ENVIRONMENTAL INVESTIGATION SERVICES

REPORT

TO

BUNNINGS GROUP LIMITED

ON

ADDITIONAL ENVIRONMENTAL SITE ASSESSMENT AND REMEDIAL ACTION PLAN

FOR

PROPOSED COMMERCIAL DEVELOPMENT

AT

950 PACIFIC HIGHWAY AND 2 BRIDGE STREET, PYMBLE, NSW

26 NOVEMBER 2018 **REF: E24542KMrpt rev1**

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EXECUTIVE SUMMARY

Bunnings Group Limited commissioned EIS to undertake an additional Environmental Site Assessment (ESA) and prepare a Remedial Action Plan (RAP) for the proposed commercial development at 950 Pacific Highway and 2 Bridge Street, Pymble. The proposed development includes demolition of the existing site buildings and construction of a two-storey warehouse with two levels of parking, driveways and landscaped areas.

Prior to the mid-1960s, the site was used for a mixture of residential and light commercial activities, with the exception of a gas-holder which was located in the southern section of the site from 1923 until 1966. Since the mid-1960s the site was the corporate headquarters of 3M. Identified potential contaminating activities at the site were restricted to the storage of fuel in underground storage tanks (USTs).

A review of contaminated land issues at the site conducted by Easterly Point in 2014 identified the following issues:

- Potential vapour issues in the former gas holder area; and
- Underground petroleum storage systems (UPSS), including USTs.

It was subsequently recommended that an additional groundwater and soil vapour assessment should be conducted in the former gas holder area, and a RAP should be developed for the site.

For the additional assessment, EIS collected groundwater samples from the five wells considered to be the most contaminated, and collected soil vapour samples from three vapour wells installed in the assessment area. Samples were analysed for primary contaminants of concern (PCC) including heavy metals, petroleum hydrocarbons, volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), cyanide and ammonia. The analytical results were compared to site assessment criteria (SAC) which were established with reference to appropriate guidelines and regulations.

Based on the results of the assessment and available data, EIS concluded that the potential risk to human health from vapour inhalation is very low. Contaminated groundwater exists at a depth of approximately 8m in the former gas holder area, however based on the results of the assessment and available data, EIS considers that the risk to freshwater ecosystems (i.e. Blackbutt Creek) from contaminated groundwater at the site is very low.

Based on the data obtained during the additional ESA, EIS considers that remediation of the former gas holder area to address potential vapour or contaminated groundwater issues is not required.

EIS considers that remedial actions at the site in order to make the site suitable for the proposed development can be limited to removal of the existing USTs and UPSS at the site and potentially contaminated soil in the immediate vicinity of the USTs/UPSS.

A RAP detailing the remedial actions to be undertaken at the site is contained in the report. The RAP includes:

- A consideration of potential remedial options (Section 9);
- Details of the procedure to be undertaken to remediate the UST/UPSS areas (Section 10);
- Validation sampling requirements and assessment criteria (Section 11);
- Material importation requirements (Section 11.3);
- A contingency plan (Section 12); and
- A site management plan for the remediation works (Section 13).

EIS are of the opinion that the site can be made suitable for the proposed development provided the recommendations in this RAP are successfully implemented, including a validation assessment.

This report has been prepared to form part of DA0307/17. DA0307/17 seeks development consent for the remediation works proposed in the Remedial Action Plan.

In the event unexpected conditions are encountered during development work or between sampling locations that may pose a contamination risk, all works should stop and an environmental consultant should be engaged to inspect the site and address the issue. The conclusions and recommendations should be read in conjunction with the limitations presented in the body of the report.

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Important Information About The Site Assessment Report

ABBREVIATIONS

Area of Environmental Concern	**AEC**
Australian Height Datum	**AHD**
Below Ground Level	**BGL**
Benzene, Toluene, Ethylbenzene, Xylene	**BTEX**
Contaminated Land Management	**CLM**
Construction Management Plan	**CMP**
Contaminant(s) of Potential Concern	**CoPC**
Chain of Custody	**COC**
Conceptual Site Model	**CSM**
Data Quality Indicator/Data Quality Objective	**DQI/DQO**
Detailed Site Investigation	**DSI**
Environmental Management Plan	**EMP**
Excavated Natural Material	**ENM**
Environmental Protection Agency	**EPA**
Environmental Site Assessment	**ESA**
Health Investigation Level	**HILs**
Health Screening Level	**HSLs**
International Organisation of Standardisation	**ISO**
Lab Control Spike	**LCS**
Light Non-Aqueous Phase Liquid	**LNAPL**
Map Grid of Australia	**MGA**
National Association of Testing Authorities	**NATA**
National Environmental Protection Measure	**NEPM**
Polycyclic Aromatic Hydrocarbons	**PAH**
Photoionisation Detector	**PID**
Practical Quantitation Limit	**PQL**
Preliminary Site Investigation	**PSI**
Primary Contaminant of Concern	**PCC**
Quality Assurance/Quality Control	**QA/QC**
Remedial Action Plan	**RAP**
Relative Percentage Difference	**RPD**
Site Assessment Criteria	**SAC**
Sampling, Analysis and Quality Plan	**SAQP**
Standard Penetration Test	**SPT**
Standard Sampling Procedure	**SSP**
Standing Water Level	**SWL**
Standard Sampling Procedure	**SSP**
Toxicity Characteristic Leaching Procedure	**TCLP**
Total Recoverable Hydrocarbons	**TRH**
Trip Spike	**TS**
Upper Confidence Limit	**UCL**
Underground Storage Tank	**UST**
Virgin Excavated Natural Material	**VENM**
Volatile Organic Compounds	**VOC**
Work Health and Safety	**WHS**

1 INTRODUCTION

Bunnings Group Limited ('the client') commissioned Environmental Investigation Services (EIS)[1] to undertake an additional Environmental Site Assessment (ESA) and prepare a Remedial Action Plan (RAP) for the proposed commercial development at 950 Pacific Highway and 2 Bridge Street, Pymble. The site location is shown on Figure 1, the current site layout is shown on Figure 2 and the assessment was confined to the assessment area as shown on Figure 3.

This report has been prepared to form part of DA0307/17. DA0307/17 seeks development consent for the remediation works proposed in the Remedial Action Plan.

1.1 Proposed Development Details

The proposed development includes demolition of the existing site buildings, and construction of a two-storey warehouse with two levels of parking, driveways and landscaped areas. Copies of the proposed development plans are contained in the appendices.

1.2 Aim and Objectives

The objectives of the additional ESA were to assess the current groundwater and soil vapour conditions in the Environmental Management Plan[2] (EMP) area, which is the area of the former gas holder.

The objectives of the RAP were to:

- Identify remediation and management measures to minimise potential risk to site receptors;
- Outline the remediation and/or management procedures for the site;
- Prepare a validation plan to be implemented in conjunction with the remediation work;
- Prepare a contingency plan for the remediation works;
- Outline site management procedures to be implemented during remediation work; and
- Provide an unexpected finds protocol to be implemented during the remediation and development works.

1.3 Scope of Work

The assessment was undertaken generally in accordance with an EIS proposal (Ref: EP44853KF.rev1) of 28 September 2017 and written acceptance from the client of 3 October 2017.

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

[2] WSP (2012) *Environmental Management Plan, 950 Pacific Highway, Pymble, NSW* (dated June 2012)

The scope of work included the following:

- A review of available site information, including a *"Review of Contaminated Land Issues"*[3] report for the site conducted by Easterly Point (referred to as Easterly Point review report);
- A site inspection;
- Installation of soil vapour wells and soil vapour sampling from three sampling points;
- Groundwater sampling from five previously-installed groundwater monitoring wells;
- Analysis of soil vapour and groundwater samples for primary contaminants of concern (PCC),
- Interpretation of the analytical results against the adopted site assessment criteria (SAC);
- Assessment of data quality;
- Identification of potential remedial options;
- Outlining the validation sampling and analysis plan for the remedial works; and
- Preparation of this report.

The report was prepared with reference to regulations and guidelines outlined in the table below. Individual guidelines are also referenced within the text of the report.

Table 1-1: Guidelines

Guidelines/Regulations/Documents
Contaminated Land Management Act (1997)[4]
State Environmental Planning Policy No.55 – Remediation of Land (1998)[5]
Managing Land Contamination, Planning Guidelines SEPP55 – Remediation of Land (1998)[6]
Guidelines for Consultants Reporting on Contaminated Sites (2011)[7]
Guidelines for the NSW Site Auditor Scheme, 3rd Edition (2017)[8]
National Environmental Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013)[9]

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[3] Easterly Point (2014) *Review of Contaminated Land Issues, 950 Pacific Highway and 2 Bridge Street, Pymble, NSW, Proposed Demolition and Development Application* (Ref: 14043L02-BGL02 dated 22 December 2014)

[4] NSW Government Legislation, (1997). *Contaminated Land Management Act 1997.* (referred to as CLM Act 1997)

[5] NSW Government, (1998). *State Environmental Planning Policy No. 55 – Remediation of Land.* (referred to as SEPP55)

[6] Department of Urban Affairs and Planning, and Environment Protection Authority, (1998). *Managing Land Contamination, Planning Guidelines SEPP55 – Remediation of Land*. (SEPP55 Planning Guidelines)

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

[8] NSW DEC, (2006). *Guidelines for the NSW Site Auditor Scheme, 3rd ed.* (referred to as Site Auditor Guidelines 2017)

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

2 SITE INFORMATION

2.1 Site Identification

Table 2-1: Site Identification

Site Address:	950 Pacific Highway and 2 Bridge Street, Pymble
Lot & Deposited Plan:	Lot 1 DP718718 and Lot B DP371406
Current Land Use:	Vacant; formerly commercial
Proposed Land Use:	Commercial
Local Government Authority:	Ku-ring-gai Council
Current Zoning:	Zone B7 – Pymble Business Park
Site Area:	Approximately 18,300m^2
RL (AHD in m) (approx.):	105m – 125m
Geographical Location (MGA) (approx.):	N: -33.750632° E: 151.146104°
Site Location Plan:	Figure 1
Site Layout Plan:	Figure 2
Assessment Area Plan:	Figure 3

2.2 Background

2.2.1 Site History

Information contained in the 2013 Cavvanba *"Strategic Contaminated Land Review"* report[10] for the site, a copy of which was included as an appendix to the Easterly Point review report, indicated the following:

- Prior to the mid-1960s, the site was used for a mixture of residential and light commercial activities, with the exception of a gas-holder which was located in the southern section of the site from 1923 until 1966; and
- Since the mid-1960s the site was the corporate headquarters of 3M. Identified potential contaminating activities at the site were restricted to the storage of fuel in underground storage tanks (USTs).

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[10] Cavvanba Consulting (2013) *Strategic Contaminated Land Review, 950 Pacific Highway, Pymble, NSW* (Ref: 12050.R01 Final, dated May 2013)

2.2.2 Site Condition and Surrounding Environment

At the time of the Cavvanba assessment, the following features were present within the site boundaries:

- A five-storey building in the south-eastern section of the site that previously contained the Australia corporate headquarters of 3M;
- Two small sheds used for the storage of garden and lawn maintenance equipment, located in the north of the site;
- A two-storey concrete car park with undercroft parking;
- Landscaped areas;
- An underground petroleum storage system (UPSS) and possibly a UST in the vicinity of the delivery dock to the 3M building; and
- A transformer located at the southern end of the 3M office building.

Land use in the surrounding environment included:

- North: Bridge Street, then commercial and industrial premises;
- South: Pymble Road, then commercial and industrial premises;
- East: Pacific Highway, then a railway line; and
- West: industrial and commercial premises.

2.2.3 Geology and Hydrogeology

Information in the Cavvanba assessment indicated the following:

- the site is underlain by Ashfield Shale overlying Hawkesbury Sandstone;
- water-bearing zones in the Hawkesbury Sandstone have generally been encountered at depths of 10m to 50m, with a standing water level (SWL) occurring at an average depth of approximately 12m; and
- the permeability of the shale and sandstone in the area is generally very low. The greatest potential means of water transmission in the bedrock is via the jointing system.

2.2.4 "Review of Contaminated Land Issues" report, Easterly Point, December 2014

The following issues were identified at the site:

Former Gas Holder:

- A gas holder, or gasometer, was formerly located in the south of the site as shown on the attached Figure 2. Based on investigations conducted at the site, the fill material, soil and rock *"is not generally contaminated at the site, but rather at approximately 8m depth in the vicinity of the gas holder (RL - 98) there exists a zone of weathered sandstone of approximately 1.5m thickness, with water filled fractures wherein exists contaminated groundwater";*
- Odours and staining were observed within the former gas holder perimeter within the deep fracture zone. No odours or staining were observed in boreholes drilled outside the gas holder.

It was assumed that the odour was from ammonia "*and given its high environmental mobility, a good indicator compound of contamination";* and

- High concentrations of contaminants including BTEX (benzene, toluene, ethylbenzene and xylenes) and volatile TRH (total recoverable hydrocarbons) C_6-C_9 have been detected in groundwater within the gas holder perimeter.

Underground Petroleum Storage Systems:

- A petrol UPSS and possibly a heating oil UPSS were located in the vicinity of the delivery dock of the former office building, as shown on Figure 2;
- A fuel oil underground storage tank (UST) was formerly located north of the former gas holder. The UST is thought to have been removed, however an anomalous response was detected during a ground penetrating radar (GPR) survey of the area, which may be associated with remnant UPSS infrastructure. It was also considered possible that the UST may be still present, or an additional unrecorded UST was present; and
- An anomalous response was also detected adjacent to the Energy Australia transformer, although records do not indicate the presence of a UST in this area.

A site audit statement (SAS)[11] was prepared for the site in 2012 by Graeme Nyland of Environ. The SAS concluded that the site was suitable for a commercial/industrial land use, subject to compliance with the EMP prepared by WSP in 2012. The EMP Management Area covers an area of approximately 1800m^2 in the vicinity of the former gas holder, as shown on Figure 2. The EMP "*described that a change of use within the management area will require the hazard assessment and control measures to be reviewed and updated."*

The following actions were proposed in the review:

1. *"Conduct an additional assessment – selected existing groundwater monitoring wells will be tested to confirm the current groundwater concentrations, and soil gas sampling in the area of the gas holder will be conducted. Based on the SAS findings, it is considered that the significant issue is the potential for vapour intrusion, and the additional assessment will focus on quantification of the potential vapour intrusion risk";*
2. Develop a RAP using the existing and additional site information;
3. The remedial works should be conducted in stages in concert with the site development works; and
4. A remediation and validation report will subsequently be provided.

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[11] Environ Australia (2012) *Site Audit Report, 950 Pacific Highway, Pymble, NSW* (Ref: AS121410)

3 SAMPLING, ANALYSIS AND QUALITY PLAN FOR THE ADDITIONAL ESA

3.1 Data Quality Objectives (DQO)

The NEPM 2013 defines the DQO process as a seven-step iterative planning tool used to define the type, quantity and quality of data needed to inform decisions relating to the environmental condition of the site. The DQO process is detailed in the Site Auditor Guidelines 2017 and the USEPA documents *Data Quality Objectives Processes for Hazardous Waste Site Investigations* (2000) and *Guidance on Systematic Planning Using the Data Quality Objectives Process* (2006). These seven steps are applicable to this assessment as summarised in the table below:

Table 3-1: DQOs – Seven Steps

Step	Input
State the Problem	Previous assessments at the site have identified contamination which may pose a risk to the site receptors. An additional groundwater and soil vapour assessment is required to assess the risk and comment on the suitability of the site for the proposed development.
Identify the Decisions/ Goal of the Study	The data collection is project specific and has been designed based on the following information: • A review of available site information; • The recommended actions of the Easterly Point review report; • PCC, receptors, pathways and media identified in the Easterly Point review report; • Development of Site Assessment Criteria (SAC) for each medium; and • The use of decision statements outlined below: 1) Are any results above the SAC? 2) Do potential risks associated with contamination exist, and if so, what are they? 3) Is remediation required in the EMP Management Area? For this assessment, 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 limited number of samples submitted for analysis.
Identify Information Inputs	The following information will be collected: • Groundwater samples from five selected monitoring wells; • Soil vapour samples from three soil vapour wells. The SAC will be designed based on the criteria outlined in NEPM 2013. Other criteria will be used as required and detailed in this report. The samples will be analysed in accordance with the analytical methods outlined in NEPM 2013. Any additional information that may arise during the field work will also be used as data inputs.
Define the Study Boundary	The sampling will be confined to the EMP Management Area as shown on Figures 2 and 3.

Step	Input
Develop the analytical approach (or decision rule)	The following acceptable limits will be adopted for the data quality assessment: • The following acceptance criteria will be used to assess the RPD results: ➢ results > 10 times the practical quantitation limit (PQL), RPDs < 50% are acceptable; ➢ results between 5 and 10 times PQL, RPDs < 75% are acceptable; ➢ results < 5 times PQL, RPDs < 100% are acceptable; and ➢ An explanation is provided if RPD results are outside the acceptance criteria. • Acceptable concentrations in trip spike, trip blank and other QA/QC samples. Non-compliance to be documented in the report; • The following acceptance criteria will be used to assess the primary laboratory QA/QC results. Non-compliance to be documented: ➢ RPDs: - Results that are < 5 times the PQL, any RPD is acceptable; and - Results > 5 times the PQL, RPDs between 0-50% are acceptable; ➢ LCS recovery 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 spike recovery: - 60-140% recovery acceptable for general organics; and - 10-140% recovery acceptable for VOCs; and ➢ Blanks: All less than PQL.
Specify the performance or acceptance criteria	NEPM 2013 defines decision errors as "*incorrect decisions caused by using data which is not representative of site conditions*". This can arise from errors during sampling or analytical testing. A combination of these errors is referred to as "*total study error*". The study error can be managed through the correct choice of sample design and measurement. 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. In this case, for example, the PCC identified in the Easterly Point review report are considered to pose a risk to receptors unless proven not to. The null hypothesis has been adopted for this assessment.
Optimise the design for obtaining data	The most resource-effective design will be used in an optimum manner to achieve the assessment objectives.

3.2 Groundwater Sampling Plan and Methodology

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

Table 3-2: Groundwater Sampling Plan and Methodology

Aspect	Input
Sampling Plan	Groundwater samples were obtained from previously installed groundwater monitoring wells MW3, MW04, MW05, MW08 and MW13. EIS also intended to collect a sample from MW1, however the contents of this well appeared to have silted up and insufficient sample could be obtained for analysis. The rationale for the selection of these wells was based on data contained in *Appendix C - Table 1 - Summary of Contaminant Concentrations in Groundwater* contained in the EMP (2012) and reproduced in the Environ Site Audit Report (2012): • MW3 and MW04 were the two wells with the highest overall concentrations of contaminants; • After MW3 and MW04, MW13 had the highest concentration of naphthalene and the second highest concentration of ammonia; • MW08 was located upgradient of the former gas holder yet had relatively high detections of BTEX compounds; • MW1 had relatively high concentrations of ammonia, benzene and cyanide; and • MW05 had a relatively high concentration of ammonia.
Monitoring Well Development	The monitoring wells were developed on 11 October 2017 using a submersible electrical pump. The wells were pumped dry in slow recharging conditions. MW05 was not developed, as it was sampled to compensate for the inability to obtain a sample from MW1. While developing MW3 and MW04, the following parameters were monitored using calibrated field instruments (see SSP): • 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. The field monitoring records are attached in the appendices.
Groundwater Sampling	The monitoring wells were allowed to recharge for approximately one week after development. Groundwater samples were obtained on 18 October 2017 (MW3, MW04, MW08 and MW13) and 19 October 2017 (MW05). Prior to sampling, the monitoring wells were checked for the presence of Light Non-Aqueous Phase Liquids (LNAPLs) using an interface probe. The monitoring well head space was checked for VOCs using a calibrated PID unit.

Aspect	Input
	The samples were obtained using a peristaltic pump. During sampling, the following parameters were monitored using calibrated field instruments (see SSP): • 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 and the difference in conductivity was less than 10%. Groundwater samples were obtained directly from the single use PVC tubing and placed in the sample containers. The use of low-flow sampling techniques, such as the peristaltic pump, generally provides for an increased confidence of accuracy, and in particular, improves the likelihood that the sample is representative of general aquifer conditions due to much lower aquifer disturbance during sampling. Duplicate samples were obtained by alternate filling of sample containers. This technique was adopted to minimise disturbance of the samples and the 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 EIS in jerry cans and stored in holding drums prior to collection by a licensed waste water contractor for off-site disposal. The field monitoring records are attached in the appendices.
Decontamination and Sample Preservation	During development, the pump was flushed between monitoring wells with potable water (single-use tubing was used for each well). Sampling was undertaken using a peristaltic pump. The pump tubing was discarded after each sampling event and replaced, therefore no decontamination procedure was considered necessary. The samples were preserved in accordance with water sampling requirements detailed in NEPM 2013 and placed in an insulated container with ice in accordance with the SSP. On completion of the fieldwork, the samples were delivered in the insulated sample container to a NATA-registered laboratory for analysis under standard COC procedures.

3.3 Soil Vapour Sampling Plan and Methodology

The soil vapour sampling plan and methodology are outlined in the table below:

Table 3-3: Soil Vapour Sampling Plan and Methodology

Aspect	Input
Sampling Plan	Soil vapour wells were installed in three locations, as shown in the attached Figure 3. • SV101 was located within the gasholder perimeter as close as possible to the two groundwater wells with the highest concentrations of contaminants, MW3 and MW04; • SV102 was located within the gasholder perimeter, in approximately the centre of the EMP Management Area; and • SV103 was located approximately 8m outside of the gasholder perimeter, close to the northern corner of the EMP Management Area.
Soil vapour sampling	Soil vapour samples were collected from the sub-slab zone directly beneath the base of the basement concrete slab. A 16mm diameter hammer drill hole was advanced through the slab and sealed with a temporary vapour pin. Each location was purged and allowed to equilibrate after installation for approximately two hours prior to sampling. The samples were drawn from the soil vapour in direct contact with the base of the site hardstand surface. Sampling was conducted using sorbent tubes and a flow rate of 100ml/min, controlled with a rotameter and digital flow meter. Once the samples had been collected the vapour pins were removed and the surface was sealed with concrete.

3.4 Analytical Schedule

The analytical schedule is outlined in the following table:

Table 3-4: Analytical Schedule

PCC	Groundwater Samples	Soil Vapour Samples
Heavy Metals	5	-
TRH/BTEX	5	3
VOCs	5	3
PAHs	5	3
Cyanide	5	-
Ammonia	5	3

3.4.1 Laboratory Analysis

The samples were analysed by the NATA-accredited laboratories 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 3-5: Laboratory Details

Samples	Laboratory	Report References
All primary groundwater samples and groundwater field QA/QC samples including intra-laboratory duplicate and trip spike	Envirolab Services Pty Ltd NSW, NATA Accreditation Number – 2901 (ISO/IEC 17025 compliance)	#178095
All primary and duplicate soil vapour samples and soil vapour field QA/QC samples	SGS Victoria, NATA Accreditation Number – 2562 (ISO/IEC 17025 compliance)	#MI70998
Inter-laboratory groundwater duplicate	Envirolab Services Pty Ltd VIC, NATA Accreditation Number – 2901 (ISO/IEC 17025 compliance)	#12159

4 SITE ASSESSMENT CRITERIA (SAC)

EIS have adopted the groundwater SAC that were outlined in Section 7.2 of the Environ Site Audit Report (2012), as summarised in the table below. Additional groundwater guidelines including the groundwater health-screening levels (HSLs) for vapour intrusion were derived from the NEPM 2013. The guideline values for individual contaminants are presented in the attached report tables.

Soil vapour SAC have been derived from NEPM 2013. The guideline values for individual contaminants are presented in the attached report tables.

Table 4-1: SAC Adopted for this Investigation

Guideline	Applicability
Groundwater Investigation Levels (GILs)	The freshwater trigger values presented in Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000[12]) have been adopted for the assessment (referred to as GIL-ANZECC-Fresh). The NSW EPA promotes the use of trigger values for the protection of 95% of aquatic ecosystems, except where the contaminants have the potential to bio-accumulate, in which case the 99% trigger values are recommended. In accordance with the criteria adopted for the Site Audit Report, the 95% trigger values have generally been adopted for this assessment. Where necessary, the low reliability trigger values are quoted.
Groundwater HSLs	Health risks in non-use scenarios are usually associated with the presence of vapours associated with volatile contaminants. The HSL-D criteria for commercial/industrial sites have been adopted for this investigation.
Soil Vapour HSLs	The HSL-D criteria for commercial/industrial sites have been adopted for this investigation.
Soil Vapour Health Investigation Levels (HILs)	The interim soil vapour HIL-D criteria for volatile organic chlorinated compounds (VOCCs) for commercial/industrial sites have been adopted for this investigation.

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[12] ANZECC, (2000), *Australian and New Zealand Guidelines for Fresh and Marine Water Quality.* (referred to as ANZECC 2000)

5 INVESTIGATION RESULTS

5.1 Field Screening

A summary of the field screening results is presented in the table below.

Table 5-1: Summary of Field Screening

<table>
<tr><th>Aspect</th><th>Details (m in bgl)</th></tr>
<tr><td>PID Screening of Groundwater Wells for VOCs</td><td>PID headspace readings for groundwater wells that were developed and/or sampled are presented in the attached field sheets and summarised below:
<table>
<tr><th>Well ID</th><th>PID reading (11/10/17) in ppm</th><th>PID reading (18-19/10/17) in ppm</th></tr>
<tr><td>MW1</td><td>0.6</td><td>-</td></tr>
<tr><td>MW3</td><td>337</td><td>211</td></tr>
<tr><td>MW04</td><td>575</td><td>342</td></tr>
<tr><td>MW05</td><td>-</td><td>0</td></tr>
<tr><td>MW08</td><td>0</td><td>0</td></tr>
<tr><td>MW13</td><td>0</td><td>0</td></tr>
</table></td></tr>
<tr><td>Groundwater Depth</td><td>SWL measured in the monitoring wells prior to developing or sampling ranged from 6.09m to 9.32m, as summarised below. Ground levels (mAHD) for MW04 to MW15 were included in Figure 3 of the EMP. Groundwater RLs calculated on these measurements ranged from 96.34mAHD to 100.02mAHD.
<table>
<tr><th>Well ID</th><th>SWL (11/10/17) in m bgl</th><th>SWL (11/10/17) in mAHD (RL)</th><th>SWL (18-19/10/17) in m bgl</th><th>SWL (18-19/10/17) in mAHD (RL)</th></tr>
<tr><td>MW1</td><td>6.40</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>MW3</td><td>6.09</td><td>-</td><td>6.57</td><td>-</td></tr>
<tr><td>MW04</td><td>7.30</td><td>96.47</td><td>7.43</td><td>96.34</td></tr>
<tr><td>MW05</td><td>-</td><td>-</td><td>6.98</td><td>96.79</td></tr>
<tr><td>MW08</td><td>6.64</td><td>100.02</td><td>6.74</td><td>99.92</td></tr>
<tr><td>MW13</td><td>9.22</td><td>97.34</td><td>9.32</td><td>97.24</td></tr>
</table></td></tr>
<tr><td>Groundwater Field Parameters</td><td>Field measurements recorded during sampling are as follows:
- pH ranged from 5.82 to 9.94;
- EC ranged from 695µS/cm to 1152µS/cm;
- Eh ranged from -123.1mV to 19.7mV; and
- DO ranged from 0.7ppm to 1.6ppm.

Parameters were not obtained from MW3 due to the small volume of water contained in the well.</td></tr>
<tr><td>LNAPLs petroleum hydrocarbons</td><td>Free phase LNAPLs were not detected with the interface probe during groundwater sampling.</td></tr>
</table>

5.2 Groundwater Laboratory Results

The groundwater laboratory results are presented in the attached report tables. A summary of the results assessed against the SAC is presented below.

Table 5-2: Summary of Groundwater Laboratory Results

<table>
<tr><th>Analyte</th><th>Results Compared to SAC</th></tr>
<tr><td>Heavy Metals</td><td>**GIL-ANZECC-Fresh:**
Elevated concentrations of copper and zinc were encountered above the GIL-ANZECC criteria as outlined below:
<table>
<tr><th>Analyte</th><th>Sample</th><th>GIL</th><th>Concentration detected</th></tr>
<tr><td rowspan="2">Copper</td><td>MW3</td><td rowspan="2">1.4 µg/L</td><td>5 µg/L</td></tr>
<tr><td>MW04</td><td>11 µg/L</td></tr>
<tr><td rowspan="2">Zinc</td><td>MW05</td><td rowspan="2">8 µg/L</td><td>12 µg/L</td></tr>
<tr><td>MW08</td><td>48 µg/L</td></tr>
</table>
</td></tr>
<tr><td>TRH & BTEX</td><td>**GIL-ANZECC-Fresh:**
Elevated concentrations of BTEX were identified above the GIL-ANZECC criteria as outlined below:
<table>
<tr><th>Analyte</th><th>Sample</th><th>GIL</th><th>Concentration detected</th></tr>
<tr><td rowspan="2">Benzene</td><td>MW3</td><td rowspan="2">950 µg/L</td><td>8100 µg/L</td></tr>
<tr><td>MW04</td><td>8800 µg/L</td></tr>
<tr><td rowspan="2">Toluene</td><td>MW3</td><td rowspan="2">180 µg/L</td><td>1400 µg/L</td></tr>
<tr><td>MW04</td><td>1300 µg/L</td></tr>
<tr><td>Ethylbenzene</td><td>MW04</td><td>80 µg/L</td><td>280 µg/L</td></tr>
<tr><td rowspan="2">m+p Xylene</td><td>MW3</td><td rowspan="2">75 µg/L</td><td>250 µg/L</td></tr>
<tr><td>MW04</td><td>230 µg/L</td></tr>
</table>
HSLs:
As detailed in Section 2.2 of the EMP, the subsurface material at the site generally comprised fill material underlain by shale, siltstone and sandstone bedrock. Deep fill, up to 8m below current ground level, was found in boreholes drilled close to the western perimeter of the gasholder, i.e. close to MW3 and MW04. The gasholder tank wall, where it appears that MW3 and MW04 were drilled, appears to have been constructed with a cement/rock mix (see Appendix D). In some locations within the gasholder perimeter, cobbles and/or boulders were used as fill. Clay was encountered at depth (up to 8m below current ground level) indicating the former gasometer was most likely sealed with clay.
Groundwater HSLs for vapour intrusion vary depending on the type of soil: sand, silt or clay. When assessing the site using the most conservative HSLs, i.e. assuming a sandy subsurface, elevated concentrations of benzene were identified above the HSL criteria as outlined below:
</td></tr>
</table>

<table>
<tr><th>Analyte</th><th>Results Compared to SAC</th></tr>
<tr><td></td><td>
<table>
<tr><th>Analyte</th><th>Sample</th><th>HSL</th><th>Concentration detected</th></tr>
<tr><td rowspan="2">Benzene</td><td>MW3</td><td rowspan="2">5000 µg/L</td><td>8100 µg/L</td></tr>
<tr><td>MW04</td><td>8800 µg/L</td></tr>
</table>
<p>If less conservative HSLs are used, i.e. for silty or clayey soil, all TRH/BTEX concentrations were below the HSLs. The HSL for benzene in silty or clayey soils at the relevant depths varies from 30,000 µg/L to 35,000 µg/L.</p>
<p>The HSLs for all three possible soil categories are provided in the attached Table A for comparison.</p>
</td></tr>
<tr><td>PAHs</td><td>
<p><u>GIL-ANZECC-Fresh:</u>
Elevated concentrations of naphthalene were identified above the GIL-ANZECC criteria as outlined below:</p>
<table>
<tr><th>Analyte</th><th>Sample</th><th>HSL</th><th>Concentration detected</th></tr>
<tr><td rowspan="2">Naphthalene</td><td>MW3</td><td rowspan="2">16 µg/L</td><td>170 µg/L</td></tr>
<tr><td>MW04</td><td>500 µg/L</td></tr>
</table>
<p><u>HSLs:</u>
All naphthalene results were below the HSL-D criterion, noting that the criterion is not limiting for this compound in the proposed land use setting.</p>
</td></tr>
<tr><td>VOCs</td><td><u>GIL-ANZECC-Fresh:</u>
With the exception of BTEX compounds as detailed above, all VOC results were below the GIL-ANZECC criteria.</td></tr>
<tr><td>Ammonia</td><td><u>GIL-ANZECC-Fresh:</u>
All ammonia results were below the GIL-ANZECC criterion.</td></tr>
<tr><td>Cyanide</td><td><u>GIL-ANZECC-Fresh:</u>
All cyanide results were below the GIL-ANZECC criterion.</td></tr>
</table>

5.3 Soil Vapour Laboratory Results

The soil vapour laboratory results are presented in the attached report tables. A summary of the results assessed against the SAC is presented below.

