0.9
		Start Time and Atmospheric Pressure (mbar):	1:03pm 1007
		Completion Time and Atmopsheric Pressure (mbar):	1:23pm, 1006

Time (min)#	Differential Pressure (Pa)	Flow (L/H)
0.5	-9	-1.6
1	-9	-1.6
1.5	-9	-1.6
2	-9	-1.6
2.5	-9	-1.6
3	-10	-1.6
3.5	-9	-1.6
4	-9	-1.6
4.5	-9	-1.5
5	-9	-1.5
Initial	-9	-1.6
Peak	-10	-1.6

Time (min)#	CH_4 (%v/v)	CO_2 (%v/v)	O_2 (%v/v)	CH_4 (%LEL)	H_2S (ppm)	CO (ppm)	Hexane (%)	PID Cf (ppm)
0.5	0	9.2	0.7	0	0	0	0.036	1.0
1	0	4.0	11.2	0	0	0	0.032	1.0
1.5	0	2.1	16.2	0	0	0	0.032	1.0
2	0	2.1	17.0	0	0	0	0.033	1.0
2.5	0	8.1	3.7	0	0	0	0.035	1.0
3	0	9.0	1.2	0	0	0	0.036	1.0
3.5	0	8.6	2.6	0	0	0	0.036	1.0
4	0	8.7	2.3	0	0	0	0.036	1.0
4.5	0	9.0	1.3	0	0	0	0.036	1.0
5	0	9.3	0.3	0	0	0	0.036	1.0
5.5	0	8.8	1.9	0	0	10	0.036	1.0
6.0	0	8.3	2.9	0	0	10	0.036	1.0
6.5	0	8.1	3.1	0	0	10	0.036	1.0
7.0	0	9.0	1.2	0	0	10	0.036	1.0
7.5	0	7.3	4.9	0	0	10	0.035	1.0
8.0	0	6.4	5.4	0	0	0	0.034	1.0
8.5	0	6.8	6.0	0	0	0	0.034	1.0
9.0	0	8.8	1.8	0	0	0	0.035	1.0
9.5	0	7.3	4.7	0	0	10	0.035	1.0
10	0	7.5	4.3	0	0	10	0.034	1.0
Initial	0	0.5	19.6	0	0	0	0.036	1.0
Peak	0	9.3	19.6	0	0	10	0.036	1.0

Notes:

^ Standing Water Level (SWL) in meters below ground level. Recorded on completion of monitoring.

HGG measurements recorded at least 5 minuites following flow measurements.

Recorded by:	~~CB~~ AD
Date:	24/07/24
Checked by:	TH
Date:	17/12/24

JKEnvironments

HAZARDOUS GROUND GAS MONITORING WELL FIELD SHEET

Client:	Syesun Pty Ltd - Flower Power Terrey Hills	Monitoring Well No:	MW204
Project:	Proposed Redevelopment of Garden Centre	Weather Conditions:	Sunny
Location:	277 Mona Vale Road, TERREY HILLS, NSW	SWL (m)^:	Well Dry
Job Number:	E34278PH	PID (ppm):	0.2
		Start Time and Atmospheric Pressure (mbar):	1:26pm, 1006
		Completion Time and Atmopsheric Pressure (mbar):	1:42pm, 1005

Time (min)#	Differential Pressure (Pa)	Flow (L/H)
0.5	-10	-1.7
1	-9	-1.6
1.5	-10	-1.6
2	-9	-1.6
2.5	-9	-1.6
3	-10	-1.7
3.5	-10	-1.6
4	-10	-1.6
4.5	-9	-1.6
5	-9	-1.5
Initial	-9	-1.7
Peak	-10	-1.7

Time (min)#	CH_4 (%v/v)	CO_2 (%v/v)	O_2 (%v/v)	CH_4 (%LEL)	H_2S (ppm)	CO (ppm)	Hexane (%)	PID Cf (ppm)
0.5	0	0.6	19.4	0	0	0	0.033	1.0
1	0	0.5	19.8	0	0	0	0.032	1.0
1.5	0	0.4	19.9	0	0	0	0.033	1.0
2	0	0.4	20	0	0	0	0.033	1.0
2.5	0	0.4	20	0	0	0	0.032	1.0
3	0	0.4	20.1	0	0	0	0.032	1.0
3.5	0	0.4	20.1	0	0	0	0.033	1.0
4	0	0.4	20.1	0	0	0	0.033	1.0
4.5	0	0.3	20.2	0	0	0	0.033	1.0
5	0	0.3	20.2	0	0	0	0.032	1.0
Initial	0	0.4	20.3	0	0	0	0.033	1.0
Peak	0	0.6	20.3	0	0	0	0.033	1.0

Notes:

^ Standing Water Level (SWL) in meters below ground level. Recorded on completion of monitoring.

HGG measurements recorded at least 5 minuites following flow measurements.