Table 5-3: Summary of Soil Vapour Laboratory Results

Analyte	Results Compared to SAC
TRH & BTEX	**HSLs:** All TRH and BTEX results were below the HSL-D criteria.
PAHs	**HSLs:** All naphthalene results were below the HSL-D criteria.
VOCCs	**HILs:** All VOCC results were below the HIL-D criteria.
Ammonia	All ammonia results were below the laboratory PQL. There are no established HSLs or HILs for ammonia.

6 DATA QUALITY ASSESSMENT

As part of the data quality assessment the following data quality indicators (DQIs) were assessed: precision, accuracy, representativeness, completeness and comparability, as outlined in the table below. Reference should be made to the appendices for an explanation of the individual DQI.

Table 6-1: Assessment of DQIs

Completeness
Field Considerations: • The investigation was designed to target the EMP Management area. A targeted sampling plan was adopted as described in Section 3; • The investigation was undertaken by trained staff in accordance with the SSP; and • Documentation maintained during the field work is attached in the appendices where applicable. Laboratory Considerations: • Selected samples were analysed for PCC; • All samples were analysed by NATA registered laboratories in accordance with the analytical methods outlined in NEPM 2013; • Appropriate analytical methods and PQLs were used by the laboratories; and • Appropriate sample preservation, handling, holding time and COC procedures were adopted for the investigation.
Comparability
Field Considerations: • The investigation was undertaken by trained staff in accordance with the SSP; and • Consistency was maintained during sampling in accordance with the SSP. Laboratory Considerations: • All samples were analysed in accordance with the analytical methods outlined in NEPM 2013; • Appropriate PQLs were used by the laboratories for all analysis; and • All primary, intra-laboratory duplicates and other QA/QC samples were analysed by the same laboratory.
Representativeness
Field Considerations: • The investigation was designed to obtain appropriate media encountered during the field work as outlined in the SAQP. Laboratory Considerations: • All samples were analysed in accordance with the SAQP.

Precision

Field Considerations:

- The investigation was undertaken in accordance with the SSP.

Laboratory Considerations:

- Analysis of field QA/QC samples including inter and intra-laboratory duplicates, a groundwater trip spike, a soil vapour trip blank, and a soil vapour shroud sample as outlined below;
- The field QA/QC frequency adopted for the investigation is outlined below;
- Calculation of the Relative Percentage Difference (RPD) from the primary and duplicate results (the RPD calculation equation is outlined in the attached appendices);
- Assessment of RPD results against the acceptance criteria outlined in Section 3.1.

Intra-laboratory RPD Results:

Groundwater samples at a frequency of 20% of the primary samples:

- DUP-GFW1 is a soil duplicate of primary sample MW08.

Soil vapour samples at a frequency of 33% of the primary samples:

- SV102 Field Dup is a soil vapour duplicate of SV102.

The intra-laboratory results are presented in the attached report Tables E and G. The results indicated that field precision was acceptable.

The RPD value for naphthalene in groundwater was outside the acceptance criteria. The primary result was below the PQL while the duplicate result was above the PQL. The higher duplicate value has been adopted as a conservative measure (see the attached Table B). As both the primary and duplicate sample result was less than the GIL, the exceedance is not considered to have had an adverse impact on the data set as a whole.

Inter-laboratory RPD Results:

Groundwater samples at a frequency of 20% of the primary samples:

- DUP-GFW2 is a groundwater duplicate of primary sample MW13.

The inter-laboratory results are presented in the attached report tables. The results indicated that field precision was acceptable.

Trip Spike:

One water trip spike was analysed for BTEX at a frequency of one spike per batch of volatiles. The results are presented in the attached Table H. The results ranged from 87% to 104% and indicated that field preservation methods were appropriate.

Trip Blank:

One soil vapour trip blank was analysed for VOCs, TRH, isopropanol (IPA), PAHs and ammonia. The results are contained in the attached laboratory reports. All results were below the PQLs.

Shroud Vapour Sample:

A shroud was placed above a selected vapour well during sampling and the headspace saturated with vapour from a piece of cloth soaked in IPA. Samples were analysed for IPA to assess whether the soil vapour points were adequately sealed. IPA was not detected in samples collected from the three vapour wells, but was detected at high concentrations within the samples collected from the shroud, indicating that the integrity of the method used to seal the well was reliable.

Accuracy

Field Considerations:

- The investigation was undertaken in accordance with the SSP.

Laboratory Considerations:

- The analytical quality assessments adopted by the laboratories were in accordance with the NATA and NEPM 2013 requirements as outlined in the analytical reports; and
- A review of the reports indicates that the analytical results were generally within the acceptance criteria adopted by the laboratories.

7 DISCUSSION

7.1 Tier 1 Risk Assessment

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.

The assessment has identified the following potential contamination issues at the site:

7.1.1 Benzene:

Benzene was detected in two groundwater monitoring wells, MW3 and MW04, at concentrations exceeding the groundwater HSLs for commercial/industrial sites in sandy soil. Assuming the underlying soils were sandy was the most conservative approach, and under this assumption the concentrations of benzene in the two wells exceeded the HSL by 62% and 76% respectively.

The actual subsurface conditions in MW04, as detailed in the EMP, appeared to comprise fill material to a depth of 0.6m, underlain by a cement/rock mix to a depth of approximately 7.5m, followed by natural weathered sandstone. Details of the subsurface conditions in MW3 are not contained in the previous reports supplied to EIS, however both MW3 and MW04 appear to have been drilled within the gasholder tank wall. Therefore, EIS considers that it is reasonable to assume that the subsurface conditions in MW3 are similar to those in MW04.

Based on what is known about the actual subsurface conditions at MW3 and MW04, it appears to be more realistic to calculate the groundwater HSLs assuming silty or clayey soil criteria. A photograph of the core obtained while drilling MW04, extracted from the EMP, is included in the appendices. When assuming a soil category of silty or clayey soil, the HSL for benzene increases to 30,000 µg/L - 35,000 µg/L, depending on the depth to groundwater. The concentrations detected in MW3 and MW04 were 8,100 µg/L and 8,800 µg/L, significantly less than the HSLs for silty or clayey soils.

The soil vapour analytical results for benzene were below the PQL of 0.005mg/m^3 in SV101 and SV102, both located within the perimeter of the gasometer. SV101 was located as close as possible to MW3 and MW04. The soil vapour result for benzene in SV103, located outside the perimeter of the gasometer near the northern corner of the EMP Management Area, was 0.015mg/m^3, close to the PQL of 0.005mg/m^3 and significantly less than the HSL of 4mg/m^3.

Based on the proposed development plans, after development the ground floor of the location of the EMP Management Area will contain a basement car parking area. The assumptions under which the commercial/industrial HSLs were derived are detailed in *CRC Technical Report No. 10*[13]. The HSLs assume exposure to a commercial/industrial worker of 8 hours per day, 240 days a year, for a period of 30 years. Therefore, applying the HSLs to a commercial car parking area, in which the average exposure time is likely to be limited to much shorter time-periods than those described above, is considered by EIS to be an extremely conservative approach. Even in the event that a staff member was stationed in the car park for 8 hours a day, 240 days a year, directly above the location of MW3, MW04 and/or SV101, the soil vapour results for benzene indicate that the potential risk to human health from vapour inhalation is very low.

Contaminants at Concentrations above the GILs:

Concentrations of copper, zinc, benzene, toluene, ethylbenzene, xylenes and naphthalene were detected at concentrations above the GILs. The GILs were established with reference to the ANZECC-Freshwater guidelines, as detailed in Section 4. The closest surface water receptor to the site is Blackbutt Creek which is located approximately 300m to the west of the site[14].

Information contained in the EMP indicated the following:

- "*A barrier against groundwater flow exists at the perimeter of the former gasholder, likely formed by the low permeability cemented conglomerate fill material and clays present around the gasholder perimeter*";
- "*The horizontal flow of impacted groundwater in the fractured sandstone is expected to occur at an extremely low rate*"; and
- "*The potential for migration downgradient of the location of the former gasholder is considered to be limited due to poor facture connectivity and a low hydraulic conductivity*."

Considering the above, EIS considers that the risk to freshwater ecosystems (i.e. Blackbutt Creek) from contaminated groundwater at the site is very low.

7.2 Decision Statements

The decision statements are addressed below:

Are any results above the SAC?

- Yes, some results were above the SAC, as detailed in Section 5.

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[13] Friebel, E. & Nadebaum, P. (2011) *CRCCare Technical Report No. 10 = Health Screening Levels for Petroleum Hydrocarbons in Soil and Groundwater - Part 1: Technical development document*

[14] Cavvanba Consulting Pty Ltd (2013) *Strategic Contaminated Land Review, 950 Pacific Highway, Pymble, NSW* (Ref: 12050.R01 Final)

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

- As detailed above in Section 7.1, based on a weight of evidence approach, EIS considers the risk posed by PCC to potential human and environmental receptors to be very low.

Is remediation required in the EMP Management Area?

- Based on the data obtained during the additional ESA, EIS considers that remediation of the EMP Management Area to address potential vapour or contaminated groundwater issues is not required.

7.3 Conclusions of the Additional ESA

Based on the data obtained during this assessment, EIS considers that remedial actions at the site in order to make the site suitable for the proposed development can be limited to removal of the existing USTs and UPSS at the site and potentially contaminated soil in the immediate vicinity of the USTs/UPSS.

A Remedial Action Plan detailing the remedial actions to be undertaken at the site is contained in the following sections of the report.

In the event that unexpected conditions are encountered during development work or between sampling locations that may pose a contamination risk, all works should stop and an environmental consultant should be engaged to inspect the site and address the issue.

8 REMEDIAL ACTION PLAN

8.1 Remediation Goal, Aims and Objectives of the RAP

The goal of the remediation and validation is to render the site suitable and confirm the suitability of the site for the proposed development.

The primary aim of the remediation is to remove potential sources of contamination in order to minimise the associated risks.

The objectives of the RAP are to:

- Identify remediation and management measures to minimise potential risk to site receptors;
- Outline the remediation and/or management procedures for the site;
- Prepare a validation plan to be implemented in conjunction with the remediation work;
- Prepare a contingency plan for the remediation works;
- Outline site management procedures to be implemented during remediation work; and
- Provide an unexpected finds protocol to be implemented during the development works.

8.2 Remediation Extent

The remediation extent for the purposes of the RAP includes:

- The petrol UST located near the north-eastern edge of the former gasometer;
- The former UST area/possible diesel UST located in the vicinity of the delivery dock of the 3M office building; and
- A possible UST located adjacent to the Energy Australia transformer, shown as “GPR anomaly” on the attached Figure 2.

The Easterly Point Review indicated that in the UST areas, samples collected during a previous environmental assessment “*showed no hydrocarbon impacts to soil at depths of 4m to 6m. However it is likely that some remnant contamination from this infrastructure exists beneath the tanks, which would not have been detected unless gross impacts exist.”*

Therefore, soil contamination requiring remediation at the site is expected to be limited to the areas immediately beneath and around the former USTs and UPSS, as indicated on Figure 2.

8.3 Contaminants of Potential Concern for the Remediation

Contaminants of Potential Concern (CoPC) for the remedial activities are those associated with UPSS, i.e.

- TRH;
- BTEX;
- PAHs; and
- Lead.

9 REMEDIATION OPTIONS

9.1 Soil Remediation

The NSW EPA follows the ANZECC/NHMRC Guidelines for the Assessment and Management of Contaminated Sites (1992) published hierarchy for the remediation of contaminated sites. The preferred order for soil remediation and management is as follows:

1. On-site treatment of soil so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level;
2. Off-site treatment of excavated material so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level, after which the soil is returned to the site;
3. Removal of contaminated material to an approved site or facility, followed where necessary by replacement with clean material; and
4. Consolidation and isolation of the soil on-site by containment within a properly designed barrier.

The Site Auditor Guidelines 2017 provide the following additional requirements to be taken into consideration:

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

9.2 Consideration of Site-Specific Remediation Options

9.2.1 Option 1: On-Site Treatment of Contaminated Soil

On-site treatment provides a mechanism to reuse the processed material and in some instances, to avoid the need for large scale earthworks. Some of the treatment options include:

- Bio-remediation: Addition of oxygen and nutrient compounds to accelerate the natural process of organic compound decay within the environment. Soils require excavation and stockpiling prior to treatment. This is not suitable for all contaminants.
- Soil Washing: Soil is stripped of contaminants via a leaching process and the concentrated contaminated liquid product is retained for disposal or additional treatment.
- Air Sparging and Extraction: Air is forced through the contaminated soil to volatilise organic contaminants. The air is then extracted and captured for treatment leaving reduced contaminant concentrations within the sub-strata.
- Thermal Desorption: Contaminated soils are heated within an incinerator to volatilise or combust the contaminants. Contaminants are either broken down to water and carbon dioxide or alternatively trapped within an air filtration system.

Licenses are necessary for specific individual waste streams due to the potential for air pollution and the formation of harmful by-products during the incineration process.

Applicability to the site:
On-site treatment options are generally very expensive and/or time consuming. These are generally applicable for large scale remediation work of sites with large areas impacted by contaminants that can be treated.

This is considered to be a possible option for the site, but is likely to require a considerable period of time and expense.

9.2.2 Option 2: Off-Site Treatment of Contaminated Soil

Contaminated soils are excavated, transported to an approved/ licensed treatment facility, treated to remove/stabilise the contaminants then returned to the subject site, transported to an alternative site or disposed of to an approved landfill facility.

This option provides for a relatively short program of on-site works, however there may be some delays if the material is to be returned to the site following treatment.

The cost per tonne for transport to and from the site and for treatment is considered to be relatively high. The material would also have to be assessed in terms of suitability for reuse as part of the proposed development works.

Applicability to the site:
Off-site treatment of soil is very expensive and is generally not considered a preferred option. Material which leaves the site as a waste stream can only be taken to a facility licensed by the NSW EPA license to receive the waste stream. The treated material cannot be brought back onto the site as it will be classed as a waste stream.

9.2.3 Option 3: Removal of contaminated material to an appropriate facility and reinstatement with clean material

Contaminated soils would be classified in accordance with NSW EPA guidelines for waste disposal, excavated and disposed of off-site to a NSW EPA licensed landfill. The material would have to meet the requirements for landfill disposal. Landfill gate fees would apply in addition to transport costs.

Applicability to the site:
This is considered to be a viable option for the site.

9.2.4 Option 4: Consolidation and isolation of impacted soil by cap and containment

This would include the placement of an impermeable barrier such as concrete, or a warning barrier and non-contaminated soil material, over the existing ground surface to isolate the contaminated material and thereby reduce the health risk to future site users.

This action may also reduce the transport of contamination via surface water movement, dust generation and potentially groundwater infiltration, however, environmental issues would need to be evaluated.

Such an option should only be considered where other preferred approaches from the NSW EPA hierarchy are not applicable. The capping and/or containment must be appropriate for the specific contaminants of concern.

An ongoing environmental management plan (EMP) would be required and site identification documentation, possibly including the Section 149 council planning certificate and/or the land title, would be modified to note the presence of the contamination. This may impact upon development approval conditions and limit the future potential land value.

Applicability to the site:
This is considered to be a possible option for the site.

9.3 Selection of Remediation Option

Option 1, the on-site treatment of contaminated soil, is a possible option for the site, but due to the considerable time period and expense likely to be involved, is not considered to be the preferred option.

Option 2, the off-site treatment of contaminated soil followed by a return of the soil to the subject site, is not considered to be a viable option for the site.

Option 3, the removal of contaminated material to an appropriate facility and reinstatement with clean material, is a viable option for the site and is considered to be the preferred option. The USTs are no longer in use and should be removed from the site as they may pose a future risk to site receptors. The Australian Standard for The Removal and Disposal of Underground Petroleum Storage Tanks (AS4976-2008[15]) states that "*if a site ceases to be used for petroleum storage, all tanks should be removed for disposal off-site in conformance with this section*" (of the standard). Once the USTs are removed, only a relatively small amount of additional excavation is expected to be required to remove potentially contaminated backfill soils. Based on the available site data, the volumes of soil requiring removal are not expected to be excessive, and the remedial works should be able to be completed relatively quickly.

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[15] Standards Australia, (2008), *The Removal and Disposal of Underground Petroleum Storage Tanks.* (referred to as AS4976-2008)

Option 4, the capping and containing of contaminated soil at the site, is a possible option for the site. However selecting this option would require the preparation of an ongoing Environmental Management Plan and may require modification of the Section 149 planning certificate and/or the land title. In accordance with the Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2008, any remaining UPSS would also need to be decommissioned and a validation report would need to be prepared. Consequently it is not considered to be the preferred option.

10 REMEDIATION DETAILS

Prior to commencement of remediation work, the site management plan for remediation works (see Section 13) should be reviewed and implemented by the Remediation Contractor.

The remediation details for each of the UST/UPSS areas is detailed below. Removal of tanks should be conducted in accordance with the Australian Standard AS4976-2008.

1. Address stability issues:

- If required, geotechnical advice should be sought regarding the stability of adjacent structures and/or adjacent areas prior to commencing the excavation.

2. Mark the UST/UPSS Area:

- Prior to the commencement of excavation, the remediation area should be clearly marked with spray paint and/or pegs.

3. Site Preparation:

- The pavement in the remediation area should be removed with care using an excavator or similar.

4. Excavation of fill soils above the UPSS:

- Fill materials (usually sand) located above and around the UST/UPSS should be excavated and placed in a stockpile. Care should be taken not to puncture the tank with the excavation equipment or strike the tank in any way.

5. Removal of Residual Product:

- Any residual product within the UST and associated pipe work should be pumped out and disposed of by a licensed liquid waste operator.

6. Removal of the UST and UPSS:

- The UST and associated UPSS infrastructure should be removed by an experienced contractor in accordance with the Australian Standard.
- Copies of all documents relating to the disposal of the UST and UPSS infrastructure must be given to the environmental consultant for inclusion in the Validation Report.

7. Purging of Residual Vapour:

- Any residual vapours within the UST should be purged in accordance with Australian Standard AS4976-2008.

8. Excavation of fill material and impacted natural material:

- Any remaining fill material should be excavated and added to the previously stockpiled material.
- Any natural material that appears to be impacted by petroleum hydrocarbons should be excavated and added to the stockpile. As a guide, excavation of the natural material to a depth of approximately 0.5m beyond the base of the UST and approximately 0.5m in all directions horizontally from the UST may be required. The excavation of this material should be conducted under the supervision of an environmental consultant experienced in the validation of tank pits.
- A photoionisation detector should be used during excavation as a guide to identify areas potentially impacted by petroleum hydrocarbons.

9. Waste Classification and Off-site Disposal of Stockpiled Material

- Samples should be collected from the stockpiled material and analysed for the CoPC identified in Section 8.3.
- A waste classification should be assigned to the stockpiled material, in accordance with the NSW EPA Waste Classification Guidelines - Part 1: Classifying Waste (2014[16])
- The material should be disposed of to an appropriately licensed landfill. The landfill should be contacted to obtain the required approvals prior to disposal.
- Copies of all landfill dockets and other waste disposal paperwork must be given to the environmental consultant for inclusion in the Validation Report.

10. Validation Sampling of Excavation Base and Walls

- Validation samples should be obtained from the walls and base of the excavation, in accordance with the validation plan described in Section 11.

11. Sampling and Disposal of Tank Pit Water

- Any water encountered within the excavation should be sampled by the environmental consultant and analysed for CoPC.
- Following the receipt of analytical results, the water should be pumped out of the excavation by a liquid waste disposal contractor and disposed of in accordance with Council and NSW EPA requirements.
- Copies of all liquid waste disposal documents must be given to the environmental consultant for inclusion in the Validation Report.

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[16] NSW EPA, (2014), *Waste Classification Guidelines, Part 1: Classifying Waste.* (referred to as Waste Classification Guidelines 2014)

12. Confirmation of Validation of Excavation & Chasing Out of Residual Contamination

- Prior to backfilling the UST/UPSS excavation, the environmental consultant should confirm that the excavation has been validated in accordance with the validation assessment criteria (VAC).
- If the excavation is not yet validated (i.e. impacted material remains in the excavation at concentrations above the VAC) additional excavation of the impacted material should be conducted under the supervision of the environmental consultant. This is commonly known as “chasing out” residual contamination.
- The additional excavated material should be assigned a waste classification and disposed off-site.
- Additional validation samples should be collected from the base and/or walls of the excavation as required.

13. Backfilling of Excavation

- Geotechnical advice should be sought regarding the requirements of any backfill material used for the reinstatement of remediation areas.
- Following confirmation from the environmental consultant that the excavation has been validated in accordance with the VAC, the excavation should be backfilled with suitable imported material, as detailed in Section 11.3.
- Alternatively, if the stockpiled fill and natural material excavated from around the UST meets the Validation Assessment Criteria detailed in Section 11.2, it may be suitable for backfilling the excavations.

11 VALIDATION

11.1 Validation Sampling Requirements

The requirements for validation sampling of the remediation areas have been adapted from the recommendations contained in the NSW EPA document *Technical Note: Investigation of Service Station Sites*[17]. The validation sampling requirements for the site are detailed below:

- Excavation Walls and Base: validation samples should be collected from each excavation wall and base as follows:
    - If the tank length was less than 4m, at least one sample should be collected per wall and base;
    - If the tank length was between 4m and 10m, at least two samples should be collected per wall and at least two samples from the base, under each end;
    - If the tank was longer than 10m, at least three samples should be collected from each wall and at least three samples collected from the base, including under each end.

  Samples from both the walls and base should be collected from at or below the depth of the base of the former tank. Samples should be obtained at a depth of between 0-200mm into the soil.

- Fuel Lines: one sample should be collected for every 5m of line. Samples should be collected from depths of approximately 0-200mm into the soil.

11.2 Validation Assessment Criteria

The site specific VAC are outlined in the table below. The VAC have been derived from NEPM 2013.

Table 11-1: VAC Adopted for the Remediation

Guideline	Applicability
Health Investigation Levels (HILs)	The HIL-D criteria for commercial/industrial sites will be adopted for the assessment.
Health Screening Levels (HSLs)	The HSL D criteria for commercial/industrial sites will be adopted for the assessment.
Direct Contact Limits for TRH	These guidelines will be used after considering the relevant HSLs for adverse effects of TRH contamination where necessary.

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[17] NSW EPA (2014) *Technical Note: Investigation of Service Station Sites*

11.3 Material Importation Requirements

It may be necessary to import material to the site to backfill the excavated areas, or for other construction or landscaping purposes. The material importation requirements are outlined in the following sections of the report.

11.3.1 Material Imported for Backfill of Excavations, Platforms and Ramps

Material classed as VENM should be imported onto the site to use as backfill, platforms or ramps provided it meets the requirements outlined below:

Importation of Virgin Excavated Natural Material (VENM)

The Waste Classification Guidelines 2014 define VENM as natural material (such as clay, gravel, sand, soil or rock fines):

- That has been excavated or quarried from areas that are not contaminated with manufactured chemicals, or with process residues, as a result of industrial, commercial mining or agricultural activities;
- That does not contain sulfidic ores or other waste; and
- Includes excavated natural material that meets such criteria for virgin excavated natural material as may be approved from time to time by a notice published in the NSW Government Gazette.

The following procedures should be adopted for all imported material:

- An inspection of the source site to confirm and document that:
  - Historical and current use of the site has not resulted in contamination of the site;
  - Potential acid sulfate soil materials are not present at the site;
  - The appearance of material excavated from the site is consistent with natural material, i.e. relatively homogenous and without any debris (any fill material should have been removed prior to the inspection);
  - The physical characteristics of the material to be imported, i.e. soil/rock description, colour, etc. This should be confirmed by photographic documentation;
- Source sites should be inspected by an experienced environmental consultant and any relevant reports should be reviewed, prior to acceptance of any material onto the site;
- All material imported as VENM should be accompanied by analytical data showing that the material has been analysed and meets the VAC;
- The material should be inspected on arrival to confirm that the material is consistent with the documentation reviewed from the source site and is free from evidence of contamination; and
- Geotechnical advice should be sought regarding compaction so that all backfilled areas are suitable for the proposed use.

Based on the site inspection and review of any relevant documentation there are likely to be two potential scenarios for selecting an appropriate sampling density:

- The risk of the VENM being impacted by contamination is considered to be low. In this case a minimum of three samples of the VENM should be sampled and analysed from across the site; or
- The risk of the VENM being impacted by contamination is considered to be medium to high. In this case the material should be sampled and analysed in accordance with the Schedule B2 NEPM 2013 guidelines.

A suitable QA/QC procedure should be adopted.

All material importation documents for backfilling remedial areas must be given to the Environmental Consultant for inclusion in the validation report.

11.3.2 Material for Landscaping

The proposed development may require suitable material (topsoil, nutrient-rich soil, etc.) to be imported onto the site for landscaping purposes. In our experience, this type of material generally does not meet the definition of virgin excavated natural material (VENM) as outlined in the Waste Classification Guidelines 2014.

In order to minimise the risk of importing potentially contaminated material onto the site, the following measures should be adopted:

- A reputable supplier of landscaped material should be contacted to identify suitable material for importation;
- Prior to the importation of the material, the following documentation should be obtained from the supplier:
    - Documentation from the source site indicating that the material is VENM or natural soil;
    - Regular laboratory testing data indicating that the material is not contaminated. The laboratory testing results should be reviewed by the Environmental Consultant; and
    - Product details and other documents.

An inspection of the source material should be undertaken prior to importation onto the site.

- The analytical data should be assessed against the site specific VAC;
- Provided that the analysis results do not exceed the VAC, the material can be imported onto the site and stockpiled away from the remediation area or any other stockpiles located on site;
- Upon importation, the material should be inspected to confirm that the material is the same as what was initially sampled/supplied and is free from evidence of contamination; and
- Some QA/QC samples of the imported material should be obtained and analysed to confirm the status of the material.

11.3.3 Importation of Recycled Material (RM)

Recycled material such as crushed concrete, bricks, AC, road base, gravel etc. may be required for the development. Such materials should only be sourced from licensed suppliers who can demonstrate that adequate testing is undertaken on a regular basis to meet the waste exemption requirements set out by the NSW EPA.

Recycled material should be accompanied by appropriate documentation verifying that the material meets the waste exemption requirements set out by the NSW EPA. The material should be inspected on arrival by the Environmental Consultant to confirm that the material is consistent with the documentation reviewed from the source site. At a minimum two samples are to be analysed for heavy metals, PAHs and asbestos and forwarded to a NATA-accredited laboratory for analysis. The recycled material must be quarantined until results are known. The results must satisfy the criteria specified for that particular waste exemption.

Recycled material can only be used as engineered fill in areas specified in the exemption guidelines provided it is geotechnically suitable.

All material importation documents should be issued to the Project Manager and the Environmental Consultant for inclusion in the validation report.

11.4 Validation Report

As part of the validation process, a site validation report should be prepared by the Environmental Consultant. The report should outline the remediation work undertaken at the site and any deviations to the remediation strategy. The report should summarise the results of the validation assessment and should be prepared in accordance with the Guidelines for Consultants Reporting on Contaminated Sites 2011.

The validation report should include:

- Details of the remedial works undertaken at the site;
- The sampling, analysis and quality plan (SAQP) adopted for the validation assessment;
- Details of the validation results including the analytical results assessed against the VAC;
- Details of material disposal analysis and review of contractor documentation;
- Details of material imported onto the site;
- Any deviation to the remediation strategy adopt for the study;
- Data Quality Assessment;
- Details of on-going monitoring and/or management requirements;
- Results from any additional investigation; and
- A statement that the remediated site is suitable for the proposed land use.

12 CONTINGENCY PLAN

A review of the proposed remediation works has indicated that the greatest risk that may affect the success of the remediation is an unexpected find during development work.

12.1 Unexpected Finds

There is a possibility that additional hazards exist at the site. The extent of the contamination has been interpreted from point source data and a documented process of reviewing historical site activities. However, ground conditions may vary between sampling locations and additional hazards may arise as result.

Residual hazards that may exist at the site would generally be expected to be detectable through visual or olfactory means. At this site, these types of hazards may include odorous or stained hydrocarbon impacted soils, demolition waste or ash and slag contaminated soils.

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

- In the event of an unexpected find, all work in the immediate vicinity should cease and the client should be contacted immediately;
- Temporary barricades should be erected to isolate the area from access to the public and works;
- In the event that potentially friable asbestos material is encountered, a qualified occupational hygienist and/or asbestos consultant should be contacted;
- The client should engage the environmental consultant to attend the site and assess the extent of remediation that may be required and/or adequately characterise the contamination;
- In the event remediation is required, the procedures outlined within this report should be adopted where appropriate, alternatively an additional RAP should be prepared;
- An additional sampling and analytical rationale should be established by the environmental consultant and should be implemented with reference to the relevant guideline documents; and
- Appropriate validation sampling should be undertaken and the results should be included in the validation report.

12.2 Importation Failure for VENM or Landscaping Soil Materials

Where material to be imported onto the site does not meet the importation acceptance criteria detailed in Section 11.3, the only option is to not accept the material. Alternative material must be sourced that meets the importation requirements.

13 SITE MANAGEMENT PLAN FOR REMEDIATION WORKS

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

13.1 Interim Site Management

The following interim measures should be adopted:

- Maintain fences to prevent access to the site;
- Construct new fences following demolition of the existing buildings where necessary;
- Entrances to the site should be locked to prevent unauthorised access, tipping or dumping on the site; and
- Appropriate warning signage should be erected as required.

13.2 Project Contacts

Emergency procedures and contact telephone numbers should be displayed in a prominent position at the site entrance gate and within the main site working areas. The contacts will also facilitate registration of complaint acceptance points. The primary point for complaint acceptance will be the Project Manager. The contact details of key project personnel are summarised below.

Table 13-1: Project Contacts

Task	Company	Contact Details
Project Manager	To be advised	To be advised
Remediation Contractor	To be advised	To be advised
Environmental Consultant	Environmental Investigation Services	9888 5000
Certifier	To be advised	To be advised
NSW EPA	Pollution Line	131 555
Emergency Services	Ambulance, Police, Fire	000

13.3 Security

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

13.4 Site Soil and Water Management Plan

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

All stockpiled materials should be placed within an erosion containment boundary with silt fences and sandbags employed to limit sediment movement. The containment area should be located away from drainage lines, gutters, stormwater pits and inlets and the site boundary. No liquid waste or runoff should be discharged to the stormwater or sewerage system without the approval of the appropriate authorities.

13.5 Noise and Vibration Control Plan

The guidelines for minimisation of noise on construction sites outlined in Australian Standard AS-2460 (2002[18]) should be adopted. Other measures specified in the consent conditions should also be complied with.

Noise producing machinery and equipment should only be operated between the hours approved by Council (refer to DA consent documents).

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

13.6 Dust Control Plan

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

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

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

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

- Use of water sprays on unsealed or exposed soil surfaces;
- Covering of stockpiled materials and excavation faces (particularly during periods of site inactivity and/or during windy conditions) or alternatively the erection of hessian fences around stockpiled soil or large exposed areas of soil;
- Establishment of dust screens consisting of a 2m high shade cloth or similar material secured to a chain wire fence;
- Maintenance of dust control measures to keep the facilities in good operating condition;
- Concrete surfaces brushed or washed to remove dust;
- Stopping work during strong winds;
- Loading or unloading of dry soil as close as possible to stockpiles to prevent spreading of loose material around the site; and
- The expanse of cleared land should be kept to a minimum to achieve a clean and economical working environment.

If stockpiles are to remain on-site or an excavation remains open for a period of longer than three days, dust monitoring should be undertaken at the site. If excessive dust is generated all site activities should cease until either wind conditions are more acceptable or a revised method of excavation/remediation is developed.

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

All equipment and machinery should be brushed or washed down before leaving the site to limit dust and sediment movement off-site. In the event of prolonged rain and lack of paved areas all vehicles should be washed down prior to exit from the site, and any soil or dirt on the wheels of the vehicles removed. Water used to clean the vehicles should be collected and tested prior to appropriate disposal under the Waste Classification Guidelines 2014.

13.7 Odour Control Plan

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

- Maintenance of construction equipment so that exhaust emissions comply with the Clean Air Regulations issued under the POEO Act 1997[19];
- Demolition materials and other combustible waste should not be burnt on site;
- The spraying of a solution of Biosolve or other appropriate product if required to suppress any odours that may be generated by excavated materials; and

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

- Use of protective covers (e.g. tarpaulins).

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

If the disturbance of contaminated soils results in odorous conditions, the following odour management plan should be implemented to limit the exposure of site personnel and surrounding residents to unpleasant odours:

- Excavation and stockpiling of material should be scheduled during periods with low winds if possible;
- Biosolve or a similar product should be sprayed on material during excavation and following stockpiling to reduce odours;
- All complaints from workers and neighbours should be logged and a response provided. Work should be rescheduled as necessary to minimise odour problems;
- The site foreman should consider the following odour control measures as outlined in NEPM 2013:
  - reduce the exposed surface of the odorous materials;
  - time excavation activities to reduce off-site nuisance (particularly during strong winds); and
  - cover exposed excavation faces overnight or during periods of low excavation activity.
- If continued complaints are received, alternative odour management strategies should be considered and implemented.

13.8 Health and Safety Plan

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

As a minimum requirement, personnel must wear appropriate protective clothing, including long sleeve shirts, long trousers and steel cap boots.

Washroom and lunchroom facilities should also be provided to allow workers to remove potential contamination from their hands and clothing prior to eating or drinking.

13.9 Waste Management

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

13.10 Incident Management Contingency

The environmental consultant should be contacted if any unexpected conditions are encountered at the site. This should enable the scope of remedial and validation works to be adjusted as required. Similarly if any incident occurs on site, such as a fuel spill or oil leaking from equipment, the environmental consultant should be advised to assess potential impacts on site contamination conditions and the remediation and validation timetable.

13.11 Hours of Operation

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

14 CONCLUSION

EIS are of the opinion that the site can be made suitable for the proposed development provided the recommendations in this RAP are successfully implemented, including a validation assessment.

14.1 Remediation Category

Site remediation can fall under the following two categories outlined in SEPP55:

Table 14-1: Remediation Category

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

The remediation works are Category 1 works under SEPP 55 because the site is a listed heritage item, and accordingly DA0307/17 seeks development consent for those remediation works.

15 LIMITATIONS

The report limitations are outlined below:

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

LIST OF IN-TEXT TABLES

IMPORTANT INFORMATION ABOUT THIS REPORT

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

The Report is based on a Unique Set of Project Specific Factors

This report has been prepared in response to specific project requirements as stated in the EIS proposal document which may have been limited by instructions from the client. This report should be reviewed, and if necessary, revised if any of the following occur:

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

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

Changes in Subsurface Conditions

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

This Report is based on Professional Interpretations of Factual Data

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

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

Assessment Limitations

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

Misinterpretation of Site Assessments by Design Professionals

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

Logs Should not be Separated from the Assessment Report

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

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

Read Responsibility Clauses Closely

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

REPORT FIGURES

SOURCE: http://www.whereis.com/

AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.5.1557
AERIAL IMAGE ©: 2015 GOOGLE INC.

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

Title:
SITE LOCATION PLAN

Location: 950 PACIFIC HIGHWAY & 2 BRIDGE STREET
PYMBLE, NSW

Report No: E24542KM
Figure No: 1

ENVIRONMENTAL INVESTIGATION SERVICES

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© EIS

LEGEND

- - - APPROXIMATE SITE BOUNDARY

🟨 EMP MANAGEMENT AREA

0 10 20 30 40 50

SCALE 1:1000 @A3 METRES

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

Title:
SITE LAYOUT PLAN

Location: 950 PACIFIC HIGHWAY & 2 BRIDGE STREET
PYMBLE, NSW

Report No: E24542KM

Figure No: 2

ENVIRONMENTAL INVESTIGATION SERVICES

EIS

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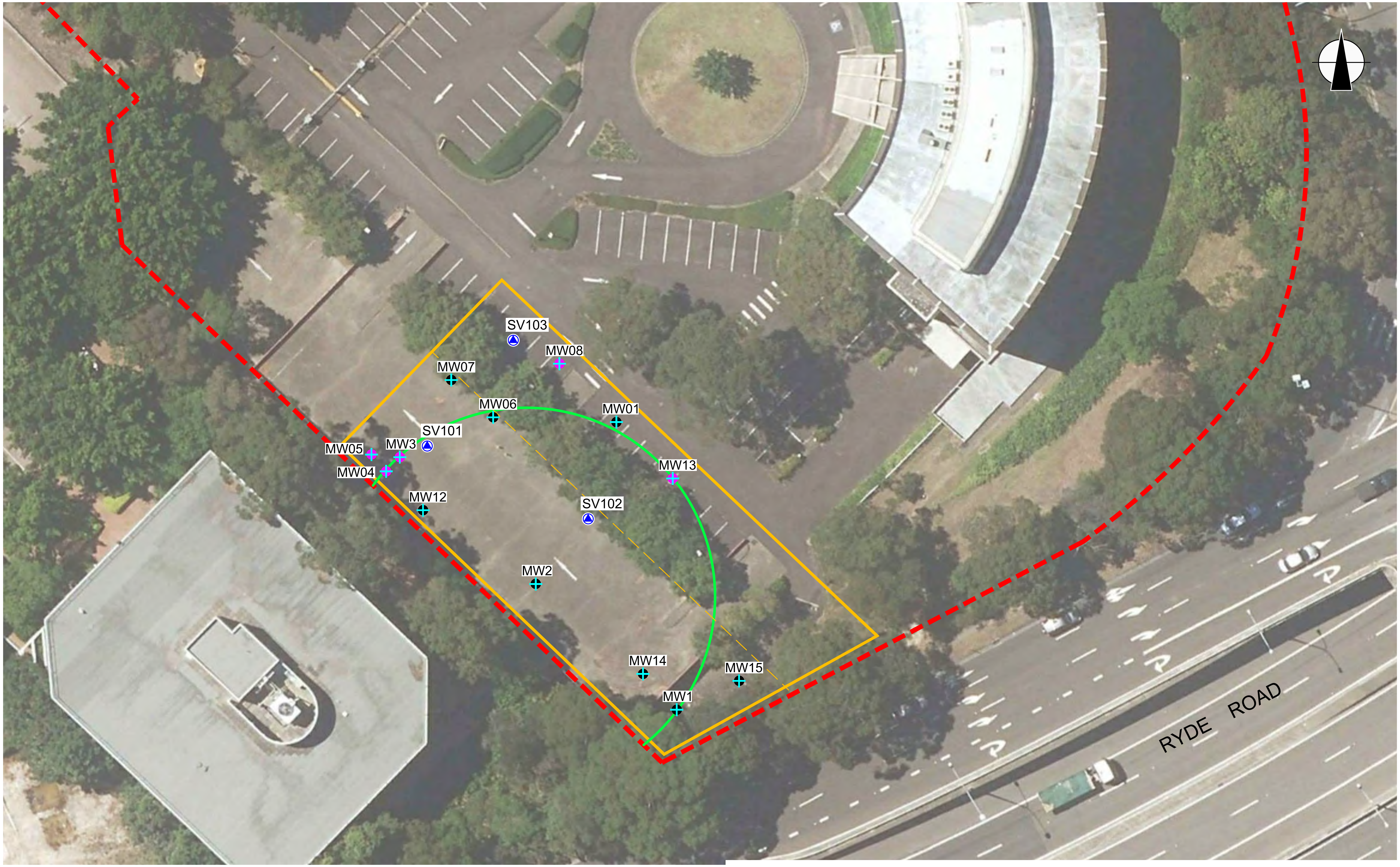

LEGEND

✚	MW	GROUND WATER MONITORING WELL LOCATION, SAMPLED DURING THIS ASSESSMENT
✚	MW	GROUND WATER MONITORING WELL LOCATION, (WSP)
▲	SV	SOIL VAPOUR WELLS

🟥	APPROXIMATE SITE BOUNDARY
🟨	EMP MANAGEMENT AREA
🟩	FOOTPRINT OF FORMER GASHOLDER INFERRED FROM HISTORICAL AERIALS)

0 4 8 12 16 20
SCALE 1:400 @A3 METRES

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

Title:
ASSESSMENT AREA PLAN

Location: 950 PACIFIC HIGHWAY & 2 BRIDGE STREET
PYMBLE, NSW

Report No: E24542KM
Figure No: 3

ENVIRONMENTAL INVESTIGATION SERVICES

EIS

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LABORATORY SUMMARY TABLES

TABLE A
GROUNDWATER LABORATORY RESULTS COMPARED TO HSLs
All data in µg/L unless stated otherwise

				C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene	PID [2]
PQL - Envirolab Services				10	50	1	1	1	3	1	
Land Use Category [1]				COMMERCIAL/INDUSTRIAL							
Sample Reference	**Water Depth**	**Depth Category[3]**	**Soil Category**								
MW3	6.57	4m to <8m	Sand	3000	210	8100	1400	65	390	300	211
MW04	7.43	4m to <8m	Sand	1300	800	8800	1300	280	360	810	342
MW05	6.98	4m to <8m	Sand	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0
MW08	6.74	4m to <8m	Sand	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0
MW13	9.32	8m+	Sand	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0
Total Number of Samples				5	5	5	5	5	5	5	5
Maximum Value				3000	800	8800	1400	280	390	810	342

Explanation:
1 - Groundwater Investigation Levels (GILs): NEPM 2013
2 - Field PID values obtained from the monitroing well headspace during the investigation
3 - The depth category used for calculating the HSL is based on the observed standing water levels in relation to the proposed building/basement finished floor level for the proposed development.

Concentration above the SAC	VALUE
Site specific assesment (SSA) required	VALUE

The guideline corresponding to the elevated value is highlighted in grey in the Site Assessment Criteria Table below

Abbreviations:

UCL: Upper Level Confidence Limit on Mean Value	PQL: Practical Quantitation Limit
HSLs: Health Screening Levels	LPQL: Less than PQL
NA: Not Analysed	SAC: Site Assessment Criteria
NC: Not Calculated	NEPM: National Environmental Protection Measure
NL: Not Limiting	SSA: Site Specific Assessment

HSL GROUNDWATER ASSESSMENT CRITERIA

				C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene
PQL - Envirolab Services				10	50	1	1	1	3	1
Land Use Category [1]				COMMERCIAL/INDUSTRIAL						
Sample Reference	**Water Depth**	**Depth Category[3]**	**Soil Category**							
MW3	6.57	4m to <8m	Sand	6000	NL	5000	NL	NL	NL	NL
MW04	7.43	4m to <8m	Sand	6000	NL	5000	NL	NL	NL	NL
MW05	6.98	4m to <8m	Sand	6000	NL	5000	NL	NL	NL	NL
MW08	6.74	4m to <8m	Sand	6000	NL	5000	NL	NL	NL	NL
MW13	9.32	8m+	Sand	7000	NL	5000	NL	NL	NL	NL

				C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene
PQL - Envirolab Services				10	50	1	1	1	3	1
Land Use Category [1]				COMMERCIAL/INDUSTRIAL						
Sample Reference	**Water Depth**	**Depth Category[3]**	**Soil Category**							
MW3	6.57	4m to <8m	Silt	NL	NL	30000	NL	NL	NL	NL
MW04	7.43	4m to <8m	Silt	NL	NL	30000	NL	NL	NL	NL
MW05	6.98	4m to <8m	Silt	NL	NL	30000	NL	NL	NL	NL
MW08	6.74	4m to <8m	Silt	NL	NL	30000	NL	NL	NL	NL
MW13	9.32	8m+	Silt	NL	NL	30000	NL	NL	NL	NL

				C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene
PQL - Envirolab Services				10	50	1	1	1	3	1
Land Use Category [1]				COMMERCIAL/INDUSTRIAL						
Sample Reference	**Water Depth**	**Depth Category[3]**	**Soil Category**							
MW3	6.57	4m to <8m	Clay	NL	NL	30000	NL	NL	NL	NL
MW04	7.43	4m to <8m	Clay	NL	NL	30000	NL	NL	NL	NL
MW05	6.98	4m to <8m	Clay	NL	NL	30000	NL	NL	NL	NL
MW08	6.74	4m to <8m	Clay	NL	NL	30000	NL	NL	NL	NL
MW13	9.32	8m+	Clay	NL	NL	35000	NL	NL	NL	NL

TABLE B

GROUNDWATER LABORATORY RESULTS COMPARED TO GILs

All results in µg/L unless stated otherwise.

	PQL Envirolab Services	GIL - ANZECC 2000 ^{1} Fresh Waters	SAMPLES				
			MW3	MW04	MW05	MW08	MW13
Non-Metallic Inorganics							
Ammonia (as NH_3-N at pH 8) (mg/L)	0.005	900	98	100	0.29	0.22	5.5
Cyanide (as un-ionised Cn) (mg/L)	0.004	7	0.088	2.4	0.012	LPQL	0.48
Metals and Metalloids							
Arsenic (As lll)	1	24	1	6	3	6	LPQL
Cadmium	0.1	0.2	LPQL	LPQL	LPQL	LPQL	LPQL
Chromium (total)	1	1 $^{a\wedge}$	LPQL	LPQL	LPQL	LPQL	LPQL
Copper	1	1.4	5	11	LPQL	LPQL	LPQL
Lead	1	3.4	LPQL	LPQL	LPQL	LPQL	LPQL
Total Mercury (inorganic)	0.05	0.06	LPQL	LPQL	LPQL	LPQL	LPQL
Nickel	1	11	3	4	1	11	LPQL
Zinc	1	8	7	5	12	48	3
Total Recoverable Hydrocarbons (TRH)							
C_6-C_9 (assessed using F1)	10	NSL	3000	1300	LPQL	LPQL	LPQL
>C_9-C_{14} (assessed using F2)	50	NSL	210	800	LPQL	LPQL	LPQL
Monocyclic Aromatic Hydrocarbons (BTEX Compounds)							
Benzene	1	950	8100	8800	LPQL	LPQL	LPQL
Toluene	1	180 ^{a}	1400	1300	LPQL	LPQL	LPQL
Ethylbenzene	1	80 ^{a}	65	280	LPQL	LPQL	LPQL
m+p-xylene	2	75 ^{m}	250	230	LPQL	LPQL	LPQL
o-xylene	1	350 ^{a}	140	130	LPQL	LPQL	LPQL
Total xylenes	2	NSL	390	360	LPQL	LPQL	LPQL
Volatile Organic Compounds (VOCs), including chlorinated VOCs							
Dichlorodifluoromethane	10	NSL	LPQL	LPQL	LPQL	LPQL	LPQL
Chloromethane	10	NSL	LPQL	LPQL	LPQL	LPQL	LPQL
Vinyl Chloride	10	100 ^{a}	LPQL	LPQL	LPQL	LPQL	LPQL
Bromomethane	10	NSL	LPQL	LPQL	LPQL	LPQL	LPQL
Chloroethane	10	NSL	LPQL	LPQL	LPQL	LPQL	LPQL
Trichlorofluoromethane	10	NSL	LPQL	LPQL	LPQL	LPQL	LPQL
1,1-Dichloroethene	1	700 ^{a}	LPQL	LPQL	LPQL	LPQL	LPQL
Trans-1,2-dichloroethene	1	NSL	LPQL	LPQL	LPQL	LPQL	LPQL
1,1-dichloroethane	1	90 ^{a}	LPQL	LPQL	LPQL	LPQL	LPQL
Cis-1,2-dichloroethene	1	NSL	LPQL	LPQL	LPQL	LPQL	LPQL
Bromochloromethane	1	NSL	LPQL	LPQL	LPQL	LPQL	LPQL
Chloroform	1	370 ^{a}	LPQL	LPQL	LPQL	LPQL	LPQL
2,2-dichloropropane	1	NSL	LPQL	LPQL	LPQL	LPQL	LPQL
1,2-dichloroethane	1	1900 ^{a}	LPQL	LPQL	LPQL	LPQL	LPQL
1,1,1-trichloroethane	1	270^{a}	LPQL	LPQL	LPQL	LPQL	LPQL
1,1-dichloropropene	1	NSL	LPQL	LPQL	LPQL	LPQL	LPQL
Cyclohexane	1	NSL	LPQL	LPQL	LPQL	LPQL	LPQL
Carbon tetrachloride	1	240 ^{a}	LPQL	LPQL	LPQL	LPQL	LPQL
Benzene	1	see BTEX	8100	8800	LPQL	LPQL	LPQL
Dibromomethane	1	NSL	LPQL	LPQL	LPQL	LPQL	LPQL
1,2-dichloropropane	1	900 ^{a}	LPQL	LPQL	LPQL	LPQL	LPQL
Trichloroethene	1	330 ^{n}	LPQL	LPQL	LPQL	LPQL	LPQL
Bromodichloromethane	1	NSL	LPQL	LPQL	LPQL	LPQL	LPQL
trans-1,3-dichloropropene	1	0.1 ^{p}	LPQL	LPQL	LPQL	LPQL	LPQL
cis-1,3-dichloropropene	1	0.1 ^{p}	LPQL	LPQL	LPQL	LPQL	LPQL
1,1,2-trichloroethane	1	6500	LPQL	LPQL	LPQL	LPQL	LPQL
Toluene	1	see BTEX	1400	1300	LPQL	LPQL	LPQL
1,3-dichloropropane	1	1100 ^{a}	LPQL	LPQL	LPQL	LPQL	LPQL
Dibromochloromethane	1	NSL	LPQL	LPQL	LPQL	LPQL	LPQL
1,2-dibromoethane	1	NSL	LPQL	LPQL	LPQL	LPQL	LPQL
Tetrachloroethene	1	70 ^{a}	LPQL	LPQL	LPQL	LPQL	LPQL
1,1,1,2-tetrachloroethane	1	400 ^{q}	LPQL	LPQL	LPQL	LPQL	LPQL
Chlorobenzene	1	55 ^{a}	LPQL	LPQL	LPQL	LPQL	LPQL
Ethylbenzene	1	see BTEX	65	280	LPQL	LPQL	LPQL
Bromoform	1	NSL	LPQL	LPQL	LPQL	LPQL	LPQL
m+p-xylene	2	see BTEX	250	230	LPQL	LPQL	LPQL
Styrene	1	NSL	72	58	LPQL	LPQL	LPQL
1,1,2,2-tetrachloroethane	1	400 ^{a}	LPQL	LPQL	LPQL	LPQL	LPQL
o-xylene	1	see BTEX	140	130	LPQL	LPQL	LPQL
1,2,3-trichloropropane	1	NSL	LPQL	LPQL	LPQL	LPQL	LPQL
Isopropylbenzene	1	30	LPQL	13	LPQL	LPQL	LPQL
Bromobenzene	1	NSL	LPQL	LPQL	LPQL	LPQL	LPQL
n-propyl benzene	1	NSL	2	8	LPQL	LPQL	LPQL
2-chlorotoluene	1	NSL	LPQL	LPQL	LPQL	LPQL	LPQL
4-chlorotoluene	1	NSL	LPQL	LPQL	LPQL	LPQL	LPQL
1,3,5-trimethyl benzene	1	NSL	8	8	LPQL	LPQL	LPQL
Tert-butyl benzene	1	NSL	LPQL	LPQL	LPQL	LPQL	LPQL
1,2,4-trimethyl benzene	1	NSL	29	31	LPQL	LPQL	LPQL
1,3-dichlorobenzene	1	260 ^{a}	LPQL	LPQL	LPQL	LPQL	LPQL
Sec-butyl benzene	1	NSL	LPQL	LPQL	LPQL	LPQL	LPQL
1,4-dichlorobenzene	1	60 ^{a}	LPQL	LPQL	LPQL	LPQL	LPQL
4-isopropyl toluene	1	NSL	LPQL	LPQL	LPQL	LPQL	LPQL
1,2-dichlorobenzene	1	160 ^{a}	LPQL	LPQL	LPQL	LPQL	LPQL
n-butyl benzene	1	NSL	LPQL	2	LPQL	LPQL	LPQL
1,2-dibromo-3-chloropropane	1	NSL	LPQL	LPQL	LPQL	LPQL	LPQL
1,2,4-trichlorobenzene	1	85	LPQL	LPQL	LPQL	LPQL	LPQL
Hexachlorobutadiene	1	NSL	LPQL	LPQL	LPQL	LPQL	LPQL
1,2,3-trichlorobenzene	1	3	LPQL	LPQL	LPQL	LPQL	LPQL
Polycyclic Aromatic Hydrocarbons (PAHs)							
Naphthalene	0.2	16 ^{a}	170	500	0.5	0.3^{b}	0.5
Acenaphthylene	0.1	NSL	LPQL	LPQL	LPQL	LPQL	LPQL
Acenaphthene	0.1	NSL	0.1	0.2	LPQL	LPQL	LPQL
Fluorene	0.1	NSL	LPQL	0.2	LPQL	LPQL	LPQL
Phenanthrene	0.1	0.6 ^{c}	0.3	0.5	LPQL	LPQL	LPQL
Anthracene	0.1	0.01 ^{c}	LPQL	LPQL	LPQL	LPQL	LPQL
Fluoranthene	0.1	1 ^{c}	LPQL	LPQL	LPQL	LPQL	LPQL
Pyrene	0.1	NSL	LPQL	LPQL	LPQL	LPQL	LPQL
Benzo(a)anthracene	0.1	NSL	LPQL	LPQL	LPQL	LPQL	LPQL
Chrysene	0.1	NSL	LPQL	LPQL	LPQL	LPQL	LPQL
Benzo(b,j+k)fluoranthene	0.2	NSL	LPQL	LPQL	LPQL	LPQL	LPQL
Benzo(a)pyrene	0.1	0.1 ^{c}	LPQL	LPQL	LPQL	LPQL	LPQL
Indeno(1,2,3-c,d)pyrene	0.1	NSL	LPQL	LPQL	LPQL	LPQL	LPQL
Dibenzo(a,h)anthracene	0.1	NSL	LPQL	LPQL	LPQL	LPQL	LPQL
Benzo(g,h,i)perylene	0.1	NSL	LPQL	LPQL	LPQL	LPQL	LPQL

Explanation:

1 - ANZECC Australian Water Quality Guidelines for Fresh Waters (ANZECC 2000) - Trigger Values for protection of 95% of species
a - In the absence of a high reliability guideline concentration, the moderate or low reliability guideline concentration has been quoted
a^ - The GIL for Cr VI has been adopted as a conservative measure
b - Higher duplicate value adopted as a conservative measure.
c - 99% trigger values adopted due to the potential for bioaccumulation effects
m - Guideline value adopted for m-Xylene. We note that the m-Xylene guideline value is 75ug/L and the p-Xylene guideline value is 200ug/L.
However these two isomers cannot be distinguished analytically, therefore EIS have adopted the more conservative guideline value.
n - In the absence of a guideline value for Trichloroethene, the guideline concentration for 1,1,2 Trichloroethylene has been adopted
p - In the absence of a guideline value for cis or trans 1,3 Dichloropropene, the guideline concentration for 1,3 Dichloropropene has been adopted
q - In the absence of a guideline concentration for 1,1,1,2 Tetrachloroethane, the guideline concentration for 1,1,2,2 Tetrachloroethane has been adopted

Concentration above the GIL	VALUE
PQL exceeds GIL	**BOLD/RED**

Abbreviations:

NA: Not Analysed	PQL: Practical Quantitation Limit
NSL: No Set Limit	LPQL: Less than Practical Quantitation Limit
GIL - Groundwater Investigation Levels	(-) : Not Applicable

TABLE C
SOIL VAPOUR LABORATORY RESULTS COMPARED TO HSLs
All data in mg/m^3 unless stated otherwise

				C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene
PQL - SGS				0.1	0.1	0.005	0.005	0.005	0.005	0.005
Land Use Category [1]				**COMMERCIAL/INDUSTRIAL**						
Sample Reference	**Sample Depth**	**Depth Category**	**Soil Category**							
SV101	0.4m	0m to <1m	Sand	LPQL	0.29	LPQL	LPQL	LPQL	LPQL	LPQL
SV102	0.4m	0m to <1m	Sand	0.39	0.49	LPQL	0.006	LPQL	LPQL	LPQL
SV103	0.4m	0m to <1m	Sand	1.4	0.15	0.015	0.037	0.0065	0.035	LPQL
Total Number of Samples				3	3	3	3	3	3	3
Maximum Value				1.4	0.49	0.015	0.037	0.0065	0.035	LPQL

Explanation:

1 -NEPM 2013

Concentration above the SAC **VALUE**

Abbreviations:

NEPM: National Environmental Protection Measure
HSLs: Health Screening Levels
na: Not Analysed
nc: Not Calculated
NL: Not Limiting

PQL: Practical Quantitation Limit
LPQL: Less than PQL
SAC: Site Assessment Criteria

HSL SOIL VAPOUR ASSESSMENT CRITERIA

				C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene
PQL - Envirolab Services				0.1	0.1	0.005	0.005	0.005	0.005	0.005
Land Use Category [1]				**COMMERCIAL/INDUSTRIAL**						
Sample Reference	**Sample Depth**	**Depth Category**	**Soil Category**							
SV101		0m to <1m	Sand	680	500	4	4800	1300	840	3
SV102		0m to <1m	Sand	680	500	4	4800	1300	840	3
SV103		0m to <1m	Sand	680	500	4	4800	1300	840	3

TABLE D
SOIL VAPOUR LABORATORY RESULTS COMPARED TO INTERIM HILs FOR VOCC
All data in mg/m^3 unless stated otherwise

		TCE	1,1,1-TCA	PCE	cis 1,2 dichloro-ethene	Vinyl chloride
PQL - SGS		0.005	0.005	0.005	0.005	0.005
Site Assessment Criteria (SAC) [1]		0.08	230	8	0.3	0.1
Land Use		**COMMERCIAL/INDUSTRIAL LAND USE**				
Sample Reference	**Sample Depth**					
SV101	0.4m	LPQL	LPQL	LPQL	LPQL	LPQL
SV102	0.4m	LPQL	LPQL	LPQL	LPQL	LPQL
SV103	0.4m	LPQL	LPQL	LPQL	LPQL	LPQL
Total Number of Samples		3	3	3	3	3
Maximum Value		LPQL	LPQL	LPQL	LPQL	LPQL

Explanation:
1 - Site Assessment Criteria (SAC): NEPM 2013

Concentration above the SAC: VALUE

Abbreviations:

PQL: Practical Quantitation Limit	UCL: Upper Level Confidence Limit on Mean Value
LPQL: Less than PQL	HILs: Health Investigation Levels
SAC: Site Assessment Criteria	TCE: Trichloroethylene
NEPM: National Environmental Protection Measure	TCA: trichloroethane
NA: Not Analysed	PCE: Perchloroethylene
NC: Not Calculated	VOCC: Volatile Organic Chlorinated Compounds

TABLE E
GROUNDWATER INTRA-LABORATORY DUPLICATE RESULTS & RPD CALCULATIONS
All results in µg/L unless stated otherwise

SAMPLE	ANALYSIS	Envirolab PQL	INITIAL	REPEAT	MEAN	RPD %
Sample Ref = MW08	Arsenic	1	6	6	6	0
Dup Ref = DUPGFW1	Cadmium	0.1	LPQL	LPQL	NC	NC
	Chromium	1	LPQL	LPQL	NC	NC
Envirolab Report: #178095	Copper	1	LPQL	LPQL	NC	NC
	Lead	1	LPQL	LPQL	NC	NC
	Mercury	0.05	LPQL	LPQL	NC	NC
	Nickel	1	11	12	12	9
	Zinc	1	48	50	49	4
	Naphthalene	0.1	LPQL	0.3	0	143
	Acenaphthylene	0.1	LPQL	LPQL	NC	NC
	Acenaphthene	0.1	LPQL	LPQL	NC	NC
	Fluorene	0.1	LPQL	LPQL	NC	NC
	Phenanthrene	0.1	LPQL	LPQL	NC	NC
	Anthracene	0.1	LPQL	LPQL	NC	NC
	Fluoranthene	0.1	LPQL	LPQL	NC	NC
	Pyrene	0.1	LPQL	LPQL	NC	NC
	Benzo(a)anthracene	0.1	LPQL	LPQL	NC	NC
	Chrysene	0.1	LPQL	LPQL	NC	NC
	Benzo(b,j+k)fluoranthene	0.2	LPQL	LPQL	NC	NC
	Benzo(a)pyrene	0.1	LPQL	LPQL	NC	NC
	Indeno(123-cd)pyrene	0.1	LPQL	LPQL	NC	NC
	Dibenzo(ah)anthracene	0.1	LPQL	LPQL	NC	NC
	Benzo(ghi)perylene	0.1	LPQL	LPQL	NC	NC
	TRH C6-C10 (F1)	10	LPQL	LPQL	NC	NC
	TRH >C10-C16 (F2)	50	LPQL	LPQL	NC	NC
	TRH >C16-C34 (F3)	100	LPQL	LPQL	NC	NC
	TRH >C34-C40 (F4)	100	LPQL	LPQL	NC	NC
	Benzene	1	LPQL	LPQL	NC	NC
	Toluene	1	LPQL	LPQL	NC	NC
	Ethylbenzene	1	LPQL	LPQL	NC	NC
	m+p-xylene	2	LPQL	LPQL	NC	NC
	o-xylene	1	LPQL	LPQL	NC	NC