Recorded by:	~~CB~~ AD
Date:	24/07/24
Checked by:	TH
Date:	17/12/24

JKEnvironments

HAZARDOUS GROUND GAS MONITORING WELL FIELD SHEET

Client:	Syesun Pty Ltd - Flower Power Terrey Hills	Monitoring Well No:	MW205
Project:	Proposed Redevelopment of Garden Centre	Weather Conditions:	Sunny
Location:	277 Mona Vale Road, TERREY HILLS, NSW	SWL (m)^:	1.27m
Job Number:	E34278PH	PID (ppm):	0.3
		Start Time and Atmospheric Pressure (mbar):	1:51pm, 1006
		Completion Time and Atmopsheric Pressure (mbar):	2:05pm, 1005

Time (min)#	Differential Pressure (Pa)	Flow (L/H)	Time (min)#	CH_4 (%v/v)	CO_2 (%v/v)	O_2 (%v/v)	CH_4 (%LEL)	H_2S (ppm)	CO (ppm)	Hexane (%)	PID Cf (ppm)
0.5	-10	-1.6	0.5	0	0.4	20.1	0	0	0	0.033	1.0
1	-9	-1.5	1	0	0.3	20.2	0	0	0	0.034	1.0
1.5	-10	-1.6	1.5	0	0.3	20.3	0	0	0	0.033	1.0
2	-9	-1.6	2	0	0.2	20.3	0	0	0	0.033	1.0
2.5	-10	-1.6	2.5	0	0.2	20.3	0	0	0	0.033	1.0
3	-9	-1.5	3	0	0.2	20.3	0	0	0	0.033	1.0
3.5	-9	-1.6	3.5	0	0.2	20.3	0	0	0	0.033	1.0
4	-9	-1.6	4	0	0.2	20.3	0	0	0	0.033	1.0
4.5	-9	-1.6	4.5	0	0.2	20.3	0	0	0	0.033	1.0
5	-9	-1.6	5	0	0.2	20.3	0	0	0	0.033	1.0
Initial	-9	-1.5	Initial	0	0.1	20.5	0	0	0	0.034	1.0
Peak	-10	-1.6	Peak	0	0.4	20.5	0	0	0	0.034	1.0

Notes:

^ Standing Water Level (SWL) in meters below ground level. Recorded on completion of monitoring.

HGG measurements recorded at least 5 minuites following flow measurements.

Recorded by:	~~CB~~ AD
Date:	24/07/24
Checked by:	TH
Date:	17/12/24

JKEnvironments

HAZARDOUS GROUND GAS MONITORING WELL FIELD SHEET

Client:	Syesun Pty Ltd - Flower Power Terrey Hills	Monitoring Well No:	MW206
Project:	Proposed Redevelopment of Garden Centre	Weather Conditions:	Sunny
Location:	277 Mona Vale Road, TERREY HILLS, NSW	SWL (m)^:	0.8m
Job Number:	E34278PH	PID (ppm):	0.2
		Start Time and Atmospheric Pressure (mbar):	12:23pm, 1006
		Completion Time and Atmopsheric Pressure (mbar):	2:40pm, 1006

Time (min)#	Differential Pressure (Pa)	Flow (L/H)	Time (min)#	CH_4 (%v/v)	CO_2 (%v/v)	O_2 (%v/v)	CH_4 (%LEL)	H_2S (ppm)	CO (ppm)	Hexane (%)	PID Cf (ppm)
0.5	-9	-1.5	0.5	0	0.1	20.5	0	0	0	0.033	1.0
1	-9	-1.5	1	0	0.1	20.6	0	0	0	0.033	1.0
1.5	-9	-1.6	1.5	0	0.1	20.6	0	0	0	0.034	1.0
2	-10	-1.6	2	0	0.1	20.6	0	0	0	0.033	1.0
2.5	-9	-1.5	2.5	0	0.1	20.6	0	0	0	0.033	1.0
3	-9	-1.6	3	0	0	20.6	0	0	0	0.032	1.0
3.5	-9	-1.5	3.5	0	0	20.6	0	0	0	0.033	1.0
4	-9	-1.5	4	0	0	20.6	0	0	0	0.031	1.0
4.5	-9	-1.6	4.5	0	0	20.6	0	0	0	0.032	1.0
5	-9	-1.5	5	0	0	20.5	0	0	0	0.033	1.0
Initial	-9	-1.5	Initial	0	0.1	20.4	0	0	0	0.032	1.0
Peak	-10	-1.6	Peak	0	0.1	20.6	0	0	0	0.034	1.0

Notes:

^ Standing Water Level (SWL) in meters below ground level. Recorded on completion of monitoring.

HGG measurements recorded at least 5 minuites following flow measurements.

Recorded by:	~~CB~~ AD
Date:	24/07/24
Checked by:	TH
Date:	17/12/24

Terrey Hills
Round 2
16/08/24

JKEnvironments

PID FIELD CALIBRATION FORM

Client:	Syesun Pty Ltd - Flower Power Terrey Hills
Project:	Proposed Redevelopment of Garden Centre
Location:	277 Mona Vale Road, TERREY HILLS, NSW
Job Number:	E34278PH

PID

Make: Honeywell	Model: MiniRAE Lite+	Unit: 3	Date of last factory calibration: 14/08/24
Date of calibration: CB		Name of Calibrator:	
Calibration gas: Iso-butylene		Calibration Gas Concentration:	100.0 ppm
Measured reading: 100.1 ppm		Error in measured reading: ± 0.1 ppm	
Measured reading Acceptable ([✓ Yes]/No):			