Explanation:

The RPD value is calculated as the absolute value of the difference between the initial and repeat results divided by the average value expressed as a percentage. The following acceptance criteria will be used to assess the RPD results:

Results > 10 times PQL = RPD value <= 50% are acceptable
Results between 5 & 10 times PQL = RPD value <= 75% are acceptable
Results < 5 times PQL = RPD value <= 100% are acceptable
If result is LPQL then 50% of the PQL is used for the calculation

RPD Results Above the Acceptance Criteria VALUE

Abbreviations:

PQL: Practical Quantitation Limit	OCP: Organochlorine Pesticides
LPQL: Less than PQL	OPP: Organophosphorus Pesticides
NA: Not Analysed	PCBs: Polychlorinated Biphenyls
NC: Not Calculated	TRH: Total Recoverable Hydrocarbons

TABLE F
GROUNDWATER INTER-LABORATORY DUPLICATE RESULTS & RPD CALCULATIONS
All results in µg/L unless stated otherwise

SAMPLE	ANALYSIS	Envirolab PQL	Envirolab VIC PQL	INITIAL	REPEAT	MEAN	RPD %
Sample Ref = MW13	Arsenic	1	1	LPQL	LPQL	NC	NC
Dup Ref = DUPGFW2	Cadmium	0.1	0.1	LPQL	LPQL	NC	NC
	Chromium	1	1	LPQL	LPQL	NC	NC
Envirolab Report: #178095	Copper	1	1	LPQL	LPQL	NC	NC
Envirolab Vic Report: #12159	Lead	1	1	LPQL	LPQL	NC	NC
	Mercury	0.05	0.05	LPQL	LPQL	NC	NC
	Nickel	1	1	LPQL	LPQL	NC	NC
	Zinc	1	1	3	5	4	50
	Naphthalene	0.1	0.1	0.5	LPQL	0.3	163.6
	Acenaphthylene	0.1	0.1	LPQL	LPQL	NC	NC
	Acenaphthene	0.1	0.1	LPQL	LPQL	NC	NC
	Fluorene	0.1	0.1	LPQL	LPQL	NC	NC
	Phenanthrene	0.1	0.1	LPQL	LPQL	NC	NC
	Anthracene	0.1	0.1	LPQL	LPQL	NC	NC
	Fluoranthene	0.1	0.1	LPQL	LPQL	NC	NC
	Pyrene	0.1	0.1	LPQL	LPQL	NC	NC
	Benzo(a)anthracene	0.1	0.1	LPQL	LPQL	NC	NC
	Chrysene	0.1	0.1	LPQL	LPQL	NC	NC
	Benzo(b,j+k)fluoranthene	0.2	0.2	LPQL	LPQL	NC	NC
	Benzo(a)pyrene	0.1	0.1	LPQL	LPQL	NC	NC
	Indeno(123-cd)pyrene	0.1	0.1	LPQL	LPQL	NC	NC
	Dibenzo(ah)anthracene	0.1	0.1	LPQL	LPQL	NC	NC
	Benzo(ghi)perylene	0.1	0.1	LPQL	LPQL	NC	NC
	TRH C6-C10 (F1)	10	10	LPQL	LPQL	NC	NC
	TRH >C10-C16 (F2)	50	50	LPQL	LPQL	NC	NC
	TRH >C16-C34 (F3)	100	100	LPQL	LPQL	NC	NC
	TRH >C34-C40 (F4)	100	100	LPQL	LPQL	NC	NC
	Benzene	1	1	LPQL	LPQL	NC	NC
	Toluene	1	1	LPQL	LPQL	NC	NC
	Ethylbenzene	1	1	LPQL	LPQL	NC	NC
	m+p-xylene	2	2	LPQL	LPQL	NC	NC
	o-xylene	1	1	LPQL	LPQL	NC	NC

Explanation:

The RPD value is calculated as the absolute value of the difference between the initial and repeat results divided by the average value expressed as a percentage. The following acceptance criteria will be used to assess the RPD results:

Results > 10 times PQL = RPD value <= 50% are acceptable
Results between 5 & 10 times PQL = RPD value <= 75% are acceptable
Results < 5 times PQL = RPD value <= 100% are acceptable
If result is LPQL then 50% of the PQL is used for the calculation

RPD Results Above the Acceptance Criteria **VALUE**

Abbreviations:

PQL: Practical Quantitation Limit	OCP: Organochlorine Pesticides
LPQL: Less than PQL	OPP: Organophosphorus Pesticides
NA: Not Analysed	PCBs: Polychlorinated Biphenyls
NC: Not Calculated	TRH: Total Recoverable Hydrocarbons

TABLE G
SOIL VAPOUR INTRA-LABORATORY DUPLICATE RESULTS & RPD CALCULATIONS
All results in mg/m^3 unless stated otherwise

SAMPLE	ANALYSIS	SGS PQL	INITIAL	REPEAT	MEAN	RPD %
Sample Ref = SV102	Dichlorodifluoromethane	0.005	0.022	0.0088	0.0	86
Dup Ref = SV102 Field Dup	Toluene	0.005	0.006	LPQL	0.0	82
	C6-C10	1	0.41	0.27	0.3	41
SGS Report: MI70998	C6-C10 (less BTEX)	1	0.39	0.26	0.3	40
	>C10-C16	1	0.49	0.26	0.4	61
	>C10-C16 (less Naphthalene)	0.1	0.49	0.26	0.4	61

Explanation:

Only analytical results with detections above the PQL have been included in this table.

The RPD value is calculated as the absolute value of the difference between the initial and repeat results divided by the average value expressed as a percentage.

The following acceptancecriteria will be used to assess the RPD results:

Results > 10 times PQL = RPD value <= 50% are acceptable
Results between 5 & 10 times PQL = RPD value <= 75% are acceptable
Results < 5 times PQL = RPD value <= 100% are acceptable

If result is LPQL then 50% of the PQL is used for the calculation

RPD Results Above the Acceptance Criteria	VALUE

Abbreviations:

PQL: Practical Quantitation Limit
LPQL: Less than PQL
NA: Not Analysed
NC: Not Calculated

OCP: Organochlorine Pesticides
OPP: Organophosphorus Pesticides
PCBs: Polychlorinated Biphenyls
TRH: Total Recoverable Hydrocarbons

TABLE H
SUMMARY OF GROUNDWATER FIELD QA/QC RESULTS

ANALYSIS	**Envirolab PQL**		TSW
			23/10/2017
	mg/kg	**µg/L**	% Recovery
Benzene	1	1	87%
Toluene	1	1	96%
Ethylbenzene	1	1	102%
m+p-xylene	2	2	104%
o-xylene	1	1	104%

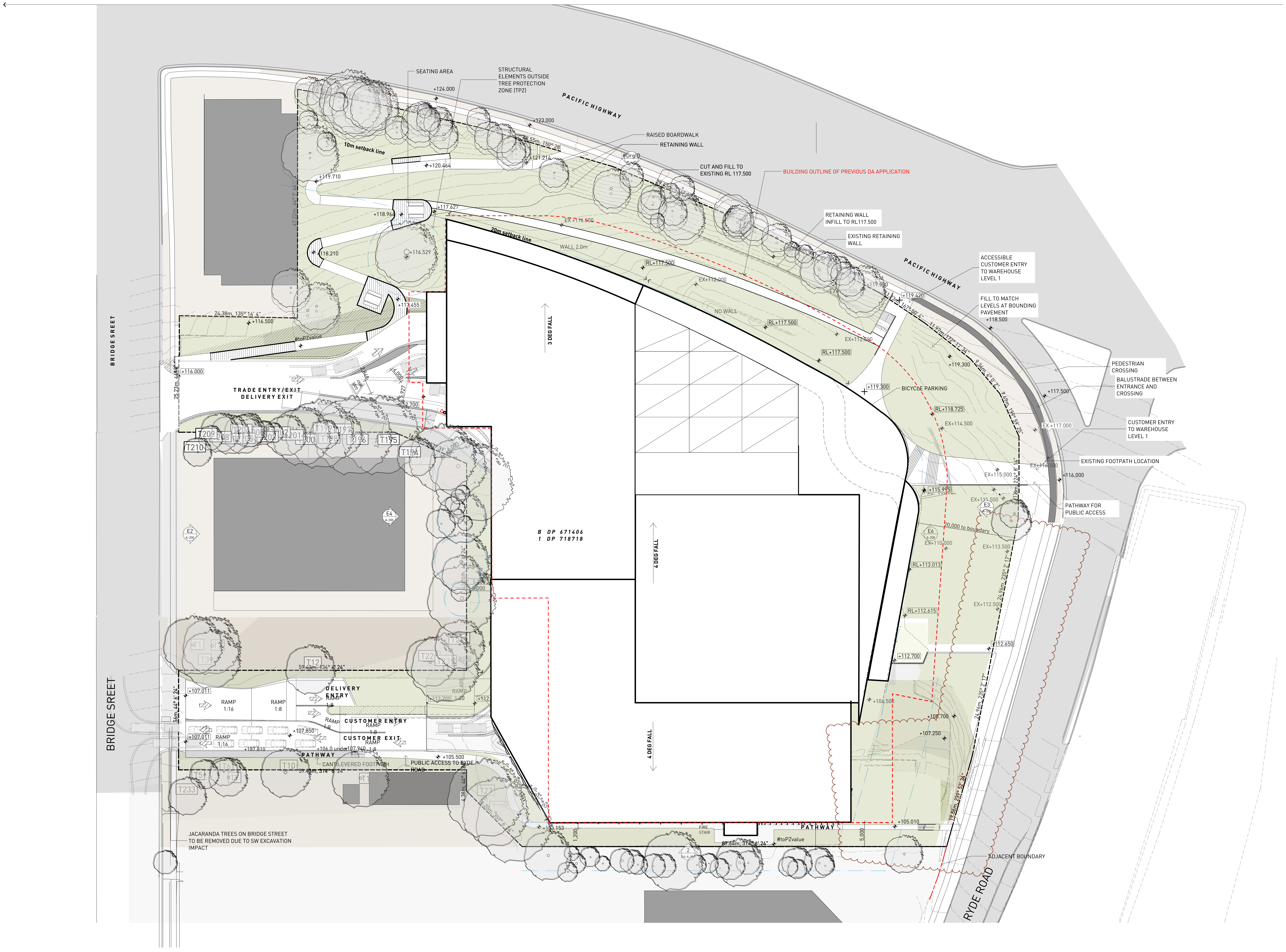
Values above PQLs/Acceptance criteria **VALUE**

Abbreviations:

PQL: Practical Quantitation Limit
LPQL: Less than PQL
NA: Not Analysed
NC: Not Calculated
TB: Trip Blank
TS: Trip Spike
RS: Rinsate Sample
TRH: Total Recoverable Hydrocarbons

REPORT APPENDICES

Appendix A: Proposed Development Plans



RYDE ROAD DRIVEWAY
DELETED.

NOTES

1. NEVER scale off drawings, use figured dimensions only.

2. Verify all dimensions on site prior to commencement & report discrepancies to the architect.

3. Drawings describe scope of works and general set out. These drawings are not shop drawings.

SELECTIONS LEGEND

REFER TO SELECTIONS SCHEDULE FOR FURTHER DETAIL

VERSION
DEVELOPMENT APPLICATION 2
REV AE 10-04-2018

DOCUMENT
SITE PLAN

STAGE
DEVELOPMENT APPLICATION

PROJECT
PYMBLE BUNNINGS
950 PACIFIC HWY
PYMBLE

13_052 DA-A-010

ARCHITECTURE URBAN PLANNING
ABN 96 142 020 693
M1/147 McEvoy Street Alexandria NSW 2015
P 02 9516 2022 **E** email@smithtzannes.com.au
smithtzannes.com.au
Nominated Architect: Peter Smith (Reg 7024)

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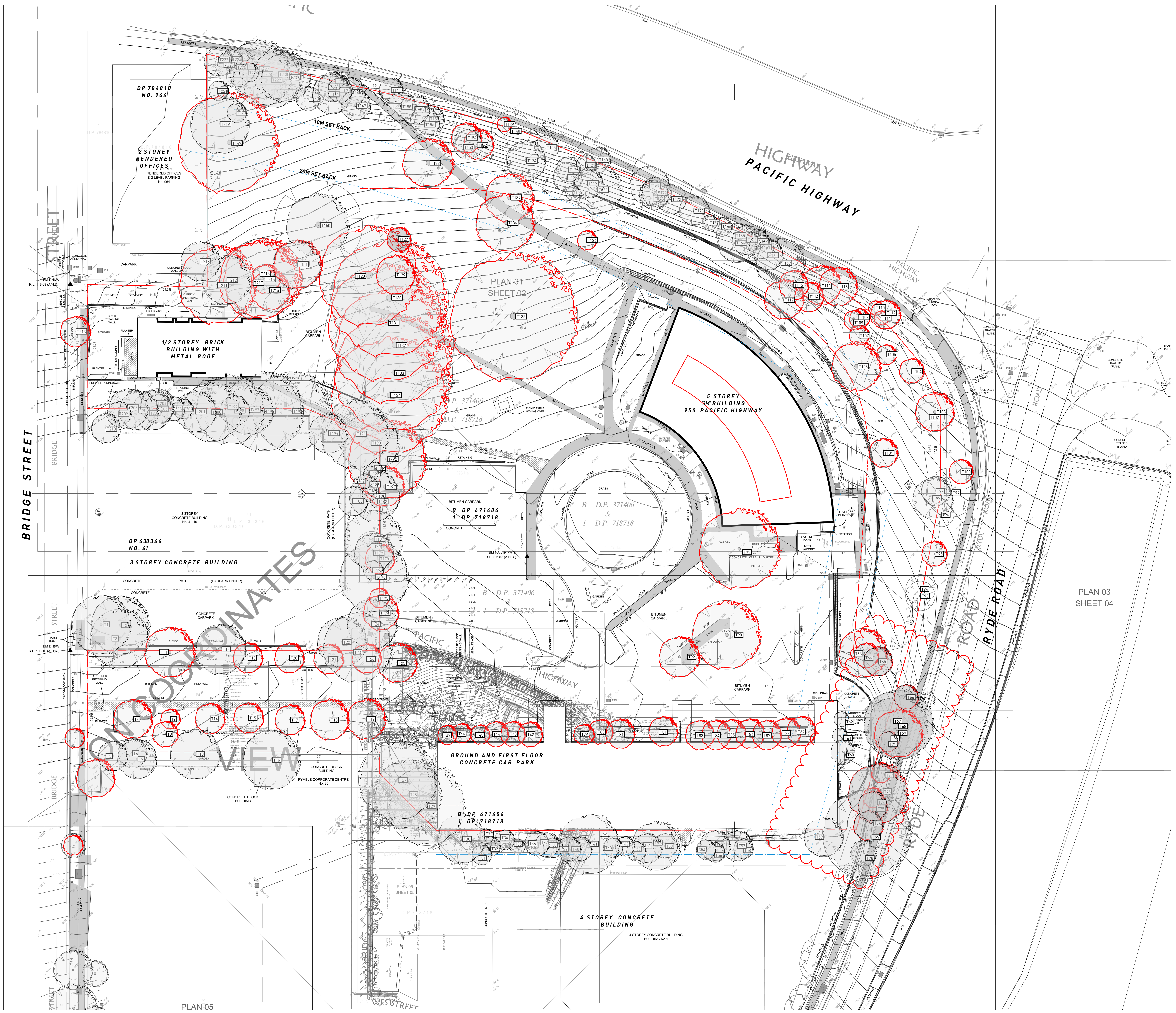

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SELECTIONS LEGEND

REFER TO SELECTIONS SCHEDULE FOR FURTHER DETAIL

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VERSION
DEVELOPMENT APPLICATION
REV K 17-05-2018

DOCUMENT
SITE PLAN DEMOLITION WORKS

STAGE
DEVELOPMENT APPLICATION

PROJECT
PYMBLE BUNNINGS
950 PACIFIC HWY
PYMBLE

BUNNINGS

ARCHITECTURE URBAN PLANNING
ABN 96 142 020 693
M1/147 McEvoy Street Alexandria NSW 2015
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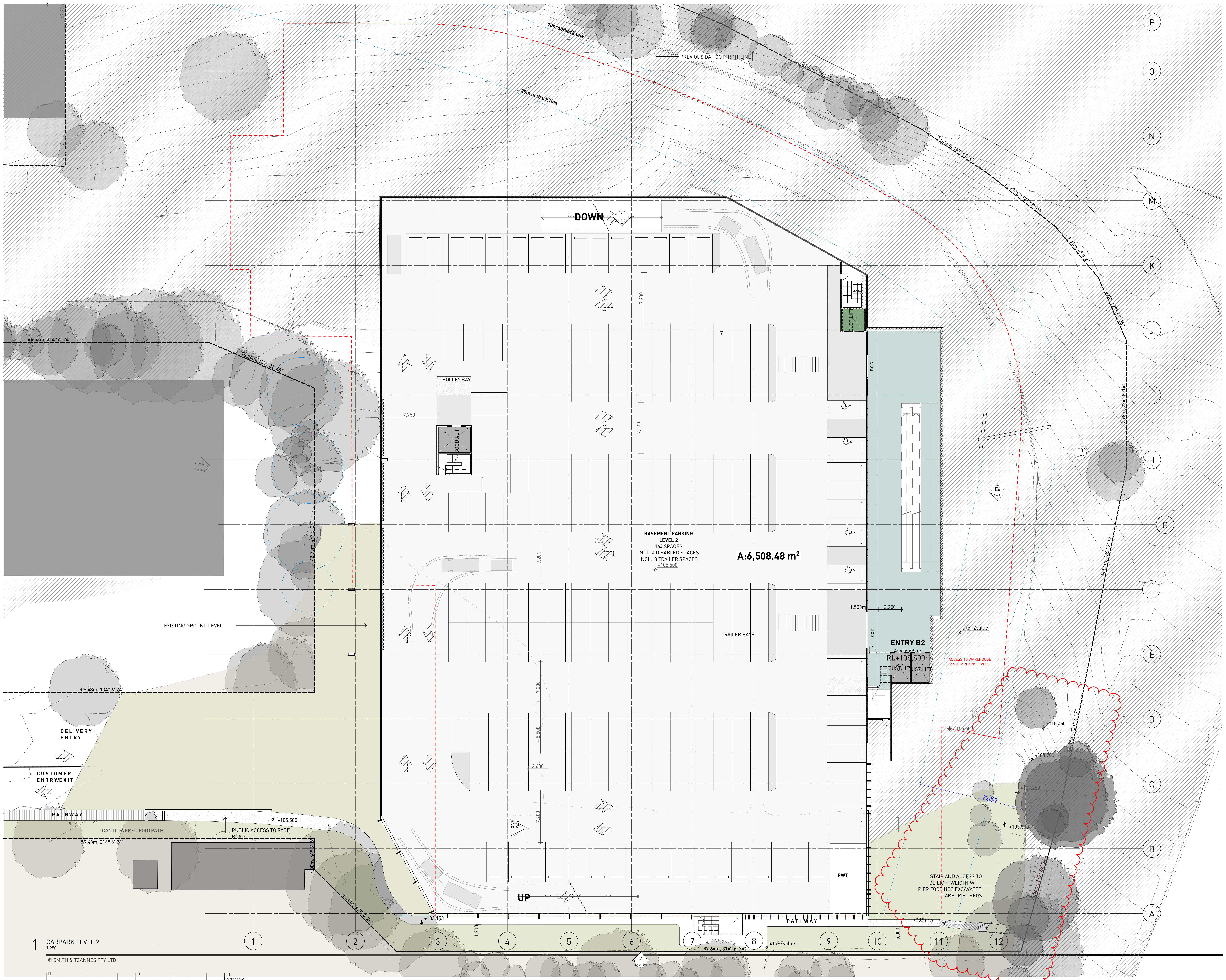
Nominated Architect: Peter Smith (Reg 7024)
SMITH & TZANNES

13_052 DA-A-011



1 CARPARK LEVEL 2
1:250

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SELECTIONS LEGEND

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ZONE LEGEND

WAREHOUSE
NURSERY
TTS
ENTRY
BAGGED GOODS
BACK OF HOUSE

VERSION
DEVELOPMENT APPLICATION 2
REV AE 17-05-2018

DOCUMENT
CARPARK LEVEL 2

STAGE
DEVELOPMENT APPLICATION

PROJECT
PYMBLE BUNNINGS
950 PACIFIC HWY
PYMBLE

BUNNINGS

ARCHITECTURE URBAN PLANNING
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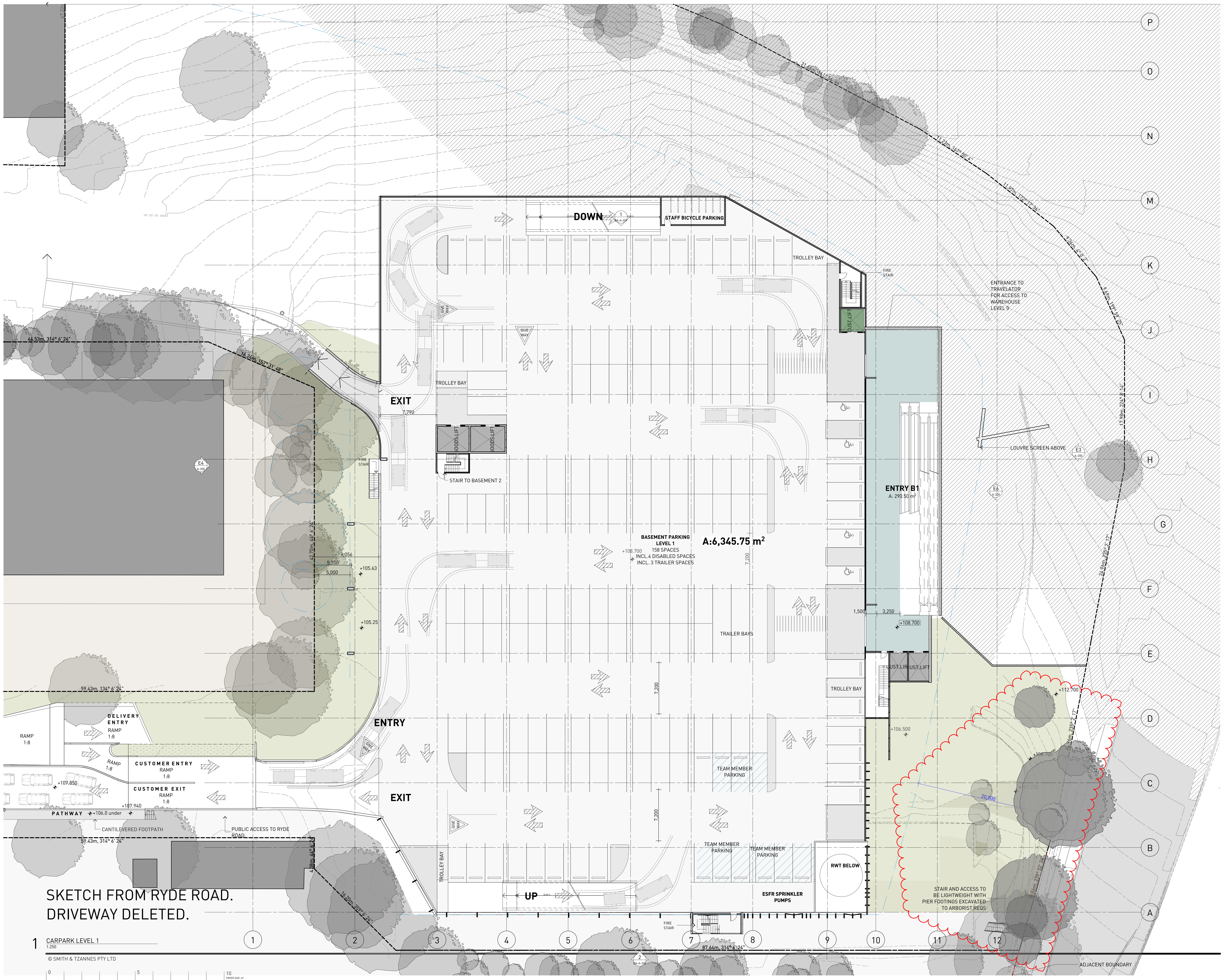
13_052 DA-A-100



SKETCH FROM RYDE ROAD.
DRIVEWAY DELETED.

1 CARPARK LEVEL 1
1:250

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ZONE LEGEND

WAREHOUSE	NURSERY	TTS
ENTRY	BAGGED GOODS	BACK OF HOUSE

VERSION
DEVELOPMENT APPLICATION 2
REV AI 17-05-2018

DOCUMENT
CARPARK LEVEL 1

STAGE
DEVELOPMENT APPLICATION

PROJECT
PYMBLE BUNNINGS
950 PACIFIC HWY
PYMBLE

BUNNINGS

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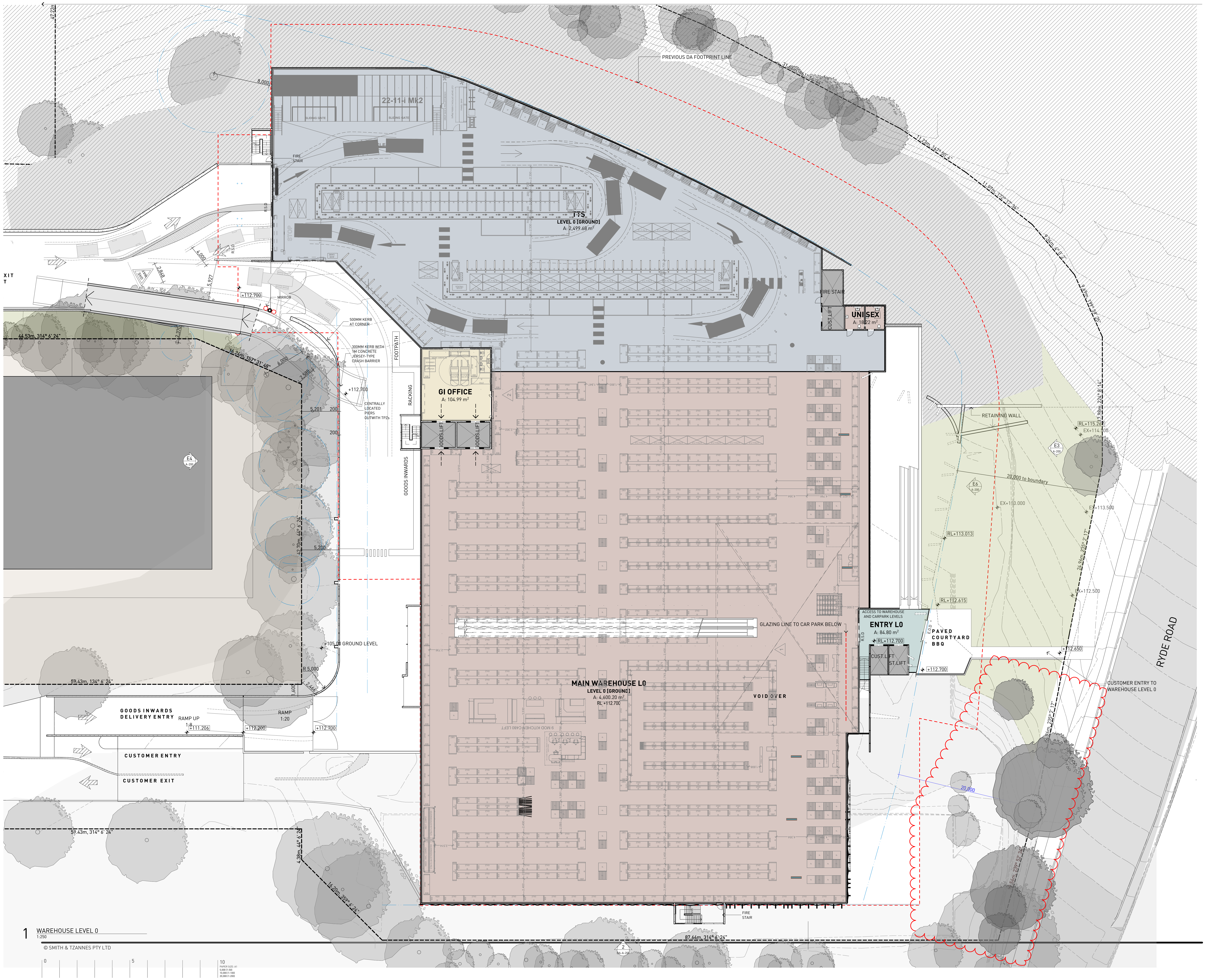
13_052 DA-A-101



1 WAREHOUSE LEVEL 0
1:250

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SELECTIONS LEGEND

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ZONE LEGEND

WAREHOUSE	NURSERY	TTS
ENTRY	BAGGED GOODS	BACK OF HOUSE

VERSION
DEVELOPMENT APPLICATION 2
REV AF 17-05-1018

DOCUMENT
WAREHOUSE LEVEL 0

STAGE
DEVELOPMENT APPLICATION

PROJECT
PYMBLE BUNNINGS
950 PACIFIC HWY
PYMBLE

ARCHITECTURE URBAN PLANNING
ABN 96 142 020 693
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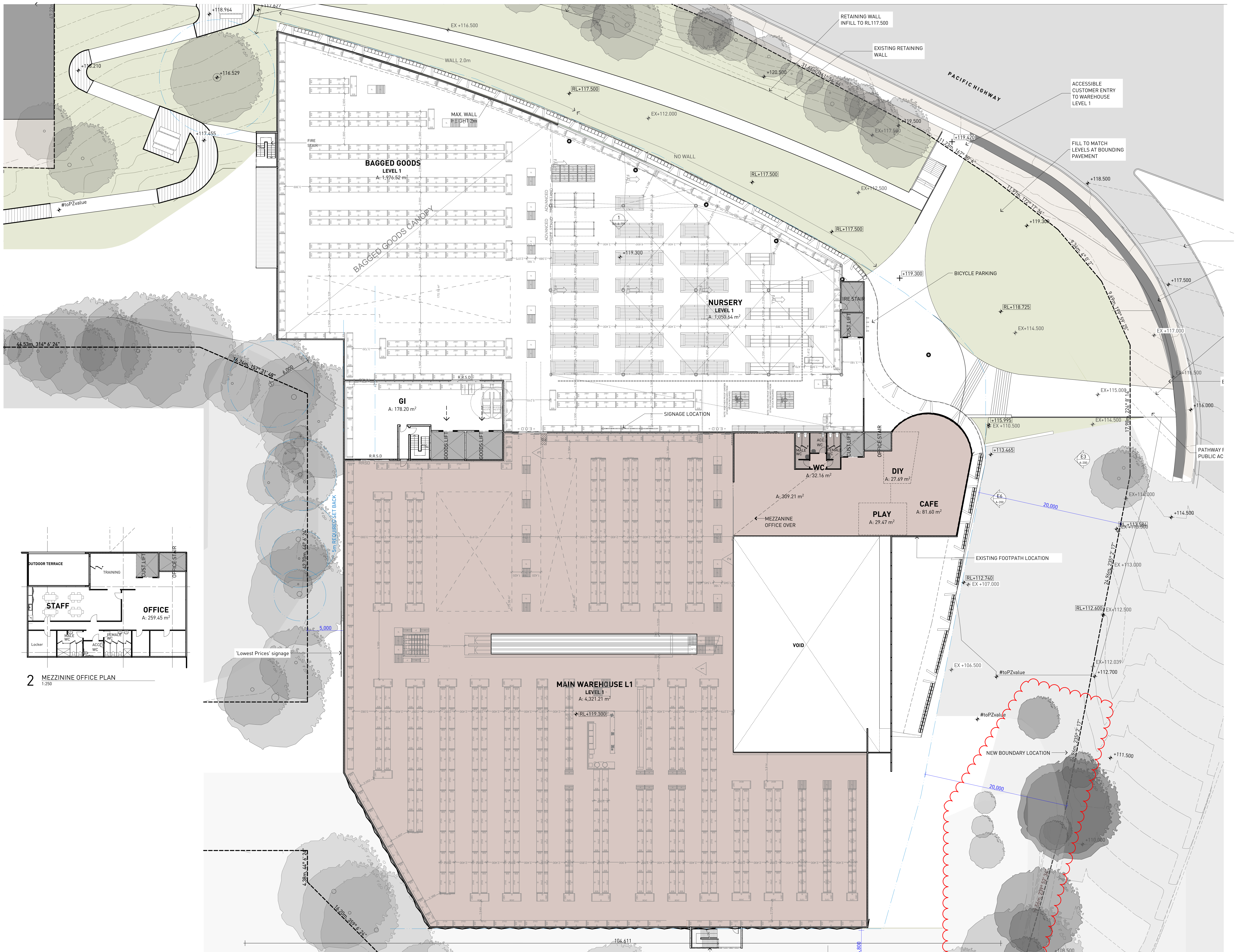
13_052 DA-A-102