PID

Make:	Model:	Unit:	Date of last factory calibration:
Date of calibration:		Name of Calibrator:	
Calibration gas: Iso-butylene		Calibration Gas Concentration:	100.0 ppm
Measured reading: ppm		Error in measured reading: ± ppm	
Measured reading Acceptable (Yes/No):			

PID

Make:	Model:	Unit:	Date of last factory calibration:
Date of calibration:		Name of Calibrator:	
Calibration gas: Iso-butylene		Calibration Gas Concentration:	100.0 ppm
Measured reading: ppm		Error in measured reading: ± ppm	
Measured reading Acceptable (Yes/No):			

PID

Make:	Model:	Unit:	Date of last factory calibration:
Date of calibration:		Name of Calibrator:	
Calibration gas: Iso-butylene		Calibration Gas Concentration:	100.0 ppm
Measured reading: ppm		Error in measured reading: ± ppm	
Measured reading Acceptable (Yes/No):			

PID

Make:	Model:	Unit:	Date of last factory calibration:
Date of calibration:		Name of Calibrator:	
Calibration gas: Iso-butylene		Calibration Gas Concentration:	100.0 ppm
Measured reading: ppm		Error in measured reading: ± ppm	
Measured reading Acceptable (Yes/No):			

JKEnvironments

HAZARDOUS GROUND GAS MONITORING WELL FIELD SHEET

Client:	Syesun Pty Ltd - Flower Power Terrey Hills	Monitoring Well No:	MW201
Project:	Proposed Redevelopment of Garden Centre	Weather Conditions:	cloudy
Location:	277 Mona Vale Road, TERREY HILLS, NSW	SWL (m)^:	1.49m
Job Number:	E34278PH	PID (ppm):	0.0
		Start Time and Atmospheric Pressure (mbar):	1002 12:08
		Completion Time and Atmopsheric Pressure (mbar):	1001 12:28

Time (min)#	Differential Pressure (Pa)	Flow (L/H)
0.5	-9	-1.6
1	-10	-1.6
1.5	-9	-1.6
2	-9	-1.5
2.5	-9	-1.6
3	-10	-1.6
3.5	-9	-1.6
4	-9	-1.5
4.5	-9	-1.6
5	-9	-1.6
Initial	-9	-1.6
Peak	-10	-1.6

Time (min)#	CH_4 (%v/v)	CO_2 (%v/v)	O_2 (%v/v)	CH_4 (%LEL)	H_2S (ppm)	CO (ppm)	Hexane (%)	PID Cf (ppm)
0.5	0	8.6	7.1	0.0	0	0	0.031	1.0
1	0	8.7	7.0	0.0	0	0	0.031	1.0
1.5	0	8.6	7.0	0.0	0	0	0.031	1.0
2	0	8.7	6.9	0.0	0	0	0.031	1.0
2.5	0	8.7	6.9	0.0	0	0	0.031	1.0
3	0	8.7	6.9	0.0	0	0	0.031	1.0
3.5	0	8.7	6.8	0.0	0	0	0.030	1.0
4	0	8.7	6.8	0.0	0	0	0.031	1.0
4.5	0	8.7	6.8	0.0	0	0	0.030	1.0
5	0	8.7	6.9	0.0	0	0	0.030	1.0
Initial	0	2.3	15.1	0	0	0	0.031	1.0
Peak	0	8.7	7.1	0	0	0	0.031	1.0

Notes:

^ Standing Water Level (SWL) in meters below ground level. Recorded on completion of monitoring.

HGG measurements recorded at least 5 minuites following flow measurements.

Recorded by:	AD
Date:	16/08/24
Checked by:	TH
Date:	17/12/24

JKEnvironments

HAZARDOUS GROUND GAS MONITORING WELL FIELD SHEET

Client:	Syesun Pty Ltd - Flower Power Terrey Hills	Monitoring Well No:	MW202
Project:	Proposed Redevelopment of Garden Centre	Weather Conditions:	cloudy
Location:	277 Mona Vale Road, TERREY HILLS, NSW	SWL (m)^:	dry
Job Number:	E34278PH	PID (ppm):	0.0
		Start Time and Atmospheric Pressure (mbar):	1001 12:31
		Completion Time and Atmopsheric Pressure (mbar):	1000 12:45

Time (min)#	Differential Pressure (Pa)	Flow (L/H)
0.5	-7	-1.3
1	-6	-1.2
1.5	-7	-1.2
2	-7	-1.2
2.5	-6	-1.1
3	-7	-1.2
3.5	-7	-1.2
4	-7	-1.3
4.5	-7	-1.2
5	-7	-1.1
Initial	-7	-1.2
Peak	-7	-1.3

Time (min)#	CH_4 (%v/v)	CO_2 (%v/v)	O_2 (%v/v)	CH_4 (%LEL)	H_2S (ppm)	CO (ppm)	Hexane (%)	PID Cf (ppm)
0.5	0	7.0	10.4	0	0	0	0.029	1.0
1	0	6.1	11.4	0	0	0	0.029	1.0
1.5	0	5.7	11.8	0	0	0	0.029	1.0
2	0	5.4	12.2	0	0	0	0.029	1.0
2.5	0	5.3	12.3	0	0	0	0.029	1.0
3	0	5.2	12.4	0	0	0	0.029	1.0
3.5	0	5.1	12.5	0	0	0	0.029	1.0
4	0	5.1	12.5	0	0	0	0.029	1.0
4.5	0	5.0	12.6	0	0	0	0.029	1.0
5	0	5.0	12.6	0	0	0	0.029	1.0
Initial	0	7.9	10.4	0	0	0	0.029	1.0
Peak	0	7.0	12.6	0	0	0	0.029	1.0

Notes:

^ Standing Water Level (SWL) in meters below ground level. Recorded on completion of monitoring.

HGG measurements recorded at least 5 minuites following flow measurements.

Recorded by:	AD
Date:	18/12/24
Checked by:	TH
Date:	17/12/24

JKEnvironments

HAZARDOUS GROUND GAS MONITORING WELL FIELD SHEET

Client:	Syesun Pty Ltd - Flower Power Terrey Hills	Monitoring Well No:	MW603
Project:	Proposed Redevelopment of Garden Centre	Weather Conditions:	cloudy
Location:	277 Mona Vale Road, TERREY HILLS, NSW	SWL (m)^:	dry
Job Number:	E34278PH	PID (ppm):	0.0
		Start Time and Atmospheric Pressure (mbar):	999 12 52 pm
		Completion Time and Atmopsheric Pressure (mbar):	998 1.19 pm

Time (min)#	Differential Pressure (Pa)	Flow (L/H)
0.5	-4	-0.7
1	-5	-0.7
1.5	-5	-0.7
2	-5	-0.8
2.5	-4	-0.7
3	-4	-0.6
3.5	-4	-0.7
4	-4	-0.7
4.5	-4	-0.6
5	-4	-0.7
Initial	-5	-0.7
Peak	-5	-0.8

Time (min)#	CH_4 (%v/v)	O_2 (%v/v)	CO_2 (%v/v)	CH_4 (%LEL)	H_2S (ppm)	CO (ppm)	Hexane (%)	PID Cf (ppm)
0.5	0	11.2	0.8	0	0	0	0.034	1.0
1	0	11.6	0.3	0	0	0	0.034	1.0
1.5	0	11.7	0.2	0	0	0	0.035	1.0
2	0	11.7	0.1	0	0	0	0.034	1.0
2.5	0	11.7	0.1	0	0	0	0.034	1.0
3	0	11.7	0.1	0	0	0	0.035	1.0
3.5	0	11.7	0.1	0	0	0	0.035	1.0
4	0	11.7	0.1	0	0	0	0.035	1.0
4.5	0	11.7	0.1	0	0	0	0.034	1.0
5	0	11.7	0.0	0	0	0	0.035	1.0
Initial	0	0	21.0	0	0	0	0.034	1.0
Peak	0	11.7	0.8	0	0	0	0.035	1.0

Notes:

^ Standing Water Level (SWL) in meters below ground level. Recorded on completion of monitoring.

HGG measurements recorded at least 5 minuites following flow measurements.

Recorded by:	AD
Date:	18/12/24
Checked by:	TH
Date:	17/12/24

JKEnvironments

HAZARDOUS GROUND GAS MONITORING WELL FIELD SHEET

Client:	Syesun Pty Ltd - Flower Power Terrey Hills	Monitoring Well No:	MW 804
Project:	Proposed Redevelopment of Garden Centre	Weather Conditions:	Sunny
Location:	277 Mona Vale Road, TERREY HILLS, NSW	SWL (m)^:	dry
Job Number:	E34278PH	PID (ppm):	0.0
		Start Time and Atmospheric Pressure (mbar):	996 2:10
		Completion Time and Atmopsheric Pressure (mbar):	

Time (min)#	Differential Pressure (Pa)	Flow (L/H)
0.5	-3	-0.4
1	-3	-0.6
1.5	-3	-0.6
2	-3	-0.6
2.5	-4	-0.6
3	-3	-0.6
3.5	-3	-0.6
4	-3	-0.6
4.5	-3	-0.5
5	-3	-0.6
Initial	-3	-0.5
Peak	-4	-0.6

Time (min)#	CH_4 (%v/v)	CO_2 (%v/v)	O_2 (%v/v)	CH_4 (%LEL)	H_2S (ppm)	CO (ppm)	Hexane (%)	PID Cf (ppm)
0.5	0	4.5	13.7	0	0	0	0.025	1.0
1	0	4.6	13.4	0	0	0	0.025	1.0
1.5	0	4.6	13.4	0	0	0	0.025	1.0
2	0	4.6	13.4	0	0	0	0.025	1.0
2.5	0	4.6	13.4	0	0	0	0.025	1.0
3	0	4.7	13.4	0	0	0	0.025	1.0
3.5	0	4.7	13.4	0	0	0	0.025	1.0
4	0	4.7	13.3	0	0	0	0.025	1.0
4.5	0	4.7	13.4	0	0	0	0.025	1.0
5	0	4.7	13.4	0	0	0	0.025	1.0
Initial	0	0.2	20.7	0	0	0	0.025	1.0
Peak	0	4.7	13.2	0	0	0	0.025	1.0

Notes:

^ Standing Water Level (SWL) in meters below ground level. Recorded on completion of monitoring.

HGG measurements recorded at least 5 minuites following flow measurements.