2 MEZZININE OFFICE PLAN
1:250

1 WAREHOUSE LEVEL 1
1:250

0 5 10
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10,000 (1:100)
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ZONE LEGEND

WAREHOUSE	NURSERY	TTS
ENTRY	BAGGED GOODS	BACK OF HOUSE

VERSION
DEVELOPMENT APPLICATION 2
REV AK 17-05-2018

DOCUMENT
WAREHOUSE LEVEL 1

STAGE
DEVELOPMENT APPLICATION

PROJECT
PYMBLE BUNNINGS
950 PACIFIC HWY
PYMBLE

BUNNINGS

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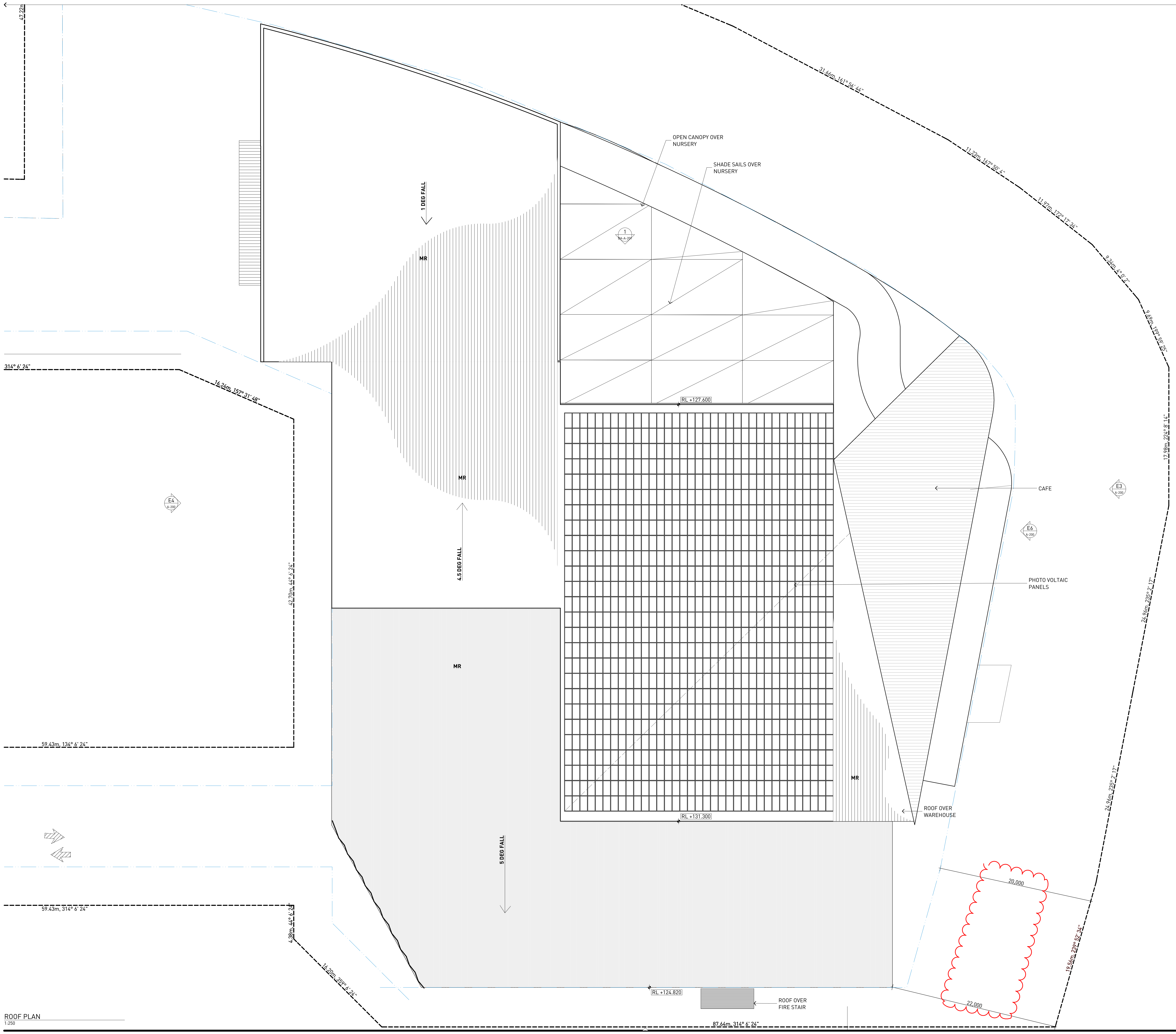
13_052 DA-A-103



1 ROOF PLAN
1:250

0 5 10
PAPER SIZE: A1
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10,000 (1:100)
20,000 (1:200)

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VERSION
DEVELOPMENT APPLICATION 2
REV AE 16-05-2018

DOCUMENT
ROOF PLAN

STAGE
DEVELOPMENT APPLICATION

PROJECT
PYMBLE BUNNINGS
950 PACIFIC HWY
PYMBLE

ARCHITECTURE URBAN PLANNING
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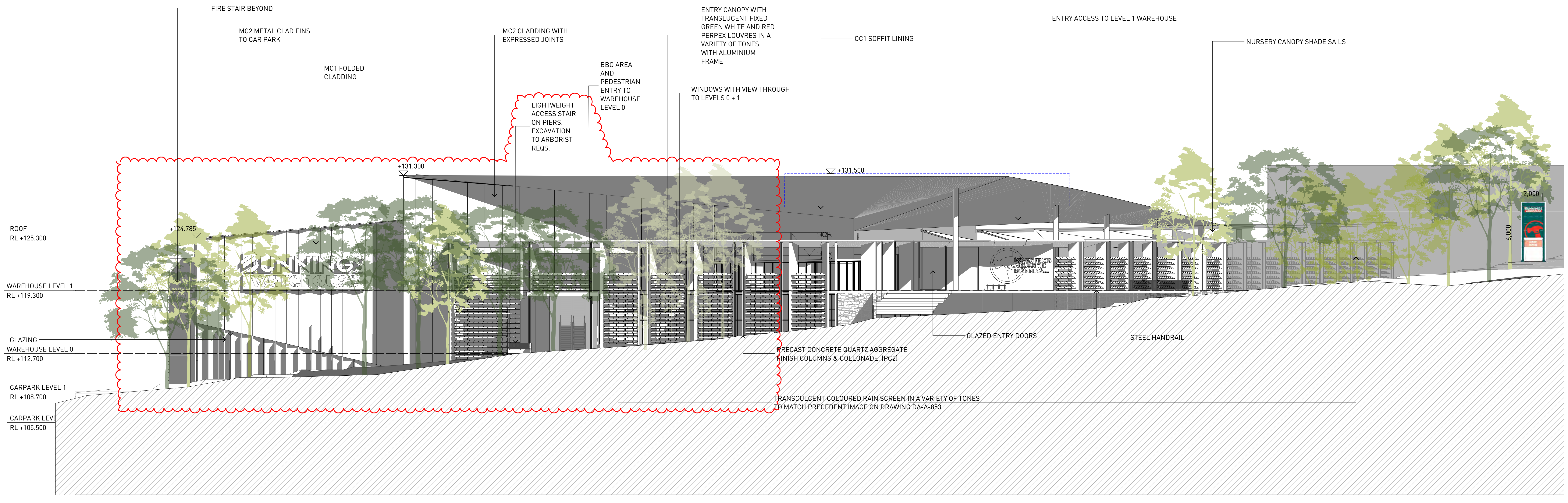
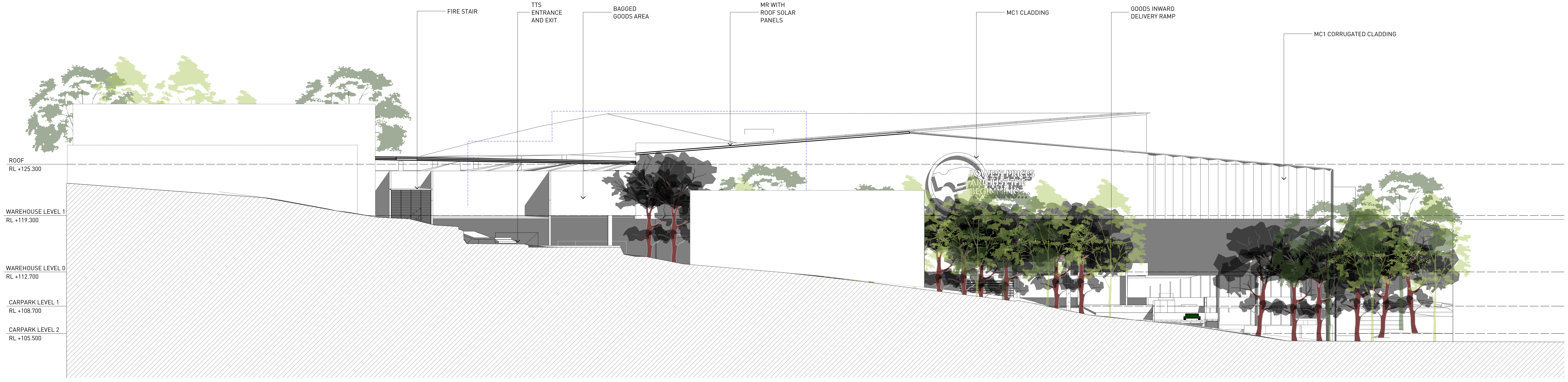
13_052 DA-A-104



2 RYDE ROAD ELEVATION
1:250



1 BRIDGE STREET ELEVATION
1:250

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LEGEND

Refer to the notes page for legend that includes further notes and explanation of abbreviation

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CHECK SCALE - SHEET SIZE A1
5m - 1:50
10m - 1:100
20m - 1:200

DOCUMENT
RYDE RD AND BRIDGE ST ELEVATIONS
STATUS

REVISION R 17-05-2018 17/05/2018 12:40 PM
STAGE
DEVELOPMENT APPLICATION

PROJECT
PYMBLE BUNNINGS

950 PACIFIC HWY PYMBLE

CLIENT **BUNNINGS**

ARCHITECTURE URBAN PLANNING
ABN 96 142 020 693
M1/147 McEvoy St Alexandria NSW 2015
P 02 9516 2022 **E** email@s-tz.com.au
smithtzannes.com.au
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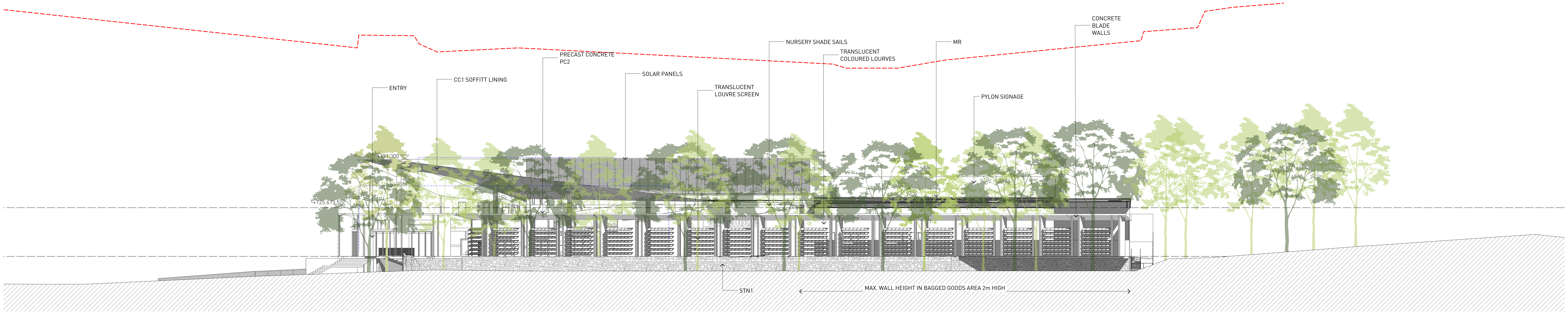
SMITH & TZANNES

13_052 DA-A-200



1 PACIFIC HIGHWAY ELEVATION
1:250

2 SOUTH WEST ELEVATION
1:250

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CHECK SCALE - SHEET SIZE A1
5m - 1:50
10m - 1:100
20m - 1:200

DOCUMENT
PACIFIC H'WAY & STH-WEST ELEVATIONS
STATUS

REVISION Q 17-05-2018 17/05/2018 12:40 PM
STAGE
DEVELOPMENT APPLICATION

PROJECT
PYMBLE BUNNINGS

950 PACIFIC HWY PYMBLE

CLIENT **BUNNINGS**

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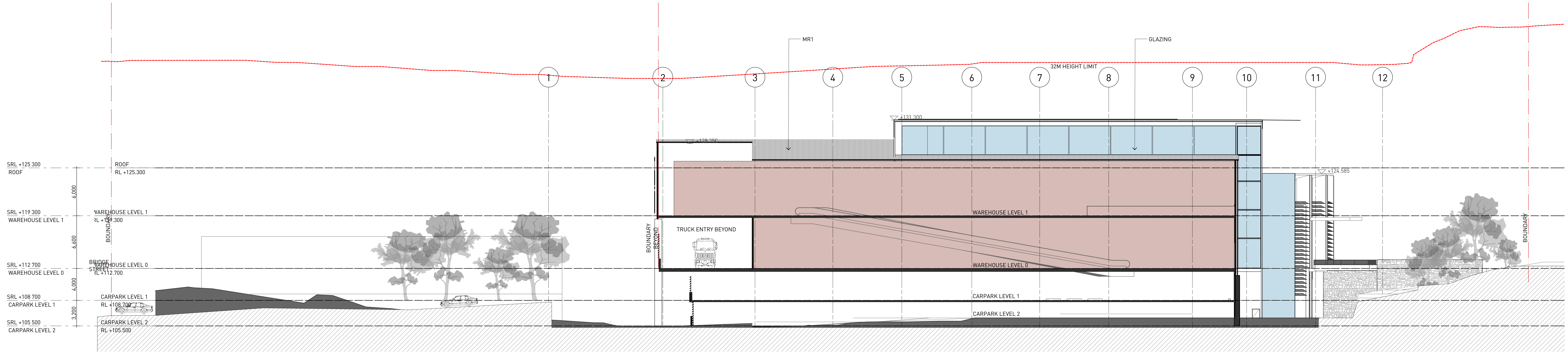
13_052 DA-A-201



2 SECTION B
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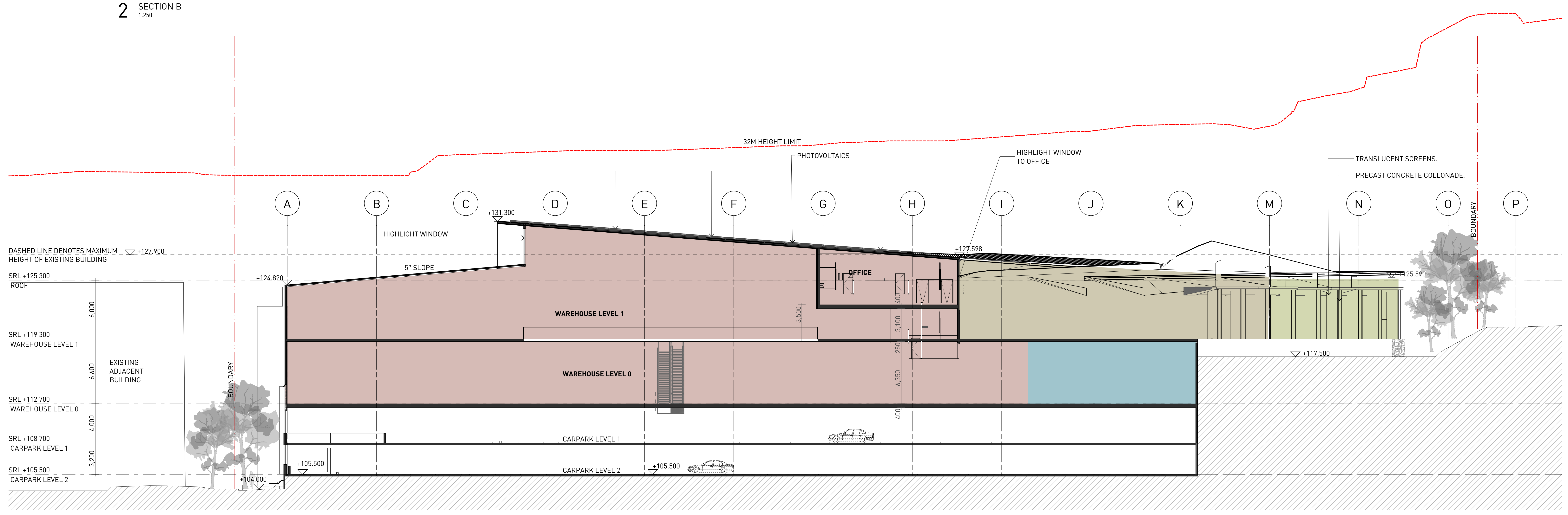

1 SECTION A
1:250

ZONE LEGEND

WAREHOUSE	**NURSERY**	**TTS**
ENTRY	**BAGGED GOODS**	**BACK OF HOUSE**

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5m - 1:50
10m - 1:100
20m - 1:200

DOCUMENT
SECTIONS

STATUS

REVISION **L** **18/03/2017** 20/03/2017 2:29 PM

STAGE
DEVELOPMENT APPLICATION

PROJECT
PYMBLE BUNNINGS

950 PACIFIC HWY PYMBLE

CLIENT **BUNNINGS**

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ABN 96 142 020 693
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smithtzannes.com.au
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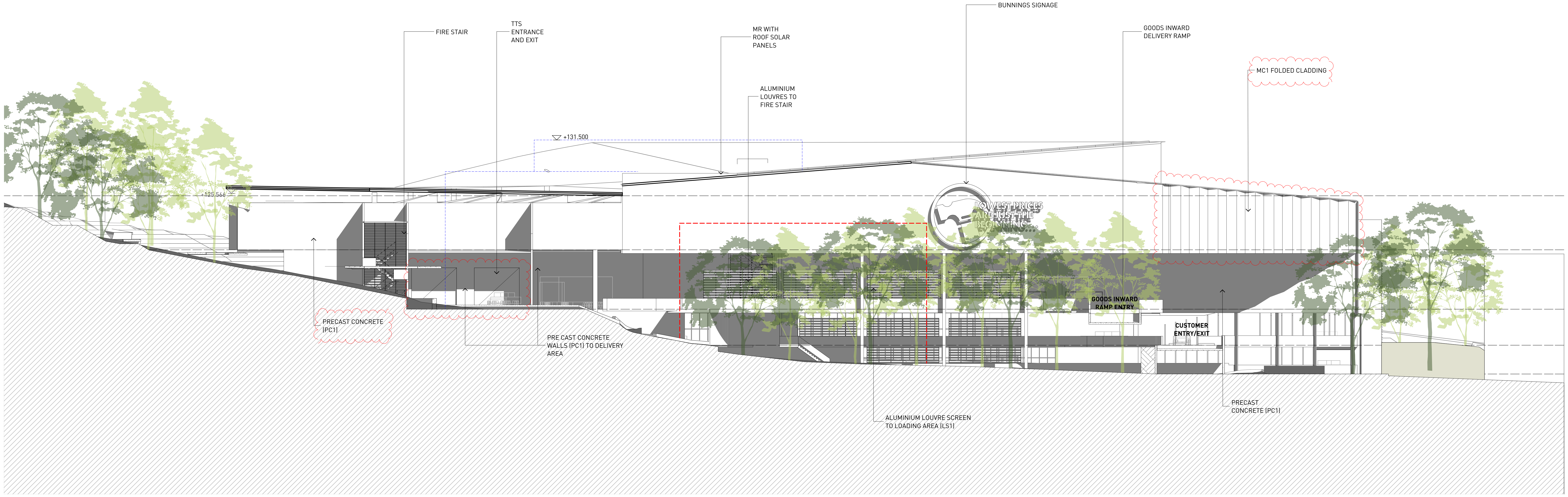
13_052 DA-A-202



1 BRIDGE STREET ELEVATION
1:250

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DOCUMENT
ELEVATIONAL SECTION

STATUS

REVISION B 20-03-2017 20/03/2017 2:30 PM

STAGE
DEVELOPMENT APPLICATION

PROJECT
PYMBLE BUNNINGS

950 PACIFIC HWY PYMBLE

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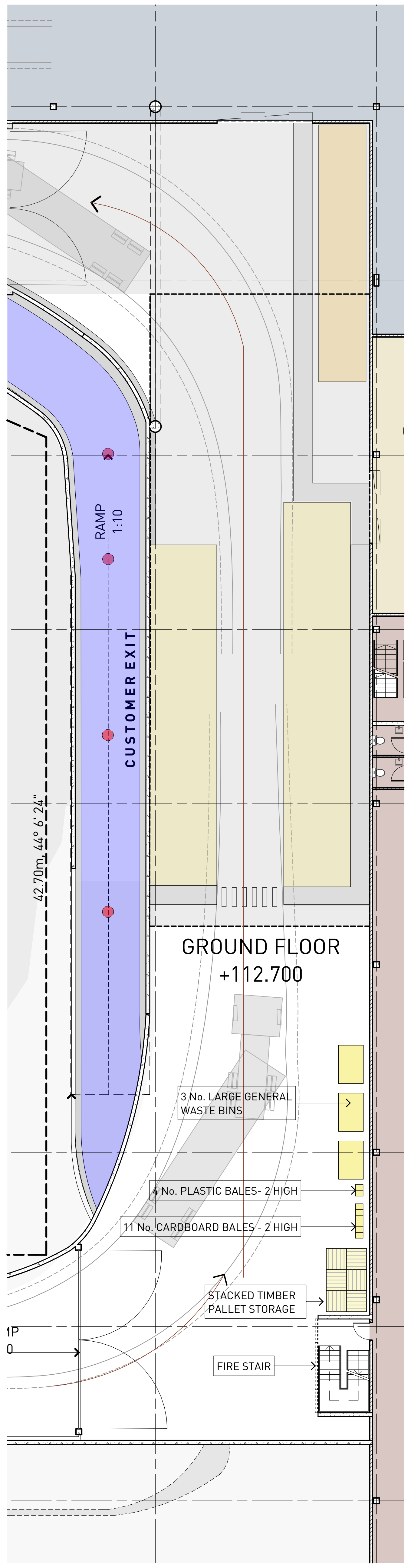
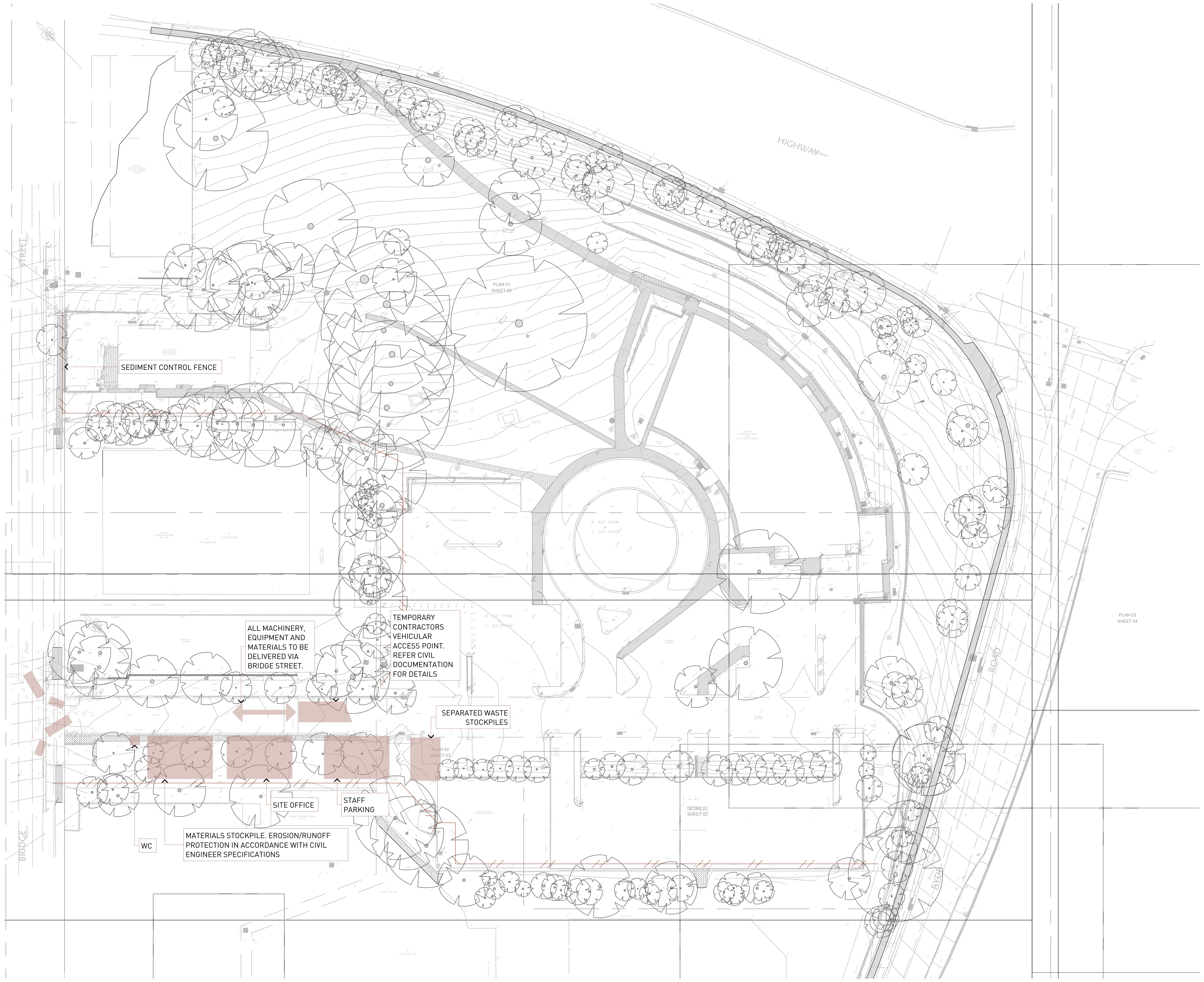
13_052 DA-A-203



1 CONSTRUCTION AND WASTE MANAGEMENT PLAN



2 CONSTRUCTION WASTE & SITE MGMT
1:500

MATERIALS HANDLING
Materials handling and vehicle operations will comply with the Road Transport Act 1999 (NSW) which incorporates the Mass Loading and Access Regulation 1996 and Safety Traffic Management Road Rules Regulations 1999. All loads will be covered to minimise dust and prevent the transfer of sediment onto the roadway.

WASTE MANAGEMENT
The proposed development will incorporate the waste minimisation principles of Avoid, Reduce, Reuse and Recycle, and conform with the Waste Avoidance and Recovery Act 2001. The development will subscribe to the attached Waste Management Plan (WMP) as guided by the Ku-ring-gai Council template. Specific bins for waste and recycling shall be provided.

NOISE CONTROL
To reduce noise emissions from construction and demolition sites, all activities should be carried out in accordance with the requirements of Australian Standard Guidelines AS2436-1981 "Guide to noise control on Construction Maintenance and Demolition sites" and in Council prescribed work hours.

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SELECTIONS LEGEND

REFER TO SELECTIONS SCHEDULE FOR MORE DETAIL

AD	ALUMINIUM FRAMED DOOR
AW	ALUMINIUM FRAMED WINDOW
B	BOLLARD
BAL#	BALUSTRADE TYPE #
BG	BOX GUTTER
BLK	BLOCKWORK
BK	BRICKWORK
CAR	CARPET
CONC	CONCRETE
CFT	CERAMIC FLOOR TILE FINISH
CWT	CERAMIC WALL TILE FINISH
D	DOOR
DW	DISHWASHER
DP	DOWNPIPE
EDB	ELECTRICAL DISTRIBUTION BOARD
EX	EXISTING
FB	FACE BRICK
FC	FIBRE CEMENT
FG	FIXED GLASS
FL	FLASHING
FR	FIRE RATED
FW	FLOOR WASTE
FFL	FINISHED FLOOR LEVE
FSL	FINISHED SLAB LEVEL
GD	GRATED DRAIN
GU	GUTTER
HR	HANDRAIL
HW	HOT WATER UNIT
LDY	LAUNDRY
MB	METER BOX
ML	METAL LOUVRES
MR#	METAL ROOF SHEET TYPE #
P	PAINT
PAV	PAVING
PB	PLASTERBOARD
PF	POOL FENCE
POLY	POLYURETHANE FINISH
MSC	MESH CAGE
REF	REFRIGERATOR
REN	RENDER
RL	RELATIVE LEVEL (TO AUSTRALIAN HEIGHT DATUM
RWO	RAINWATER OUTLET
RWT	RAINWATER TANK
STD	SLIDING TIMBER DOOR
SG	STEEL GATE
SK	SKIRTING
SP	STONE PAVING
TW	TIMBER FRAMED WINDOW
TRG	TRANSLUCENT GLAZING (OBSCURE)
VP	VENT PIPE
WM	WASHING MACHINE
WS	WHEEL STOP

DOCUMENT
WASTE MANAGEMENT PLAN

STATUS
PRELIMINARY

REVISION FOR INFORMATION 05-12-2014

STAGE
DEVELOPMENT APPLICATION

PROJECT
PYMBLE BUNNINGS
BUNNINGS
950 PACIFIC HWY PYMBLE

CLIENT **BUNNINGS**

13_052 DA-A-801

ARCHITECTURE URBAN PLANNING
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P 02 9516 2022 **E** email@smithtzannes.com.au
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SMITH & TZANNES

0 5 10
CHECK SCALE: A1 SHEET
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SELECTIONS LEGEND

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RED DENOTED TREES TO BE REMOVED:

4, 8, 9, 11, 13, 14, 15, 17, 18, 19, 20, 21, 25, 26, 42, 43, 44, 45, 46, 47, 63, 64, 69, 72, 74, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 95, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 126, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 149, 151, 152, 154, 174, 175, 178, 193, 211, 213, 214, 215, 216, 217 & 232.