Recorded by:	AD
Date:	16/08/24
Checked by:	TH
Date:	17/12/24

JKEnvironments

HAZARDOUS GROUND GAS MONITORING WELL FIELD SHEET

Client:	Syesun Pty Ltd - Flower Power Terrey Hills	Monitoring Well No:	MW105
Project:	Proposed Redevelopment of Garden Centre	Weather Conditions:	Sunny
Location:	277 Mona Vale Road, TERREY HILLS, NSW	SWL (m)^:	1.2/m
Job Number:	E34278PH	PID (ppm):	0.0
		Start Time and Atmospheric Pressure (mbar):	997 1.26pm
		Completion Time and Atmopsheric Pressure (mbar):	996 1.41pm

Time (min)#	Differential Pressure (Pa)	Flow (L/H)
0.5	-4	-0.6
1	-4	-0.6
1.5	-4	-0.5
2	-3	-0.6
2.5	-4	-0.6
3	-3	-0.5
3.5	-3	-0.6
4	-4	-0.6
4.5	-4	-0.6
5	-4	-0.6
Initial	-3	-0.6
Peak	-4	-0.6

Time (min)#	CH_4 (%v/v)	CO_2 (%v/v)	O_2 (%v/v)	CH_4 (%LEL)	H_2S (ppm)	CO (ppm)	Hexane (%)	PID Cf (ppm)
0.5	0	1.4	15.8	0	0	0	0.030	1.0
1	0	1.2	16.2	0	0	0	0.030	1.0
1.5	0	1.2	16.4	0	0	0	0.030	1.0
2	0	1.2	16.4	0	0	0	0.028	1.0
2.5	0	1.2	16.4	0	0	0	0.029	1.0
3	0	1.3	16.3	0	0	0	0.029	1.0
3.5	0	1.4	16.3	0	0	0	0.029	1.0
4	0	1.5	16.3	0	0	0	0.029	1.0
4.5	0	1.6	16.3	0	0	0	0.029	1.0
5	0	1.6	16.2	0	0	0	0.030	1.0
Initial	0	0.4	20.3	0	0	0	0.030	1.0
Peak	0	1.6	16.4	0	0	0	0.030	1.0

Notes:

^ Standing Water Level (SWL) in meters below ground level. Recorded on completion of monitoring.

HGG measurements recorded at least 5 minuites following flow measurements.

Recorded by:	AD
Date:	16/12/24
Checked by:	TH
Date:	17/12/24

JKEnvironments

HAZARDOUS GROUND GAS MONITORING WELL FIELD SHEET

Client:	Syesun Pty Ltd - Flower Power Terrey Hills	Monitoring Well No:	MW206
Project:	Proposed Redevelopment of Garden Centre	Weather Conditions:	sunny
Location:	277 Mona Vale Road, TERREY HILLS, NSW	SWL (m)^:	0.75m
Job Number:	E34278PH	PID (ppm):	0.0
		Start Time and Atmospheric Pressure (mbar):	995 - 1.46pm
		Completion Time and Atmopsheric Pressure (mbar):	996 - 2pm

Time (min)#	Differential Pressure (Pa)	Flow (L/H)
0.5	-5	-0.7
1	-4	-0.7
1.5	-5	-0.8
2	-4	-0.7
2.5	-4	-0.8
3	-4	-0.7
3.5	-5	-0.8
4	-4	-0.9
4.5	-4	-0.8
5	-5	-0.8
Initial	-4	-0.7
Peak	-5	-0.9

Time (min)#	CH_4 (%v/v)	CO_2 (%v/v)	O_2 (%v/v)	CH_4 (%LEL)	H_2S (ppm)	CO (ppm)	Hexane (%)	PID Cf (ppm)
0.5	0	1.2	17.9	0	0	0	0.030	1.0
1	0	0.7	19.4	0	0	0	0.030	1.0
1.5	0	0.6	19.7	0	0	0	0.030	1.0
2	0	0.5	19.8	0	0	0	0.030	1.0
2.5	0	0.5	19.8	0	0	0	0.030	1.0
3	0	0.5	19.9	0	0	0	0.030	1.0
3.5	0	0.5	19.9	0	0	0	0.030	1.0
4	0	0.5	19.9	0	0	0	0.029	1.0
4.5	0	0.5	19.9	0	0	0	0.029	1.0
5	0	0.5	19.9	0	0	0	0.029	1.0
Initial	0	0.4	20.0	0	0	0	0.030	1.0
Peak	0	1.2	19.9	0	0	0	0.030	1.0

Notes:

^ Standing Water Level (SWL) in meters below ground level. Recorded on completion of monitoring.

HGG measurements recorded at least 5 minuites following flow measurements.