BLUE DENOTES TREES TO BE ASSESSED OR PRUNED TO SUIT CONSTRUCTION:

T27, T28, T29, T30, T150, T176, T179, T180, T181, T190, T191, T192

(NOTE: PRUNING OF OVERHANGING CANOPIES FROM TREES LOCATED WITHIN THE ADJOINING PROPERTIES IS ONLY PERMITTED WITHIN THE SUBJECT SITE. NO CONSENT IS GRANTED TO CARRY OUT TREE WORKS ON AND WITHIN ADJOINING PROPERTIES.)

GREEN DENOTES EXTENT OF SET BACK ZONE

—□——□— APPROXIMATE TREE PROTECTION FENCE LOCATIONS

NOTE: DRAWING TO BE READ IN CONJUNCTION WITH ' ARBORICULTURAL PROTECTION REPORT' PREPARED BY RAINTREE CONSULTING

TMP Figure 1, showing fence construction detail

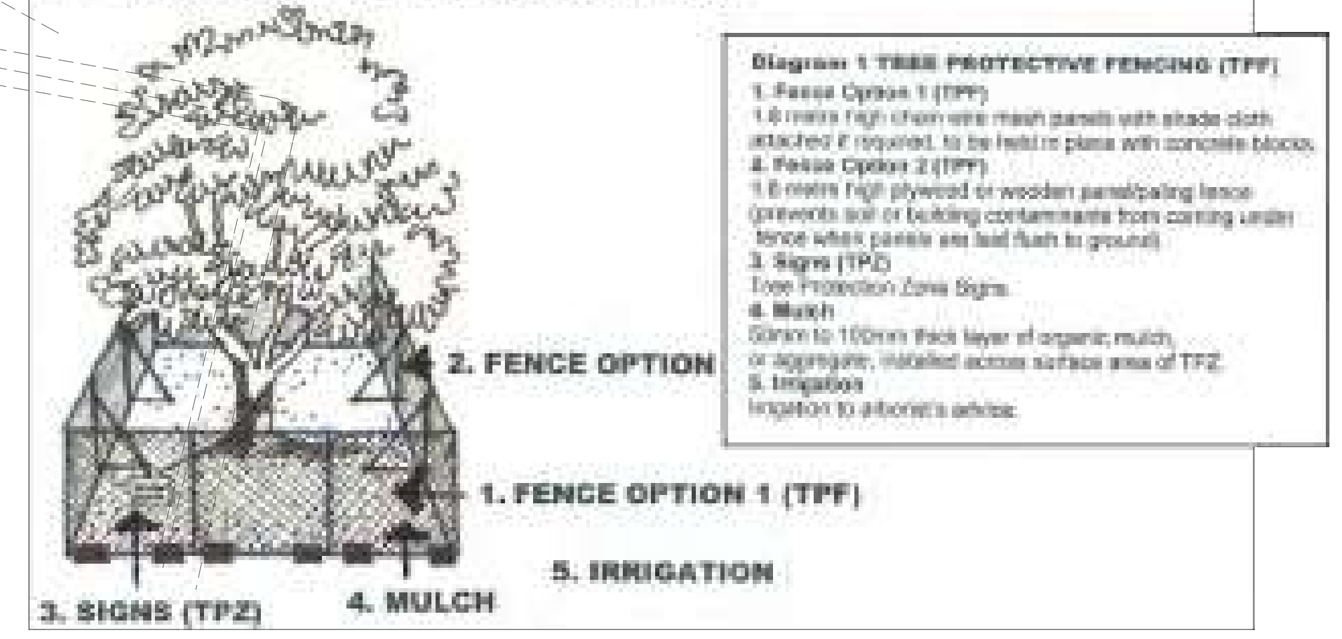

Diagram 1 TREE PROTECTIVE FENCING (TPF)
1. Fence Option 1 (TPF)
1.8 metre high chain wire mesh panels with shade cloth attached if required, to be held in place with concrete blocks.
2. Fence Option 2 (TPF)
1.8 metre high plywood or wooden panel/paling fence (prevents soil or building contaminants from coming under fence when panels are laid flush to ground)
3. Signs (TPZ)
Tree Protection Zone Signs.
4. Mulch
50mm to 100mm thick layer of organic mulch, or aggregate, installed across surface area of TPZ.
5. Irrigation
Irrigation to arborist's advice.

TMP Figure 2, showing trunk & root protection detail

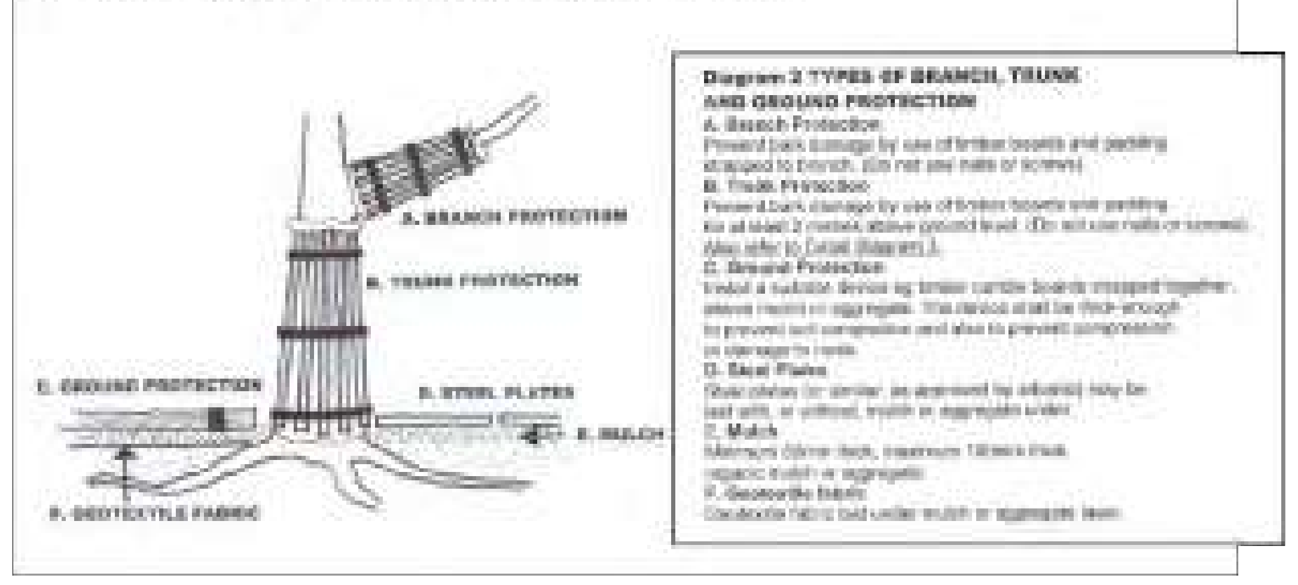

Diagram 2 TYPES OF BRANCH, TRUNK AND GROUND PROTECTION

VERSION
DA SUBMISSION
REV AF 16-05-2018

DOCUMENT
TREE MANAGEMENT PLAN

STAGE
DEVELOPMENT APPLICATION

PROJECT
PYMBLE BUNNINGS
950 PACIFIC HWY
PYMBLE

BUNNINGS

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SMITH & TZANNES

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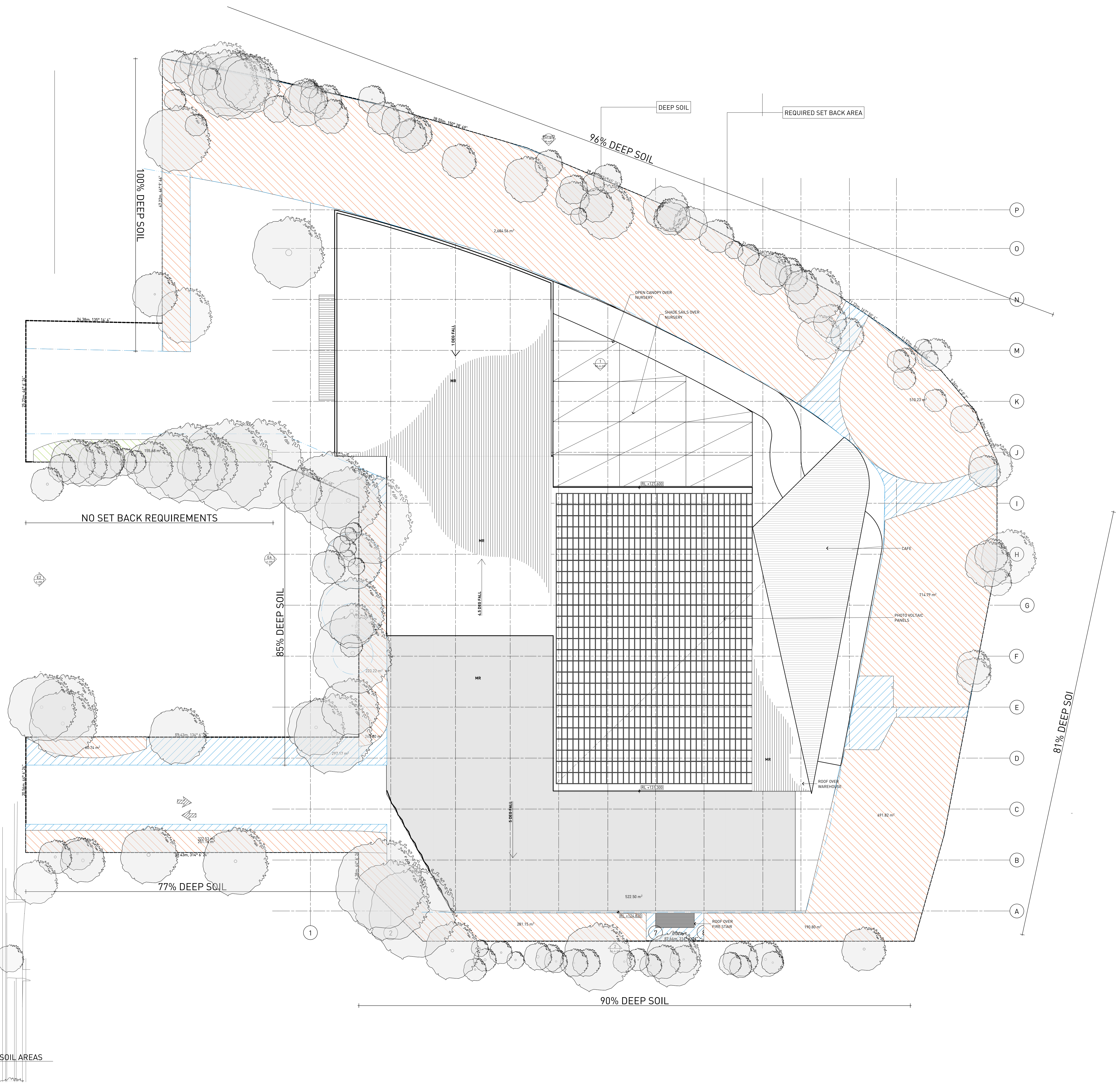

2 LANDSCAPE AND DEEP SOIL AREAS WITHIN SETBACKS

1 LANDSCAPE AND DEEP SOIL AREAS WITHIN SETBACKS

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SELECTIONS LEGEND

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▨ DEEP SOIL 5605 m²

▨ TOTAL AREA WITHIN SETBACKS 6308 m²

AVERAGE DEEP SOIL 87% OF SET BACK AREA

VERSION
DEVELOPMENT APPLICATION 2
REV L 10-04-2018

DOCUMENT
DEEP SOIL LANDSCAPE PLAN
K

STAGE
DEVELOPMENT APPLICATION

PROJECT
PYMBLE BUNNINGS
950 PACIFIC HWY
PYMBLE

13_052 DA-A-811

ARCHITECTURE URBAN PLANNING
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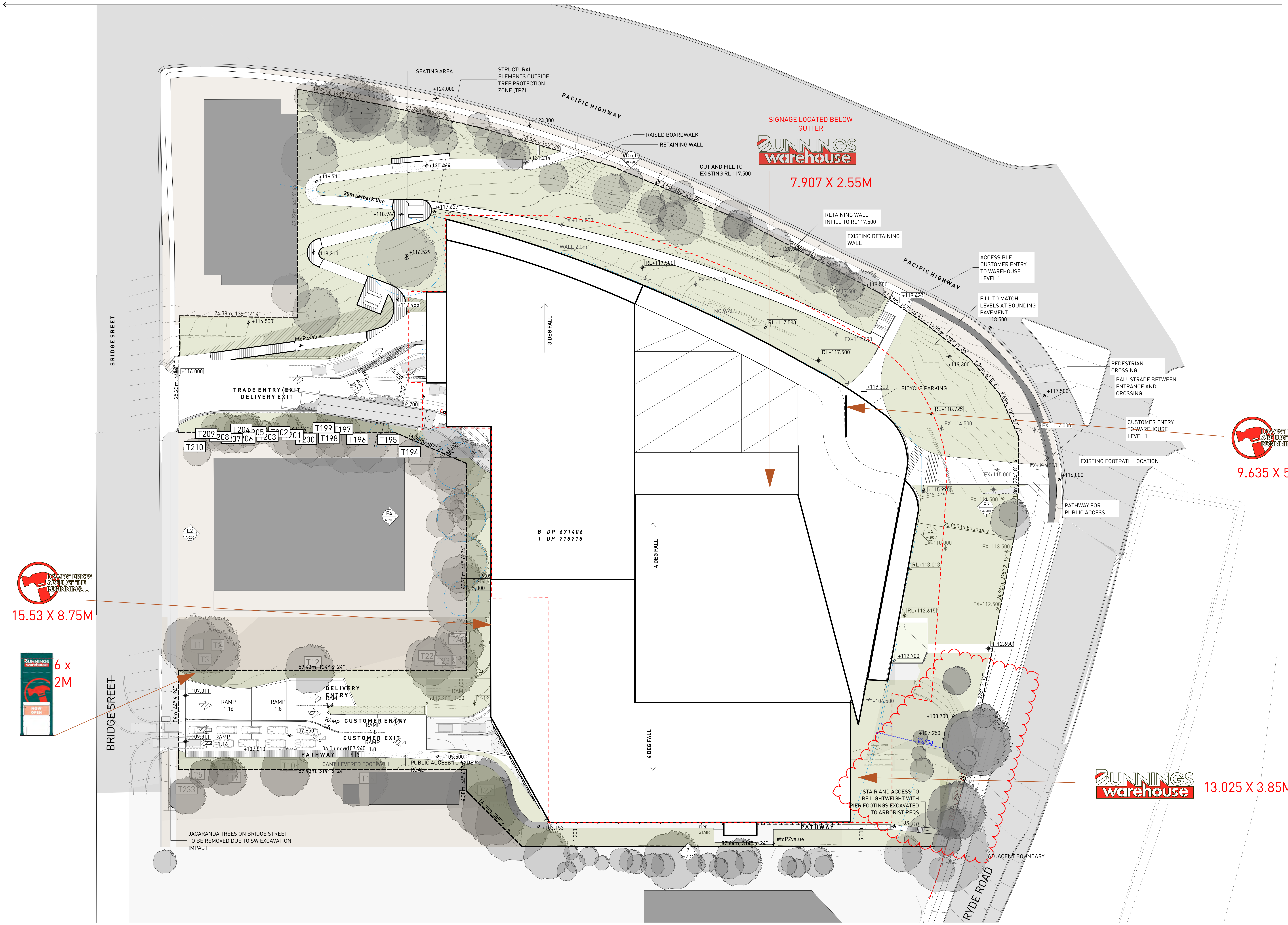

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SELECTIONS LEGEND

REFER TO SELECTIONS SCHEDULE FOR FURTHER DETAIL

VERSION
JOINT REPORT
REV C 17-05-2018

DOCUMENT
SIGNAGE PLAN

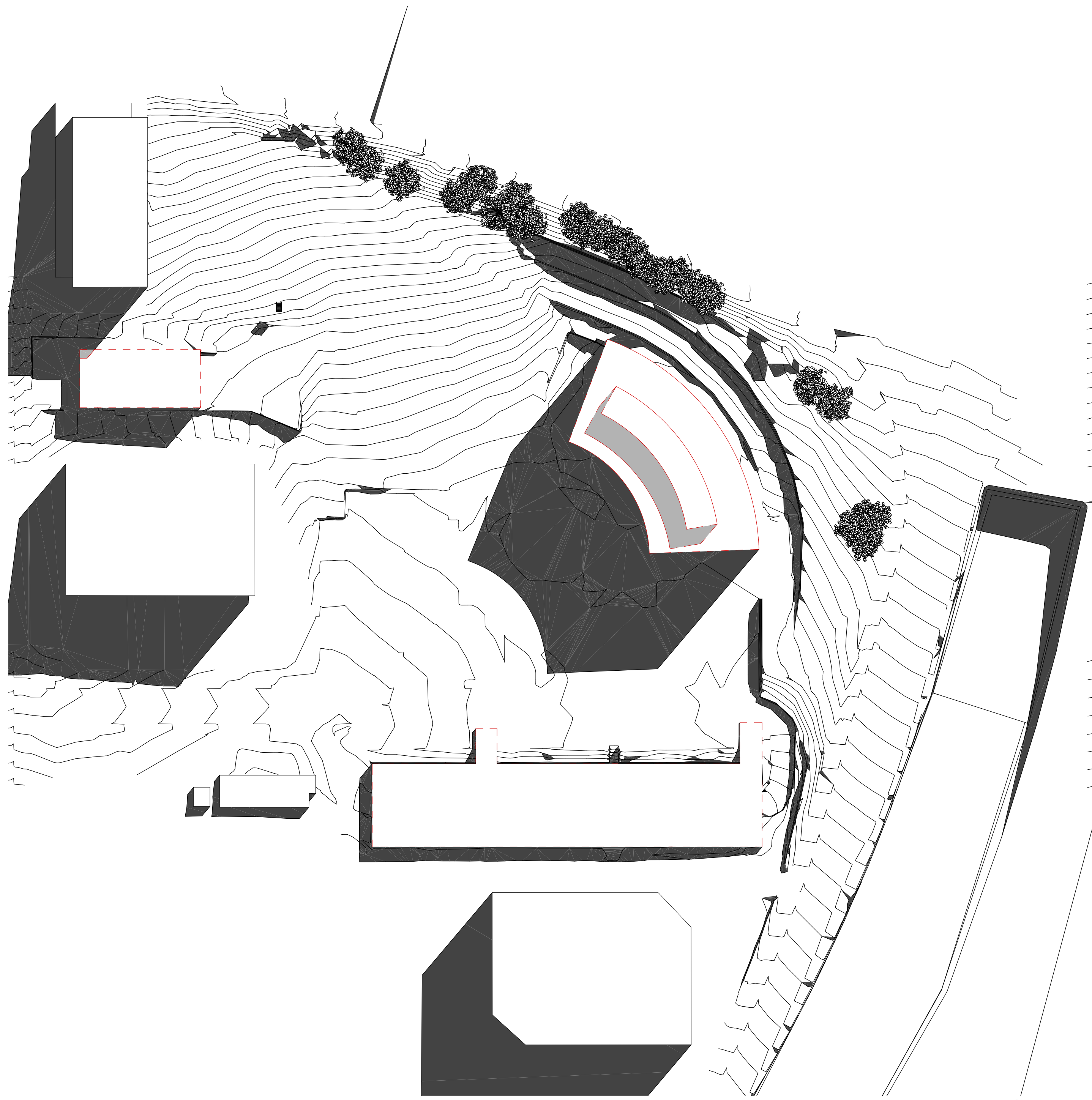
-

STAGE
DEVELOPMENT APPLICATION

PROJECT
PYMBLE BUNNINGS
950 PACIFIC HWY
PYMBLE

13_052 DA-A-812

ARCHITECTURE URBAN PLANNING
ABN 96 142 020 693
M1/147 McEvoy Street Alexandria NSW 2015
P 02 9516 2022 **E** email@smithtzannes.com.au
smithtzannes.com.au
Nominated Architect: Peter Smith (Reg 7024)



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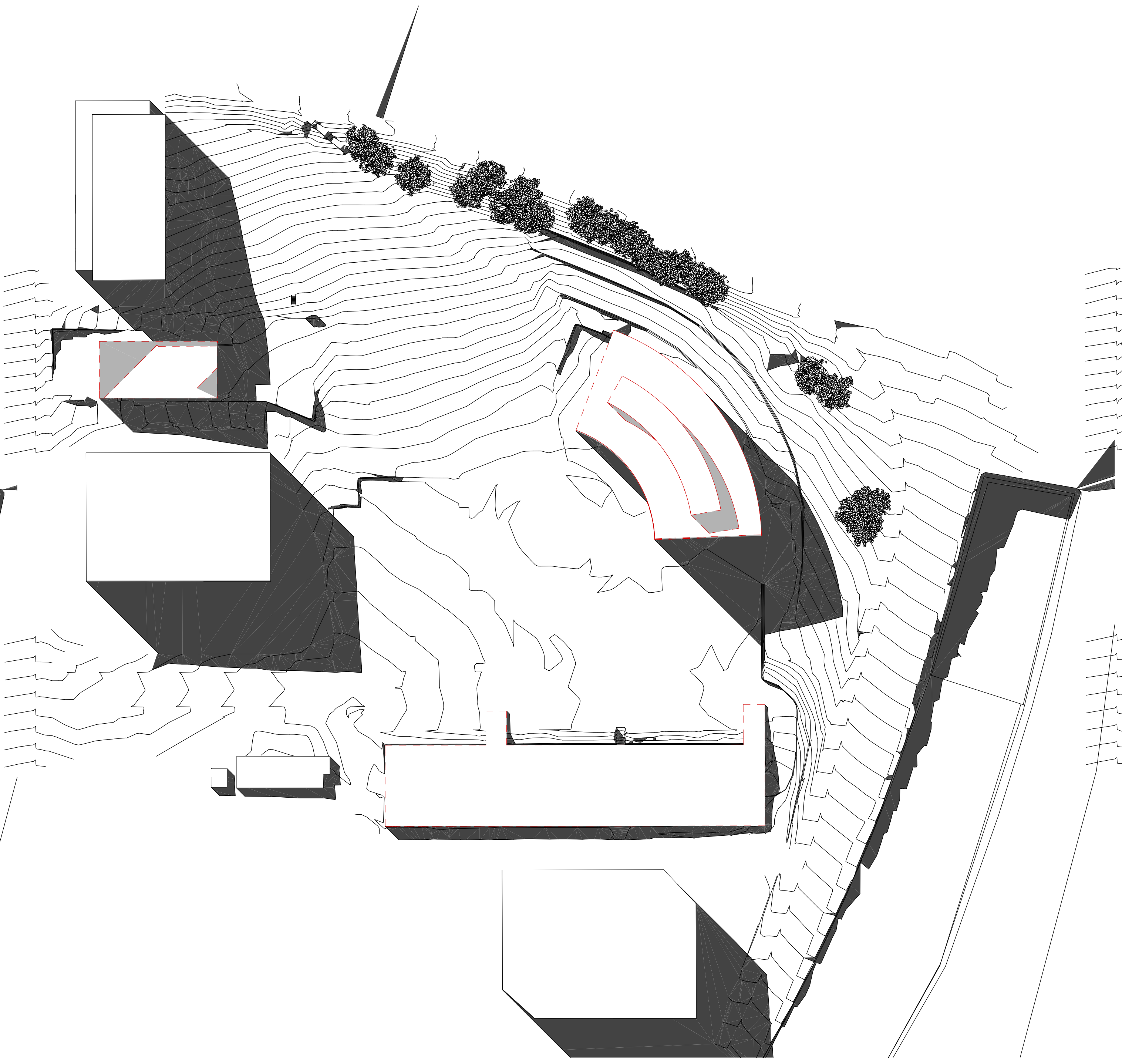

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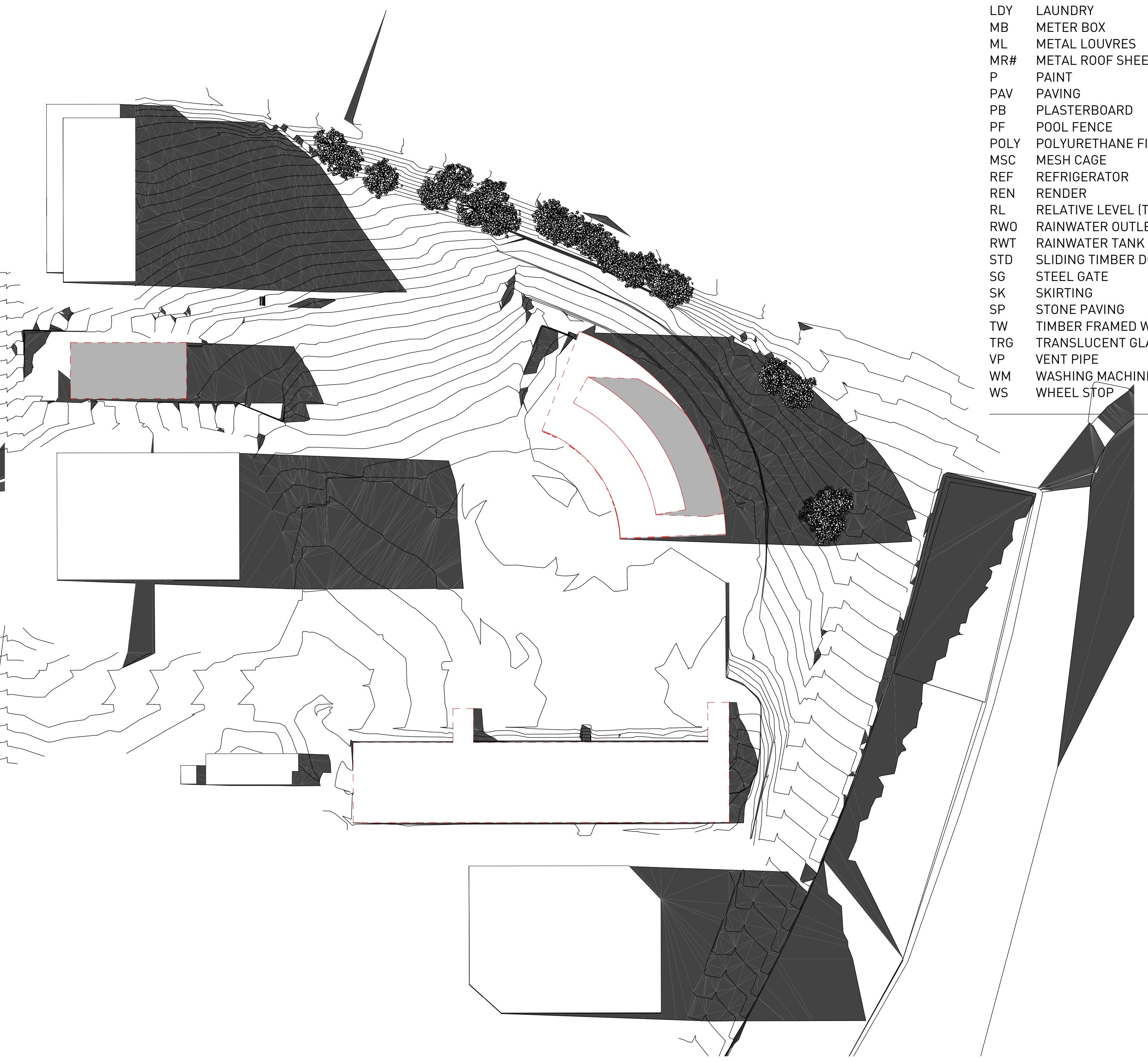

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SELECTIONS LEGEND

REFER TO SELECTIONS SCHEDULE FOR MORE DETAIL

AD	ALUMINIUM FRAMED DOOR
AW	ALUMINIUM FRAMED WINDOW
B	BOLLARD
BAL#	BALUSTRADE TYPE #
BG	BOX GUTTER
BLK	BLOCKWORK
BK	BRICKWORK
CAR	CARPET
CONC	CONCRETE
CFT	CERAMIC FLOOR TILE FINISH
CWT	CERAMIC WALL TILE FINISH
D	DOOR
DW	DISHWASHER
DP	DOWNPIPE
EDB	ELECTRICAL DISTRIBUTION BOARD
EX	EXISTING
FB	FACE BRICK
FC	FIBRE CEMENT
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FR	FIRE RATED
FW	FLOOR WASTE
FFL	FINISHED FLOOR LEVE
FSL	FINISHED SLAB LEVEL
GD	GRATED DRAIN
GU	GUTTER
HR	HANDRAIL
HW	HOT WATER UNIT
LDY	LAUNDRY
MB	METER BOX
ML	METAL LOUVRES
MR#	METAL ROOF SHEET TYPE #
P	PAINT
PAV	PAVING
PB	PLASTERBOARD
PF	POOL FENCE
POLY	POLYURETHANE FINISH
MSC	MESH CAGE
REF	REFRIGERATOR
REN	RENDER
RL	RELATIVE LEVEL (TO AUSTRALIAN HEIGHT DATUM
RWO	RAINWATER OUTLET
RWT	RAINWATER TANK
STD	SLIDING TIMBER DOOR
SG	STEEL GATE
SK	SKIRTING
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TW	TIMBER FRAMED WINDOW
TRG	TRANSLUCENT GLAZING (OBSCURE)
VP	VENT PIPE
WM	WASHING MACHINE
WS	WHEEL STOP

DOCUMENT
SHADOWS - JUNE SOLSTICE-EXISTING

STATUS
DEVELOPMENT APPLICATION

REVISION - FOR DA 19-09-2016

STAGE
DEVELOPMENT APPLICATION

PROJECT
PYMBLE BUNNINGS
BUNNINGS
950 PACIFIC HWY PYMBLE

CLIENT **BUNNINGS**

ARCHITECTURE URBAN PLANNING
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SMITH & TZANNES

13_052 DA-A-850C

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CHECK SCALE: A1 SHEET
5,000 (1:50)
10,000 (1:100)
20,000 (1:200