Recorded by:	AD
Date:	16/08/24
Checked by:	TH
Date:	17/12/24

JKEnvironments

HAZARDOUS GROUND GAS MONITORING WELL FIELD SHEET

Client: Syesun Pty Ltd - Flower Power Terrey Hills.	Monitoring Well No: MW101
Project: Proposed redevelopment of Garden Centre	Weather Conditions: Clear
Location: 277 Mona Vale Road, Terrey Hills, NSW	SWL (m)^: 0.99m
Job Number: E34778PH	PID (ppm): 0.0
	Start Time and Atmospheric Pressure (mbar): 2.09pm - 988mb
	Completion Time and Atmopsheric Pressure (mbar): 2.31pm - 988mb

Time (min)#	Differential Pressure (Pa)	Flow (L/H)
0.5	-9	-1.5
1	-8	-1.3
1.5	-9	-1.5
2	-8	-1.3
2.5	-9	-1.6
3	-8	-1.5
3.5	-9	-1.5
4	-8	-1.3
4.5	-9	-1.5
5	-9	-1.5
Initial	-9	-1.5
Peak	-9	-1.6

Time (min)#	CH_4 (%v/v)	CO_2 (%v/v)	O_2 (%v/v)	CH_4 (%LEL)	H_2S (ppm)	CO (ppm)	Hexane (%)	PID Cf (ppm)
0.5	0	0.7	19.7	0	0	0	0.034	1.0
1	0	0.8	19.5	0	0	0	0.034	1.0
1.5	0	0.7	19.6	0	0	0	0.034	1.0
2	0	0.7	19.6	0	-90	0	0.034	1.0
2.5	0	0.7	19.6	0	0	0	0.033	1.0
3	0	0.7	19.6	0	0	0	0.033	1.0
3.5	0	0.9	19.3	0	0	0	0.033	1.0
4	0	0.9	19.3	0	0	0	0.033	1.0
4.5	0	0.9	19.1	0	0	0	0.032	1.0
5	0	0.7	19.6	0	0	0	0.033	1.0
5.5	0	0.7	19.6	0	0	0	0.033	1.0
6	0	0.9	19.4	0	0	0	0.033	1.0
6.5	0	0.8	19.5	0	0	0	0.033	1.0
7	0	0.8	19.5	0	0	0	0.033	1.0
	0	0.8	19.5	0	0	0	0.033	1.0
Initial	0	0.7	19.7	0	0	0	0.034	1.0
Peak	0	0.9	19.7	0	0	0	0.034	1.0

Notes:

^ Standing Water Level (SWL) in meters below ground level. Recorded on completion of monitoring.

HGG measurements recorded at least 5 minuites following flow measurements.

Recorded by:	VR
Date:	30/8/24
Checked by:	TH
Date:	17/12/24

JKEnvironments

HAZARDOUS GROUND GAS MONITORING WELL FIELD SHEET

Client: Syesun Pty Ltd - Flower Power Terrey Hills	Monitoring Well No: MW102
Project: Proposed Redevelopment of Garden Centre	Weather Conditions: Cloor
Location: 277 Mona Vale Road, Terrey Hills, NSW	SWL (m)^: Dry
Job Number: E34278PH	PID (ppm): 0.0
	Start Time and Atmospheric Pressure (mbar): 2.41pm: 987mb
	Completion Time and Atmopsheric Pressure (mbar): 2.58pm : 987mb.

Time (min)#	Differential Pressure (Pa)	Flow (L/H)	Time (min)#	CH_4 (%v/v)	CO_2 (%v/v)	O_2 (%v/v)	CH_4 (%LEL)	H_2S (ppm)	CO (ppm)	Hexane (%)	PID Cf (ppm)
0.5	-6	-1.0	0.5	0	0	20.7	0	0	0	0.031	1.0
1	-6	-1.0	1	0	0	20.7	0	0	0	0.031	1.0
1.5	-6	-1.1	1.5	0	0	20.7	0	0	0	0.032	1.0
2	-6	-1.0	2	0	0	20.7	0	0	0	0.032	1.0
2.5	-6	-1.0	2.5	0	0	20.8	0	0	0	0.031	1.0
3	-6	-1.1	3	0	0	20.8	0	0	0	0.032	1.0
3.5	-6	-1.0	3.5	0	0	20.7	0	0	0	0.032	1.0
4	-6	-1.0	4	0	0	20.8	0	0	0	0.032	1.0
4.5	-6	-1.0	4.5	0	0	20.8	0	0	0	0.032	1.0
5	-6	-1.0	5	0	0	20.8	0	0	0	0.031	1.0
				0	0	20.8	0	0	0	0.031	1.0
Initial	-6	-1.0	Initial	0	0.1	20.4	0	0	0	0.031	1.0
Peak	-6	-1.1	Peak	0	0.1	20.8	0	0	0	0.032	1.0

Notes:

^ Standing Water Level (SWL) in meters below ground level. Recorded on completion of monitoring.

HGG measurements recorded at least 5 minuites following flow measurements.

Recorded by:	VR
Date:	30/12/24
Checked by:	TH
Date:	17/12/24

JKEnvironments

HAZARDOUS GROUND GAS MONITORING WELL FIELD SHEET

Client: Syesun Pty Ltd - Flower Power Terrey Hills.	Monitoring Well No: MW103
Project: Proposed Redevelopment of Garden Centre	Weather Conditions: Clear.
Location: 277 Mona Vale Road, Terrey Hills, NSW	SWL (m)^: DRY
Job Number: E34278PH	PID (ppm): 0.8
	Start Time and Atmospheric Pressure (mbar): 3.01pm, 987mb
	Completion Time and Atmopsheric Pressure (mbar): 3.18pm 987mb.