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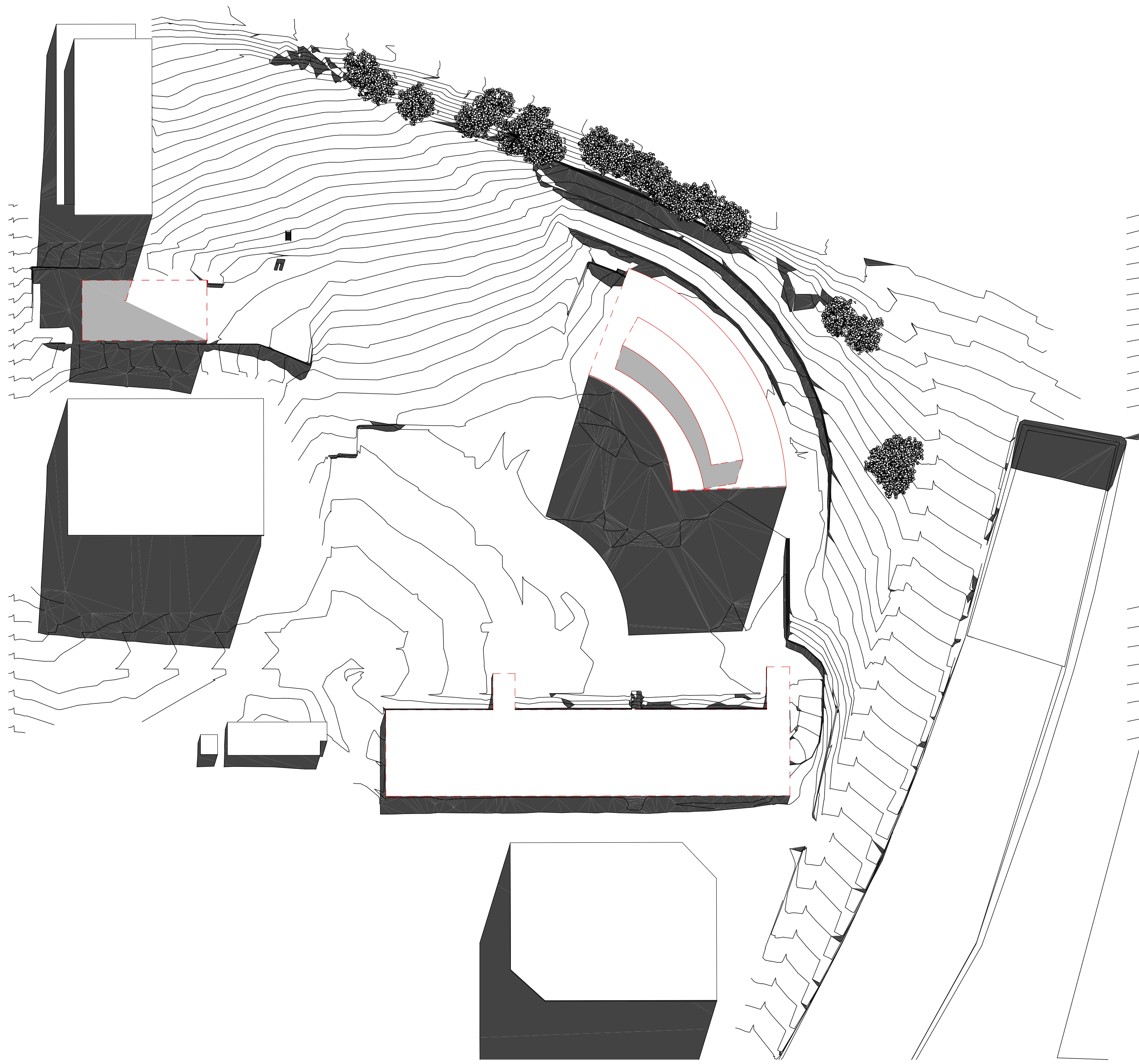

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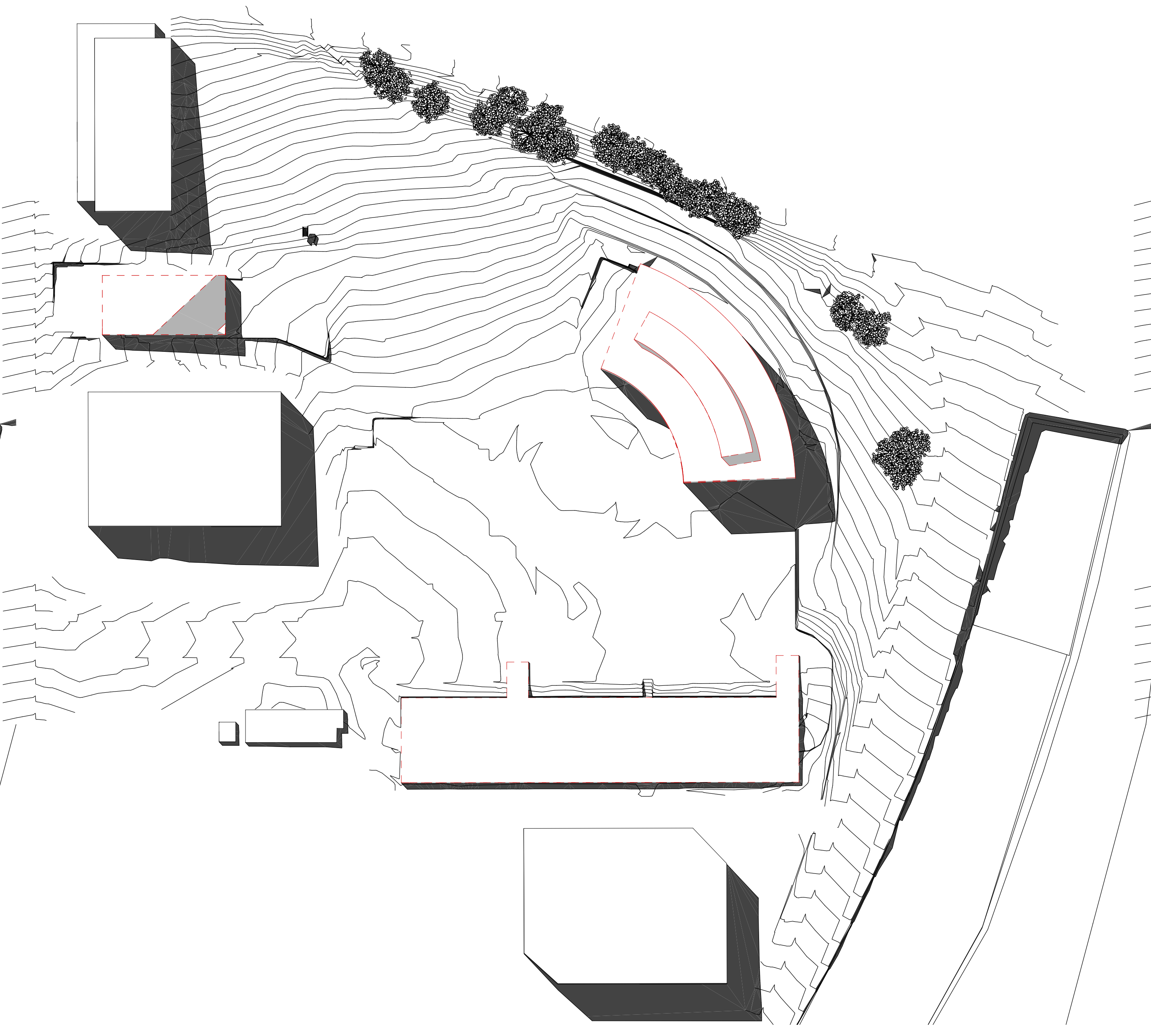

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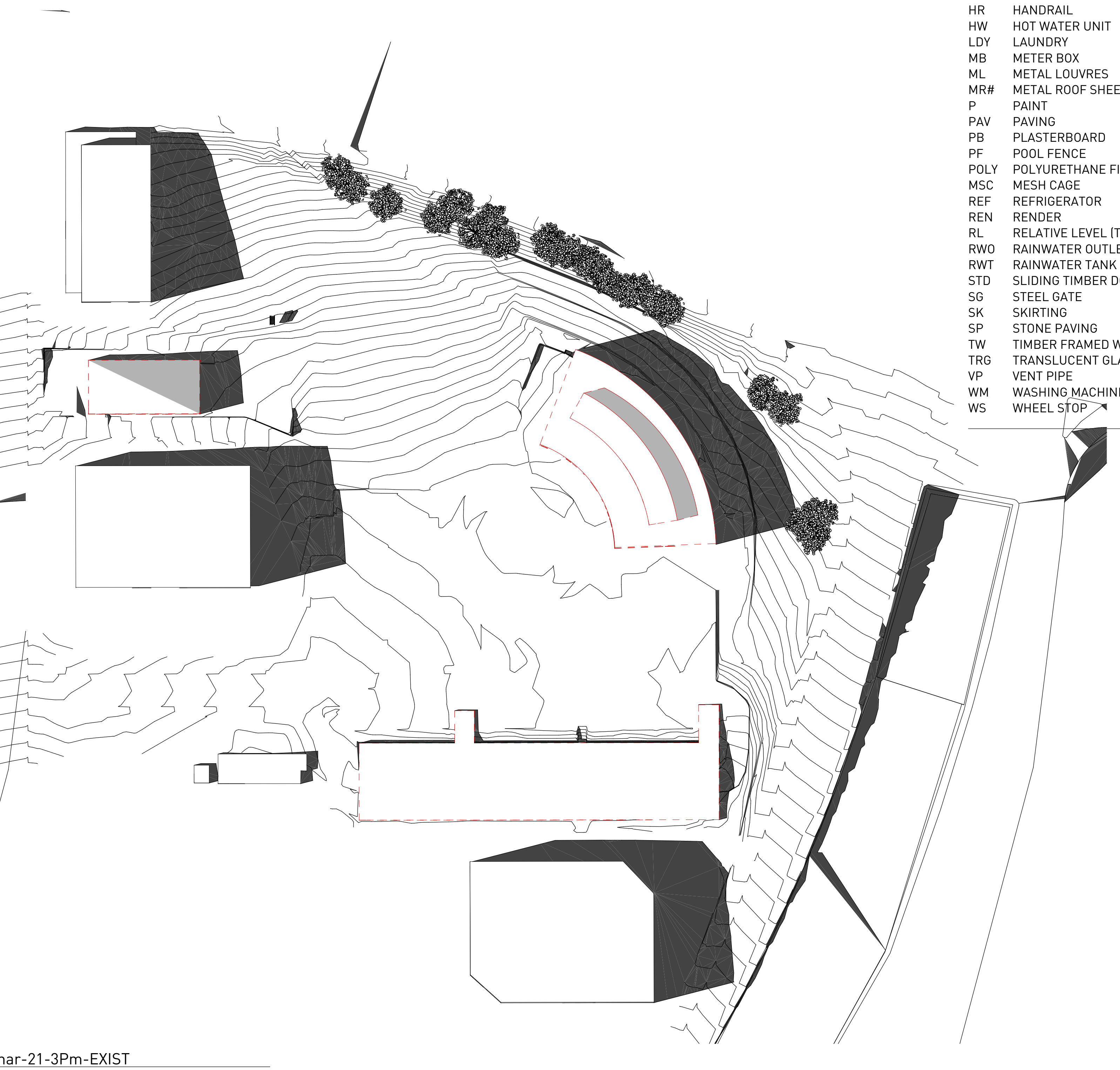

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DOCUMENT
SHADOWS - MARCH EQUINOX- EXISTING

STATUS
DEVELOPMENT APPLICATION

REVISION - **FOR DA 19-09-2016**

STAGE
DEVELOPMENT APPLICATION

PROJECT
PYMBLE BUNNINGS
BUNNINGS
950 PACIFIC HWY PYMBLE

CLIENT **BUNNINGS**

13_052 DA-A-851 C

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5,000 (1:50)
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20,000 (1:200

ARCHITECTURE URBAN PLANNING
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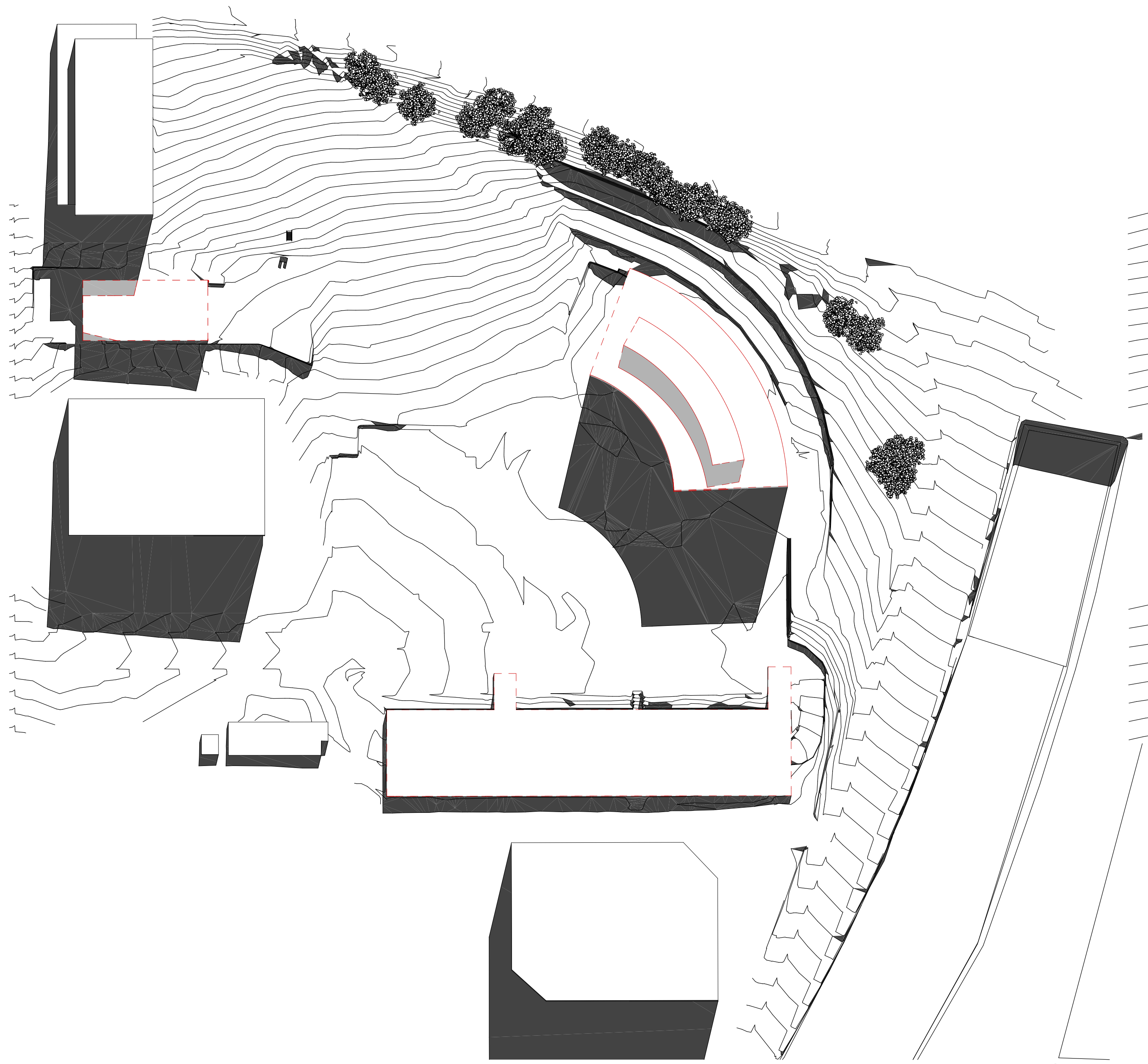

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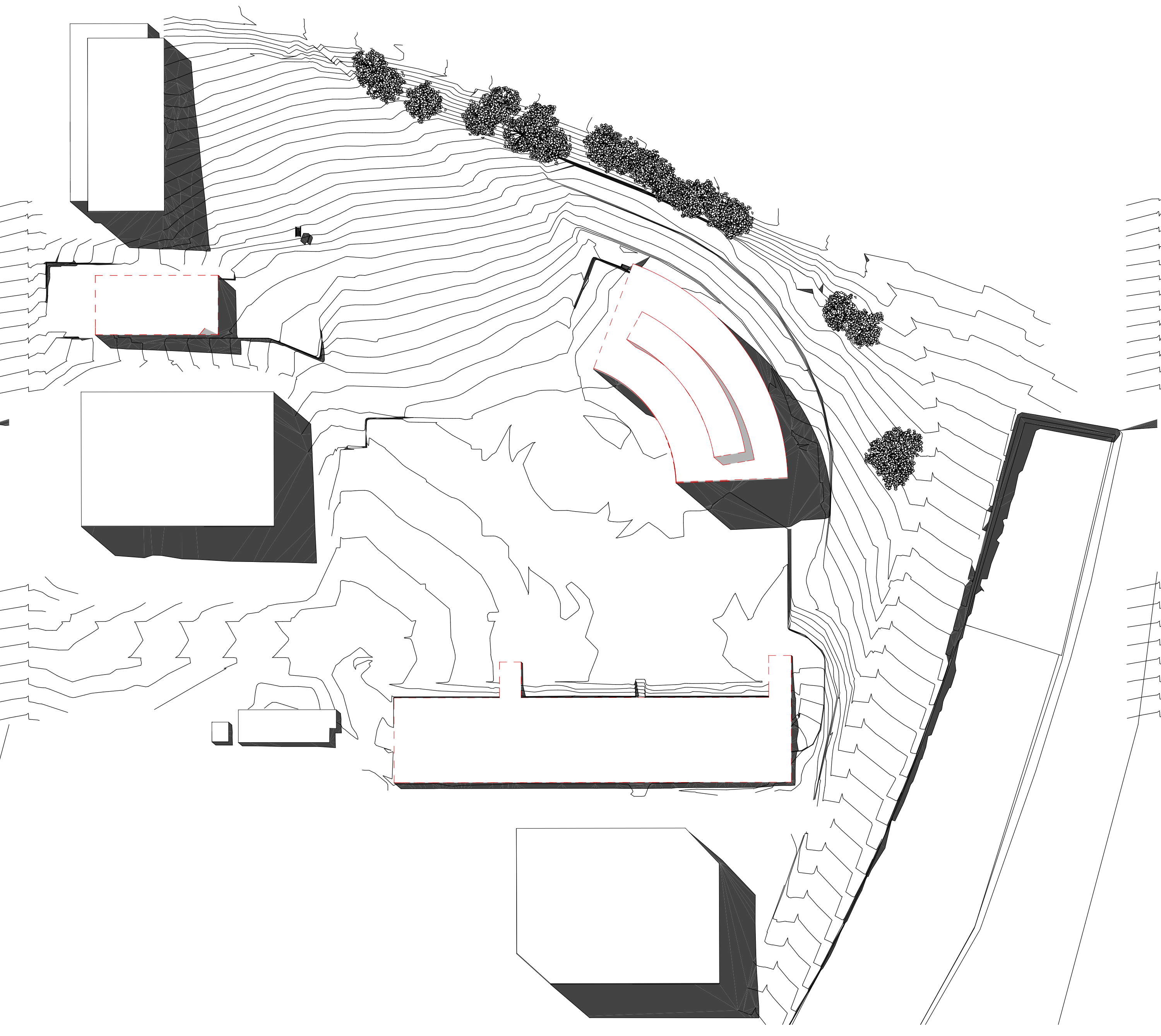

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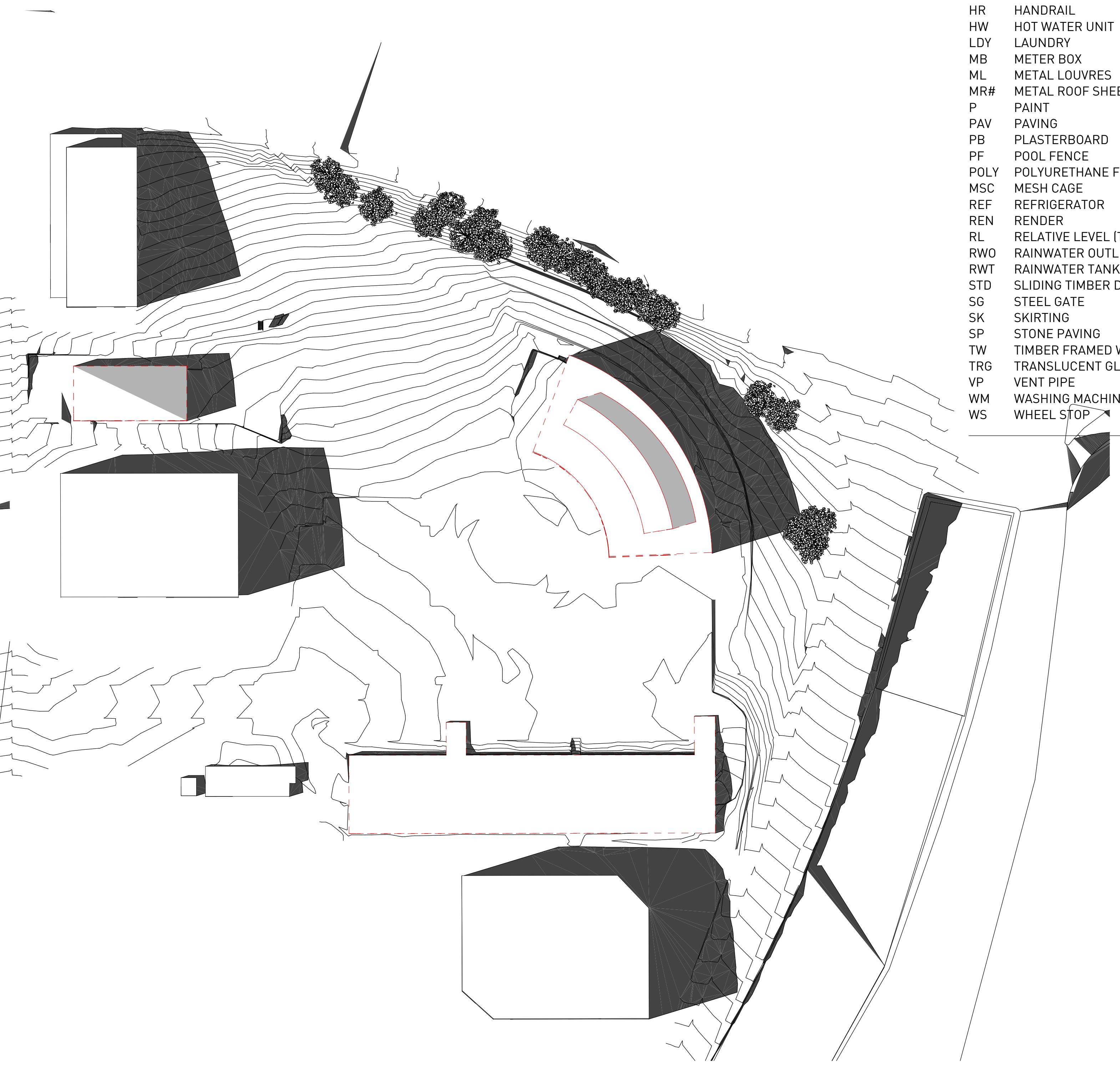

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VP	VENT PIPE
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DOCUMENT
SHADOWS - SEPTEMBER EQUINOX-
EXISTING

STATUS
DEVELOPMENT APPLICATION

REVISION - FOR DA 19-09-2016

STAGE
DEVELOPMENT APPLICATION

PROJECT
PYMBLE BUNNINGS
BUNNINGS
950 PACIFIC HWY PYMBLE

CLIENT **BUNNINGS**

13_052 DA-A-852C

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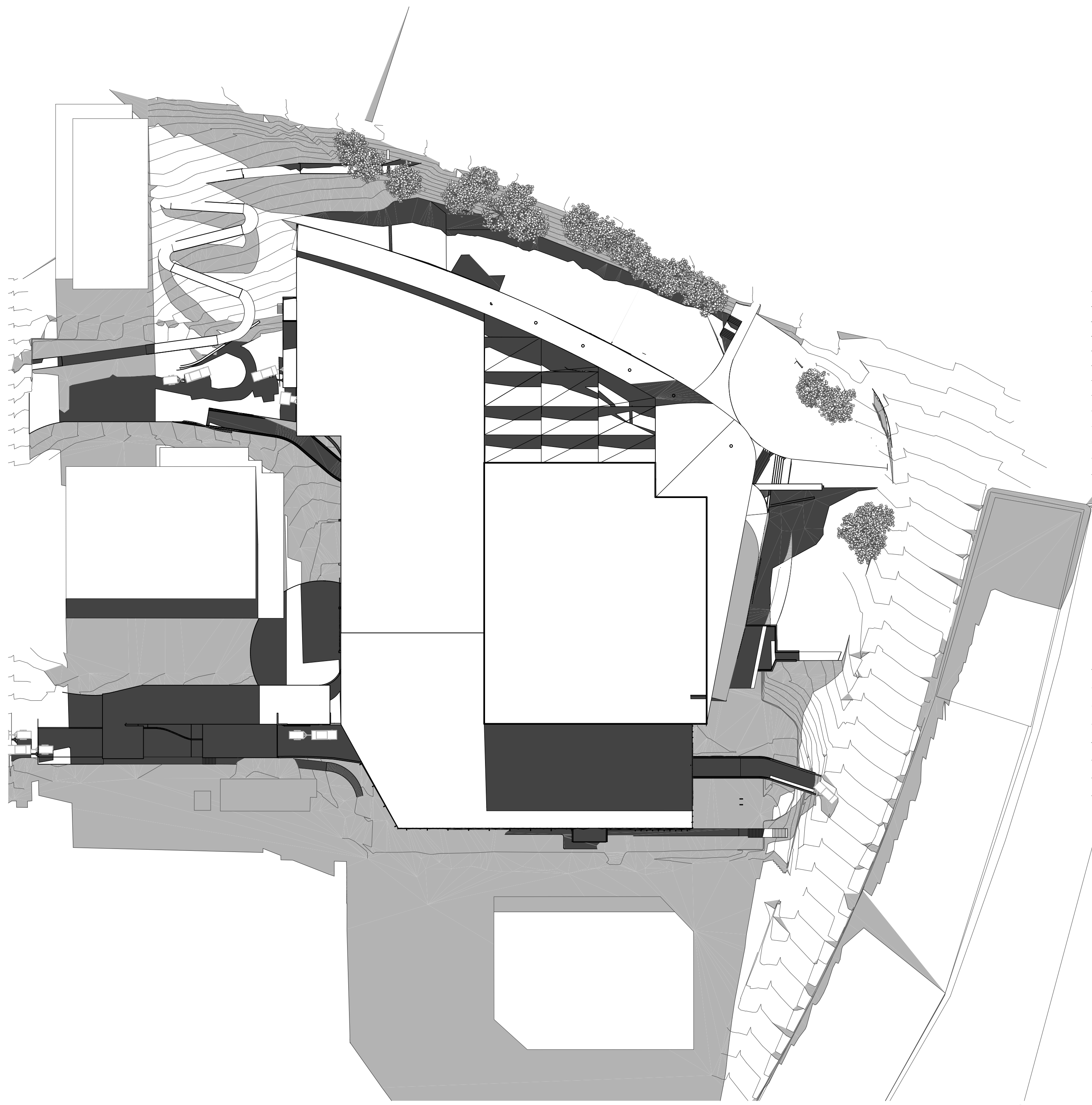

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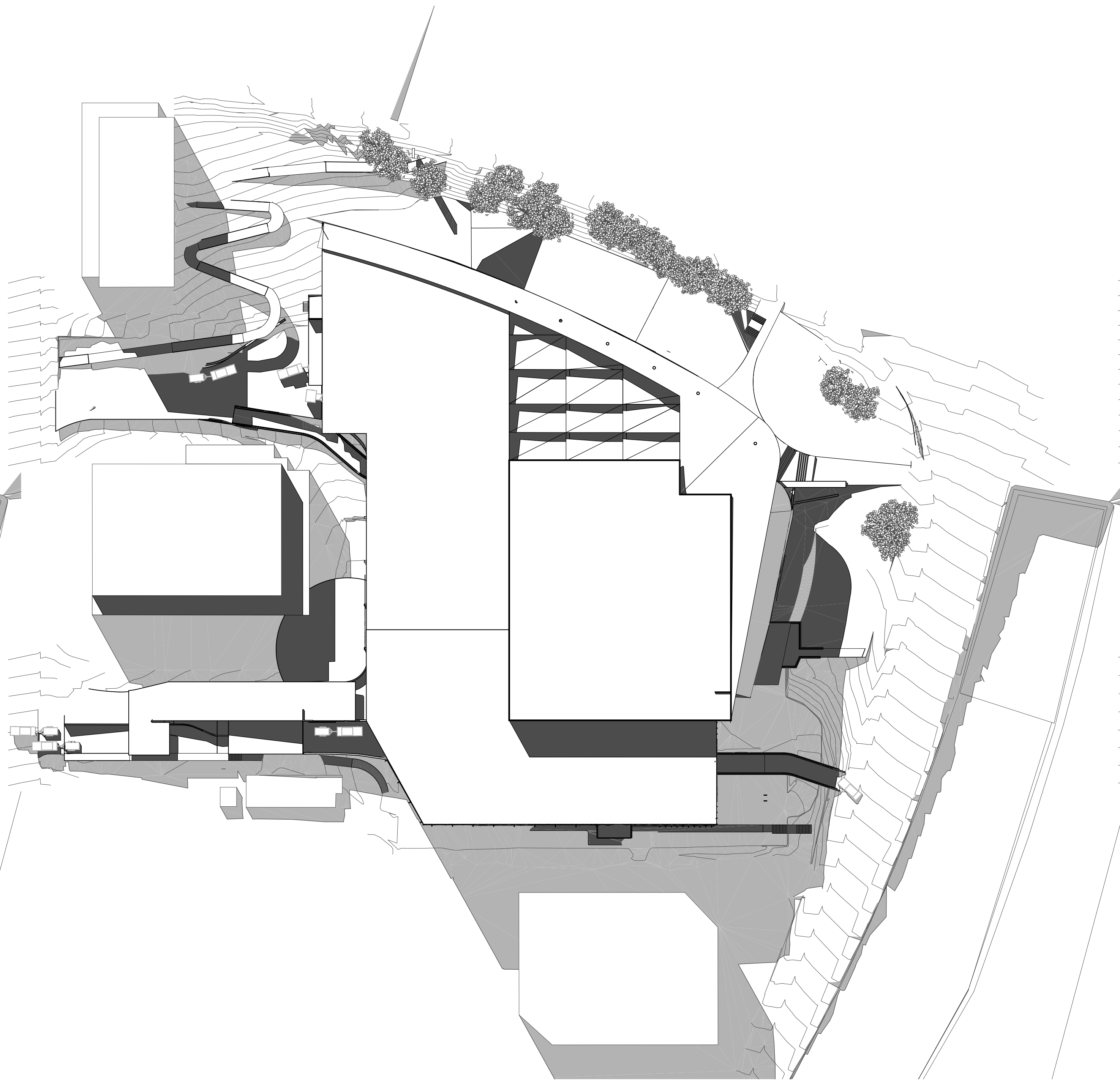

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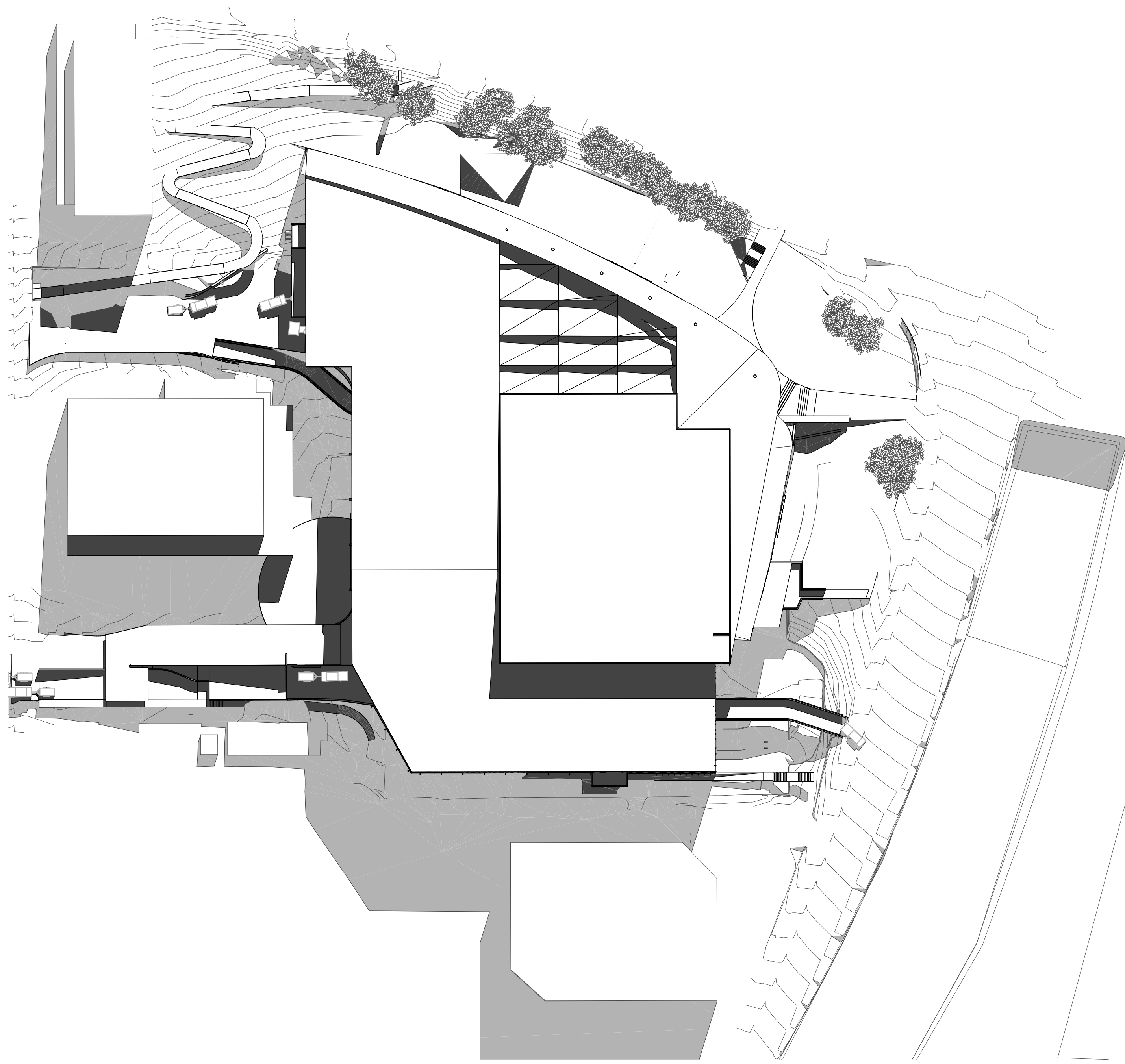

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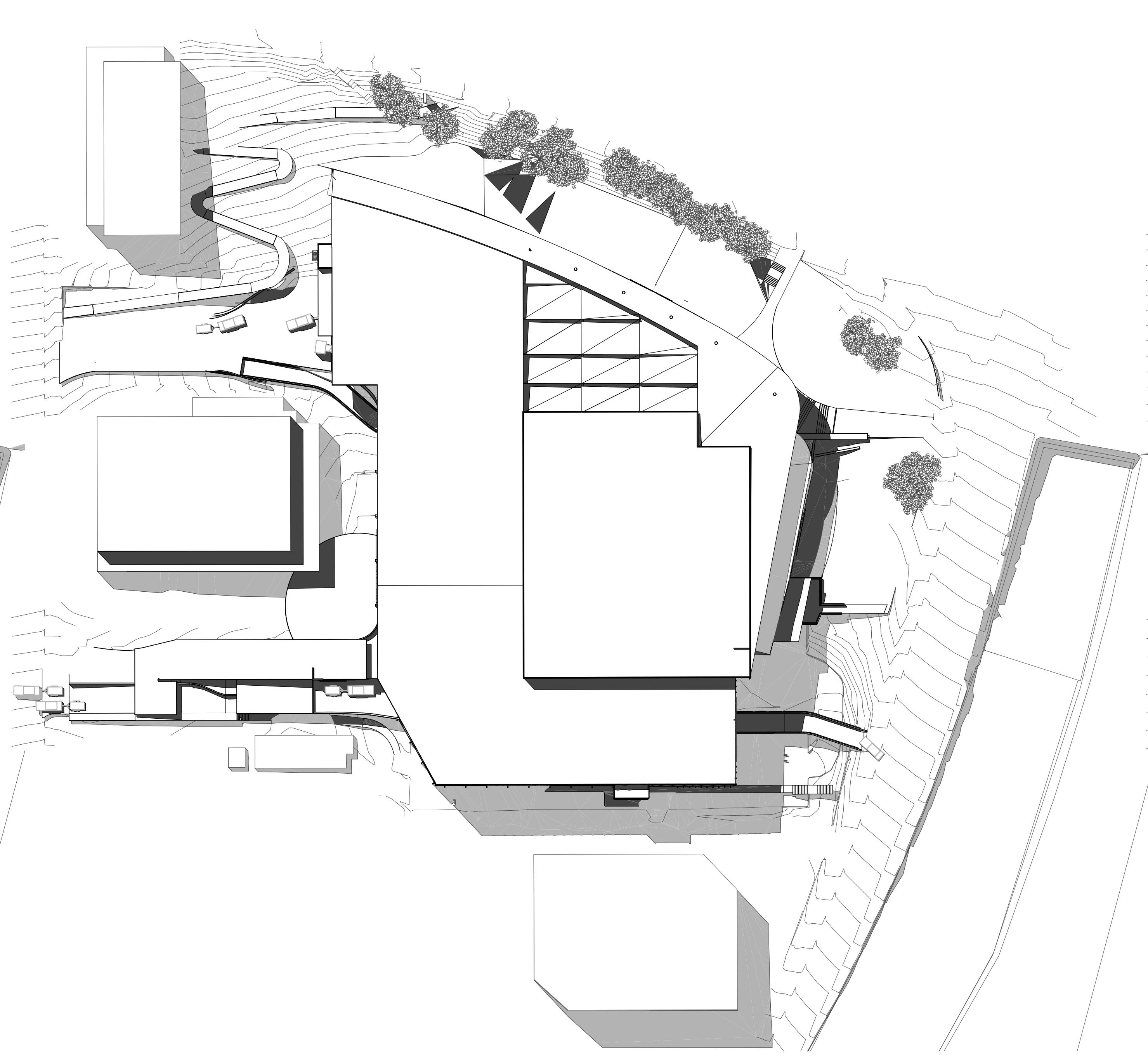

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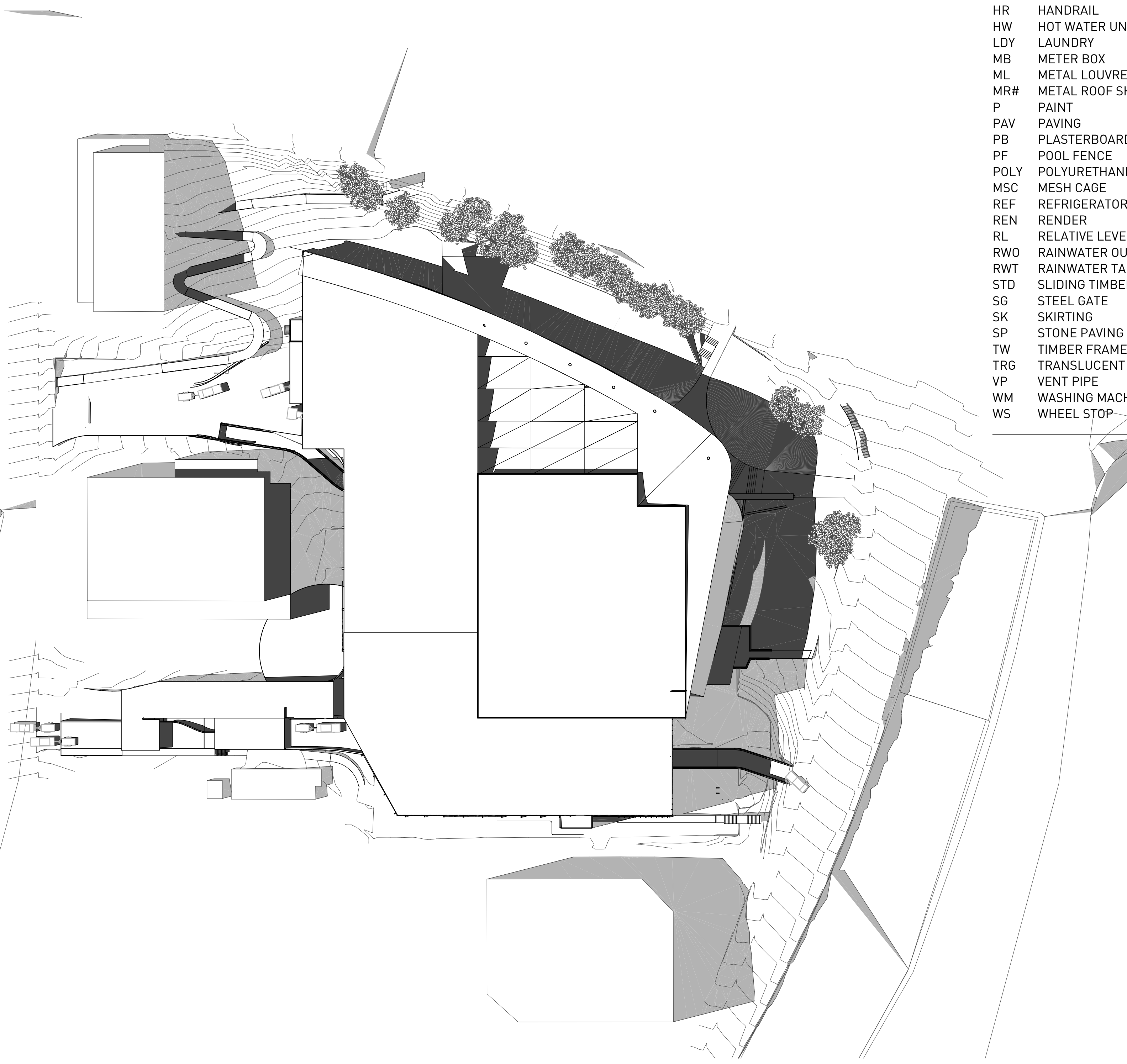

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SHADOWS - MARCH EQUINOX

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DEVELOPMENT APPLICATION

PROJECT
PYMBLE BUNNINGS
950 PACIFIC HWY PYMBLE

CLIENT **BUNNINGS**

13_052 DA-A-854C

0 5 10
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5,000 (1:50)
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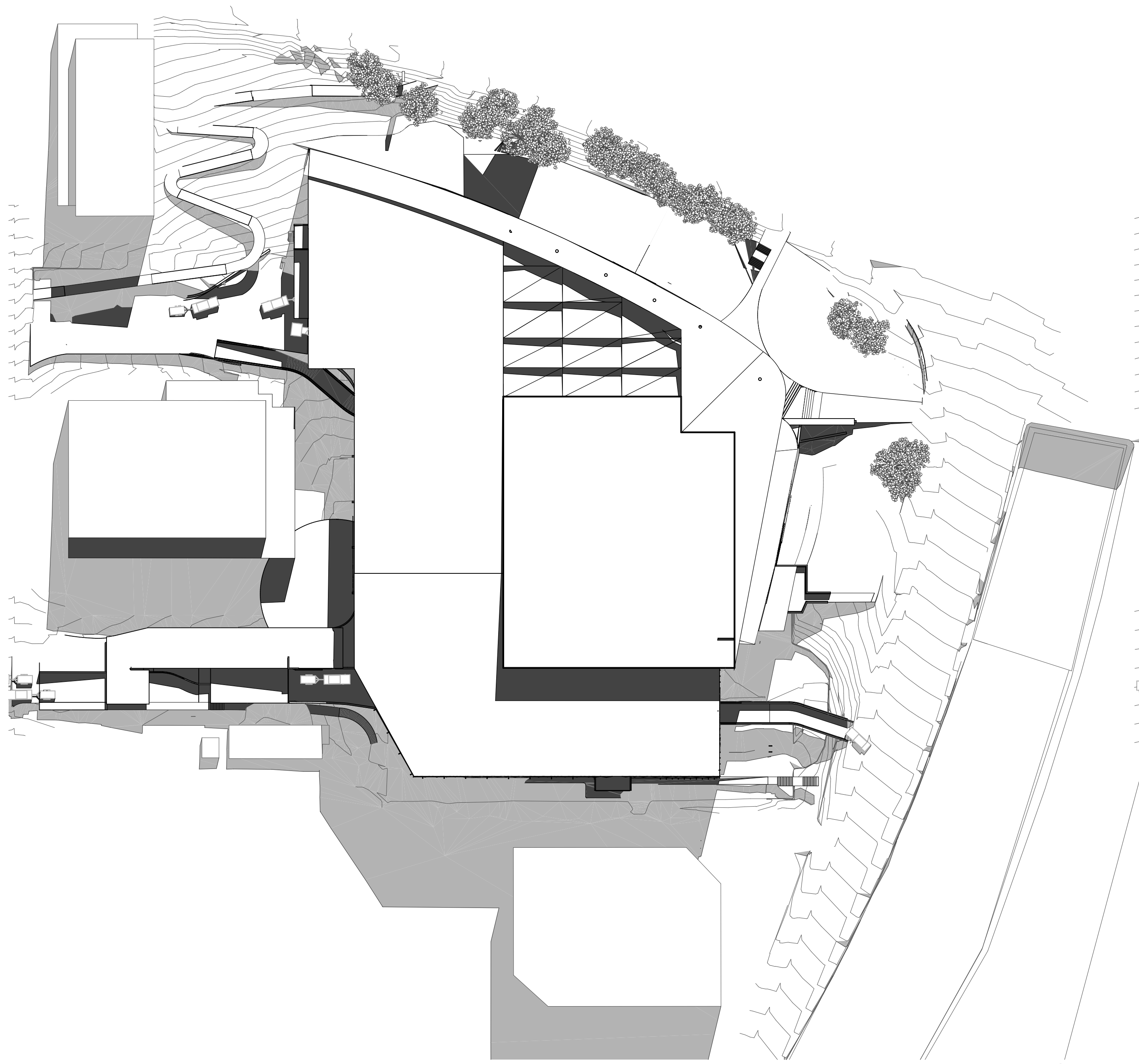

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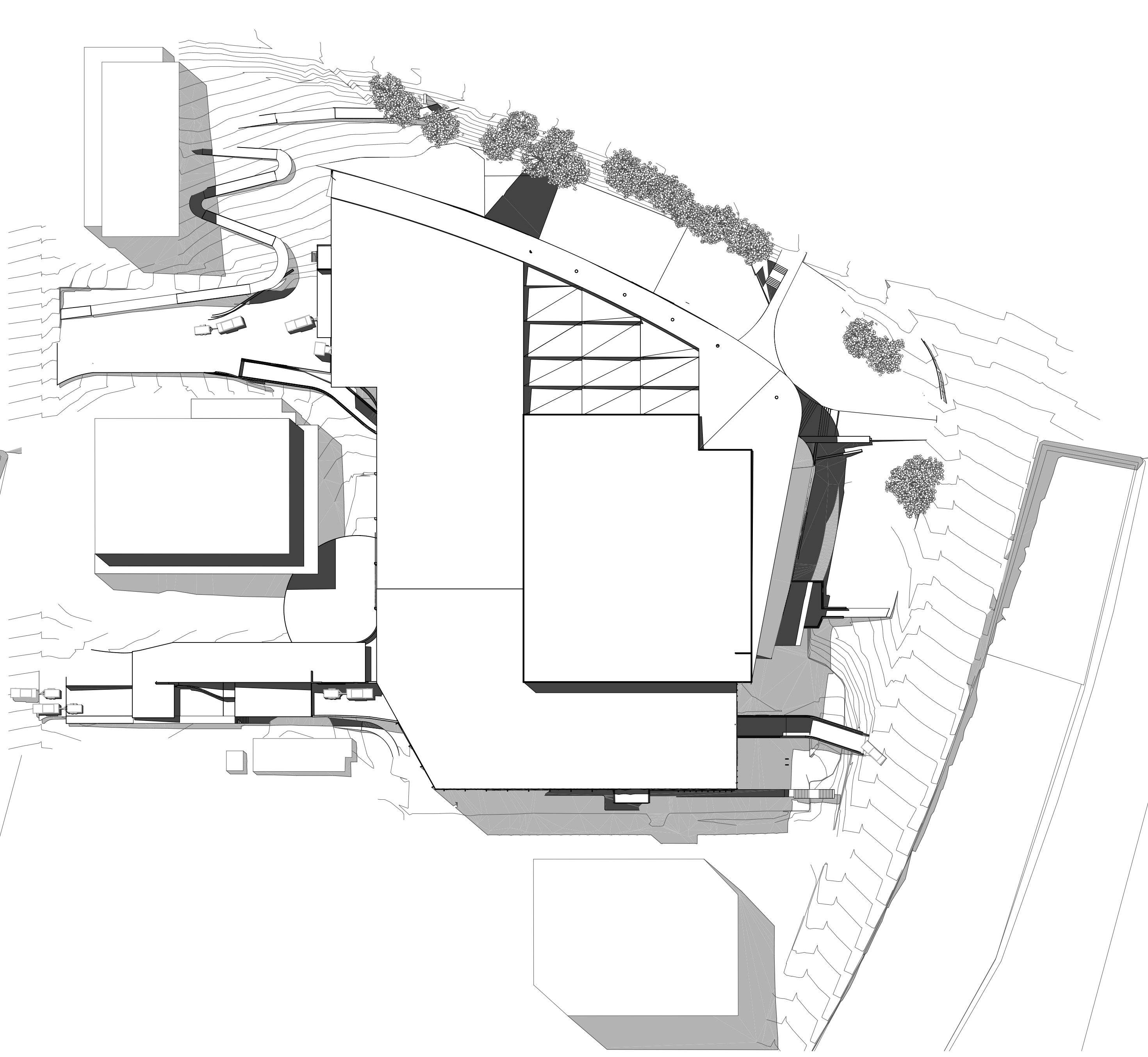

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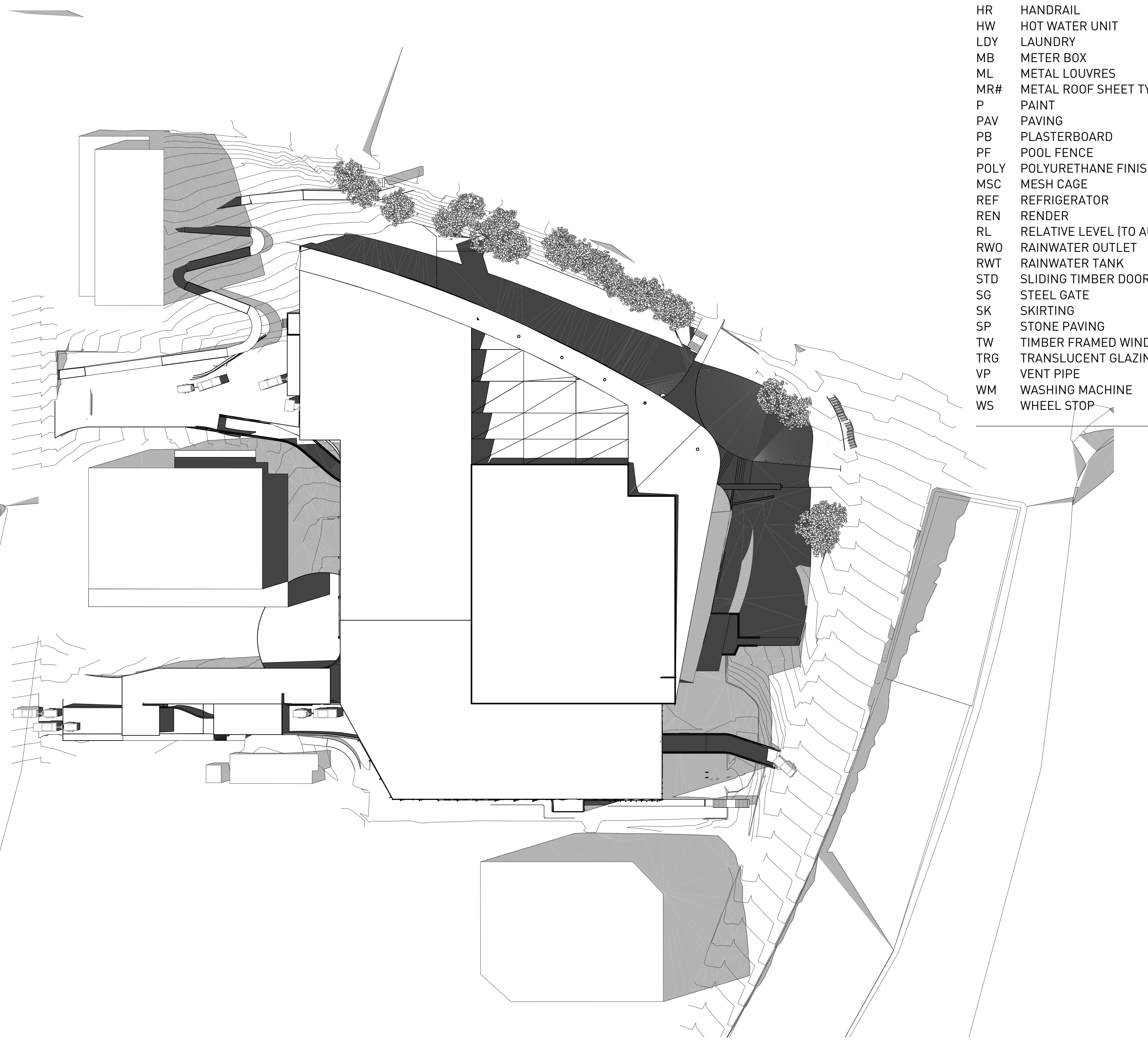

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DOCUMENT
SHADOWS - SEPTEMBER EQUINOX

STATUS
DEVELOPMENT APPLICATION

REVISION - FOR DA 19-09-2016

STAGE
DEVELOPMENT APPLICATION

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PYMBLE BUNNINGS
BUNNINGS
950 PACIFIC HWY PYMBLE

CLIENT **BUNNINGS**

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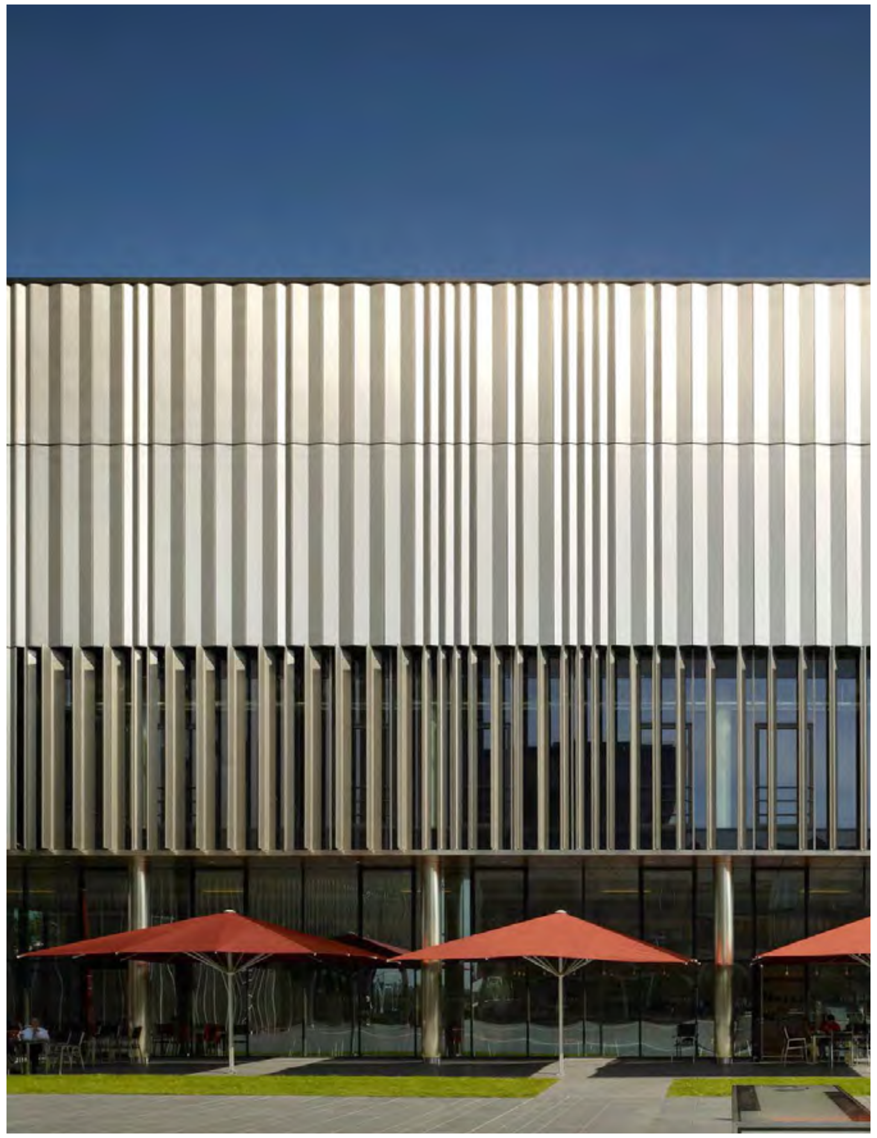
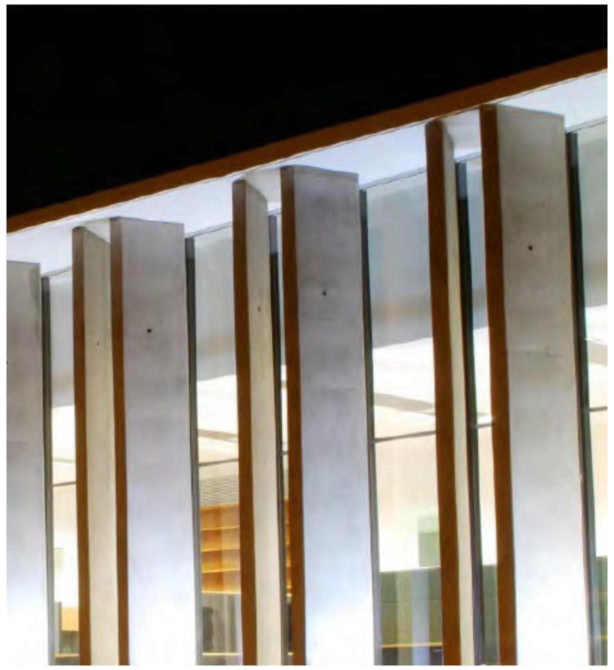


EXAMPLE OF CORRUGATED CLADDING

EXAMPLE OF COLONNADE WITH PRECAST CLADDING - ANGLED



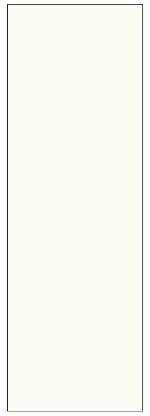
EXAMPLE OF SCULTED ROOF WITH DEEP OVERHANG DEFINING ENTRY

EXAMPLE OF TRANSLUCENT GLAZED SCREEN - COLOURED

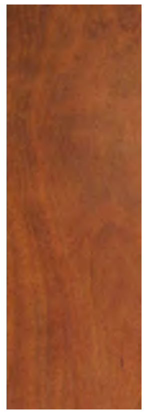
EXTERNAL METAL CLADDING
ALPOLIC 'GREEN METALLIC'
(MC1)
CORRUGATED PROFILE
~600mm & ~300mm.

EXTERNAL METAL CLADDING & LOUVRES- ALPOLIC
'MEDIUM GREY' METALLIC
(MC2) & (LS1)

WINDOW FRAMES
CHARCOAL (DULUX)



PAINTED
CONCRETE
(PC1)

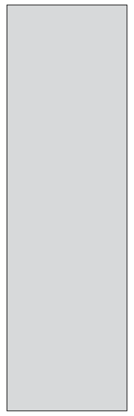


TIMBER -LIKE
COMPOSITE
CLADDING

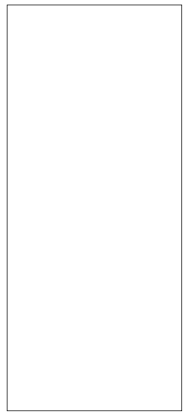
SOFFIT (CC1)

(EG TRESPA PACIFIC
BOARD

PRECAST OFF WHITE CONCRETE TO COLLONADE -SHOT
BLAST FINISH WITH QUARTZ
AGGREGATE



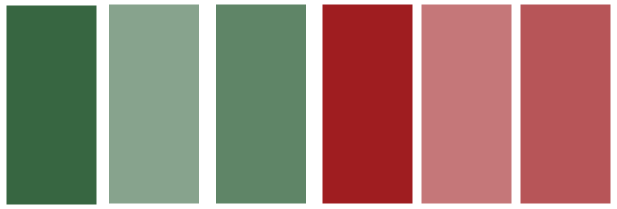
ROOF
LIGHT GREY
(MR)
COLORBOND
SHALE GREY



BALUSTRADE
WHITE

SANDSTONE
CLADDING TO
RETAINING WALLS
(STN1)

SOLAR PANELS FLUSH WITH ROOF
INTEGRATED INTO ROOF DESIGN



TRANSLUCENT COLOURED GLAZING /
PERSPEX TO SCREEN

EXTERNAL FINISHES & PRECEDENT

BUNNINGS PYMBLE

13_052
REV B 20-03-2017

Brands can be substituted for products of equal quality and colour

Appendix B: Laboratory Reports & 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 178095

Client Details

Client	Environmental Investigation Services
Attention	Rob Muller
Address	PO Box 976, North Ryde BC, NSW, 1670

Sample Details

Your Reference	**E24542KF - Pymble**
Number of Samples	7 Water
Date samples received	20/10/2017
Date completed instructions received	20/10/2017

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.

Please refer to the last page of this report for any comments relating to the results.

Report Details

Date results requested by	27/10/2017
Date of Issue	27/10/2017

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

Results Approved By
Dragana Tomas, Senior Chemist
Jaimie Loa-Kum-Cheung, Senior Chemist
Nick Sarlamis, Inorganics Supervisor
Steven Luong, Senior Chemist

Authorised By
David Springer

David Springer, General Manager

VOCs in water						
Our Reference		178095-1	178095-2	178095-3	178095-4	178095-5
Your Reference	UNITS	MW3	MW04	MW05	MW08	MW13
Date Sampled		18/10/2017	18/10/2017	18/10/2017	18/10/2017	18/10/2017
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	23/10/2017	23/10/2017	23/10/2017	23/10/2017	23/10/2017
Date analysed	-	24/10/2017	24/10/2017	24/10/2017	24/10/2017	24/10/2017
Dichlorodifluoromethane	µg/L	<10	<10	<10	<10	<10
Chloromethane	µg/L	<10	<10	<10	<10	<10
Vinyl Chloride	µg/L	<10	<10	<10	<10	<10
Bromomethane	µg/L	<10	<10	<10	<10	<10
Chloroethane	µg/L	<10