Time (min)#	Differential Pressure (Pa)	Flow (L/H)
0.5	-5	-0.8
1	-5	-0.8
1.5	-5	-0.8
2	-5	-0.8
2.5	-6	-0.9
3	-5	-0.8
3.5	-5	-0.9
4	-5	-0.8
4.5	-5	-0.9
5	-5	-0.8
Initial	-5	-0.9
Peak		

Time (min)#	CH_4 (%v/v)	CO_2 (%v/v)	O_2 (%v/v)	CH_4 (%LEL)	H_2S (ppm)	CO (ppm)	Hexane (%)	PID Cf (ppm)
0.5	0	0	20.8	0	0	0	0.030	1.0
1	0	0	20.8	0	0	0	0.030	1.0
1.5	0	0	20.8	0	0	0	0.030	1.0
2	0	0	20.8	0	0	0	0.030	1.0
2.5	0	0	20.9	0	0	0	0.031	1.0
3	0	0	20.9	0	0	0	0.030	1.0
3.5	0	0	20.9	0	0	0	0.030	1.0
4	0	0	20.9	0	0	0	0.030	1.0
4.5	0	0	20.9	0	0	0	0.030	1.0
5	0	0	20.8	0	0	0	0.030	1.0
Initial	0	0	20.7	0	0	0	0.030	1.0
Peak	0	0	20.9	0	0	0	0.031	1.0

Notes:

^ Standing Water Level (SWL) in meters below ground level. Recorded on completion of monitoring.

HGG measurements recorded at least 5 minuites following flow measurements.

Recorded by:	VR
Date:	30/08/24
Checked by:	TH
Date:	17/12/24

JKEnvironments

HAZARDOUS GROUND GAS MONITORING WELL FIELD SHEET

Client: Sunsige Pty Ltd – Flower Power Terrey Hills	Monitoring Well No: MW104
Project: Proposed Redevelopment of Garden Centre	Weather Conditions: Clear.
Location: 272, Mona Vale Road, Terrey Hills, NSW	SWL (m)^: Dry
Job Number: E34278PH	PID (ppm): 0.0
	Start Time and Atmospheric Pressure (mbar): 3.21, 987mb
	Completion Time and Atmopsheric Pressure (mbar): 3.34pm, 987mb

Time (min)#	Differential Pressure (Pa)	Flow (L/H)
0.5	-4	-0.7
1	-5	-0.9
1.5	-4	-0.8
2	-4	-0.7
2.5	-4	-0.7
3	-4	-0.7
3.5	-5	-0.7
4	-4	-0.7
4.5	-4	-0.7
5	-5	-0.7
Initial	-4	-0.7
Peak	-5	-0.9

Time (min)#	CH_4 (%v/v)	CO_2 (%v/v)	O_2 (%v/v)	CH_4 (%LEL)	H_2S (ppm)	CO (ppm)	Hexane (%)	PID Cf (ppm)
0.5	0	0	20.9	0	0	0	0.030	1.0
1	0	0	20.9	0	0	0	0.030	1.0
1.5	0	0	20.9	0	0	0	0.029	1.0
2	0	0	20.9	0	0	0	0.030	1.0
2.5	0	0	20.9	0	0	0	0.030	1.0
3	0	0	20.9	0	0	0	0.030	1.0
3.5	0	0	20.9	0	0	0	0.029	1.0
4	0	0	20.9	0	0	0	0.029	1.0
4.5	0	0	20.9	0	0	0	0.029	1.0
5	0	0	20.9	0	0		0.029	1.0
Initial	0	0	20.9	0	0	0	0.030	1.0
Peak	0	0	20.9	0	0	0	0.30	1.0

Notes:

^ Standing Water Level (SWL) in meters below ground level. Recorded on completion of monitoring.

HGG measurements recorded at least 5 minuites following flow measurements.

Recorded by:	VR
Date:	30/8/24
Checked by:	TH
Date:	17/12/24

JKEnvironments

HAZARDOUS GROUND GAS MONITORING WELL FIELD SHEET

Client: Sycsion Pty Ltd - Flower Power Terrey Hills.
Project: Proposed Redevelopment of Garden Centre
Location: 277, Mona Vale Road, Terrey Hills, NSW
Job Number: E34273PH

Monitoring Well No: MW105
Weather Conditions: Clear
SWL (m)^: 0.86
PID (ppm): 0.1
Start Time and Atmospheric Pressure (mbar): 3.36pm, 986mb
Completion Time and Atmopsheric Pressure (mbar): 3.49pm, 986mb

Time (min)#	Differential Pressure (Pa)	Flow (L/H)
0.5	-4	-0.7
1	-4	-0.7
1.5	-3	-0.6
2	-4	-0.7
2.5	-4	-0.6
3	-4	-0.6
3.5	-3	-0.6
4	-4	-0.6
4.5	-3	-0.6
5	-3	-0.6
Initial	-4	-0.6
Peak	-4	-0.7

Time (min)#	CH_4 (%v/v)	CO_2 (%v/v)	O_2 (%v/v)	CH_4 (%LEL)	H_2S (ppm)	CO (ppm)	Hexane (%)	PID Cf (ppm)
0.5	0	0	20.9	0	0	0	0.029	1.0
1	0	0	20.9	0	0	0	0.029	1.0
1.5	0	0	20.9	0	0	0	0.029	1.0
2	0	0	21.0	0	0	0	0.029	1.0
2.5	0	0	21.0	0	0	0	0.029	1.0
3	0	0	21.0	0	0	0	0.029	1.0
3.5	0	0	20.9	0	0	0	0.031	1.0
4	0	0	20.9	0	0	0	0.029	1.0
4.5	0	0	21.0	0	0	0	0.030	1.0
5	0	0	21.0	0	0	0	0.029	1.0
Initial	0	0	20.9	0	0	0	0.029	0
Peak	0	0	21.0	0	0	0	0.031	1.0

Notes:

^ Standing Water Level (SWL) in meters below ground level. Recorded on completion of monitoring.

HGG measurements recorded at least 5 minuites following flow measurements.

Recorded by:	VR
Date:	30/8/24
Checked by:	TH
Date:	17/12/24

JKEnvironments

HAZARDOUS GROUND GAS MONITORING WELL FIELD SHEET

Client: Sydsim Pty Ltd - Flower Power Terrey Hills	Monitoring Well No: MW106
Project: Proposed Redevelopment of Garden Centre	Weather Conditions: Clear
Location: 277, Mona Vale Road, Terrey Hills, NSW	SWL (m)^: 0.56m
Job Number: E34278PM	PID (ppm): 0.0
	Start Time and Atmospheric Pressure (mbar): 3.52pm, 985mb
	Completion Time and Atmopsheric Pressure (mbar): 4.10pm, 985mb

Time (min)#	Differential Pressure (Pa)	Flow (L/H)
0.5	-3	-0.6
1	-3	-0.6
1.5	-3	-0.6
2	-4	-0.6
2.5	-4	-0.7
3	-4	-0.6
3.5	-3	-0.6
4	-3	-0.6
4.5	-3	-0.5
5	-3	-0.6
Initial	-3	-0.6
Peak	-4	-0.7

Time (min)#	CH_4 (%v/v)	CO_2 (%v/v)	O_2 (%v/v)	CH_4 (%LEL)	H_2S (ppm)	CO (ppm)	Hexane (%)	PID Cf (ppm)
0.5	0	0	21.0	0	0	0	0.029	1.0
1	0	0.1	20.9	0	0	0	0.028	1.0
1.5	0	0.1	20.8	0	0	0	0.029	1.0
2	0	0.1	20.8	0	0	0	0.029	1.0
2.5	0	0.1	20.8	0	0	0	0.029	1.0
3	0	0.1	20.8	0	0	0	0.028	1.0
3.5	0	0.1	20.8	0	0	0	0.028	1.0
4	0	0.1	20.8	0	0	0	0.028	1.0
4.5	0	0.1	20.9	0	0	0	0.029	1.0
5	0	0.1	20.9	0	0	0	0.029	1.0
Initial	0	0	20.9	0	0	0	0.029	1.0
Peak	0	0.1	20.9	0	0	0	0.029	1.0

Notes:

^ Standing Water Level (SWL) in meters below ground level. Recorded on completion of monitoring.

HGG measurements recorded at least 5 minuites following flow measurements.

Recorded by:	VR
Date:	30/8/24
Checked by:	TH
Date:	17/12/24

Appendix I: Guidelines and Reference Documents

Acid Sulfate Soils Management Advisory Committee (ASSMAC), (1998). Acid Sulfate Soils Manual

Australian and New Zealand Governments (ANZG), (2018). Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia

Canadian Council of Ministers of the Environment, (1999). Canadian soil quality guidelines for the protection of environmental and human health: Benzo(a)Pyrene (1997)

CRC Care, (2011). Technical Report No. 10 – Health screening levels for hydrocarbons in soil and groundwater Part 1: Technical development document

Contaminated Land Management Act 1997 (NSW)

Department of Land and Water Conservation, (1997). 1:25,000 Acid Sulfate Soil Risk Map Series

Heads of EPAs Australia and New Zealand (HEPA), (2020). PFAS National Environmental Management Plan Version 2.0 - January 2020

Managing Land Contamination, Planning Guidelines SEPP55 – Remediation of Land (1998)

National Health and Medical Research Council (NHMRC), (2021). National Water Quality Management Strategy, Australian Drinking Water Guidelines 2011

NSW Department of Environment and Conservation, (2007). Guidelines for the Assessment and Management of Groundwater Contamination

NSW EPA, (2014). Waste Classification Guidelines - Part 1: Classifying Waste

NSW EPA, (2015). Guidelines on the Duty to Report Contamination under Section 60 of the CLM Act 1997

NSW EPA, (2017). Guidelines for the NSW Site Auditor Scheme, 3rd Edition

NSW EPA, (2020). Consultants Reporting on Contaminated Land, Contaminated Land Guidelines

NSW EPA, (2022). *Sampling design part 1 - application*, Contaminated Land Guidelines

National Environment Protection Council (NEPC), (2013). National Environmental Protection (Assessment of Site Contamination) Measure 1999 as amended (2013)

Olszowy, H., Torr, P., and Imray, P., (1995). Trace Element Concentrations in Soils from Rural and Urban Areas of Australia. Contaminated Sites Monograph Series No. 4. Department of Human Services and Health, Environment Protection Agency, and South Australian Health Commission

Protection of the Environment Operations Act 1997 (NSW)

State Environmental Planning Policy (Resilience and Hazards) 2021 (NSW)

World Health Organisation (WHO), (2008). Petroleum Products in Drinking-water, Background document for the development of WHO Guidelines for Drinking Water Quality

Western Australia Department of Health, (2021). Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia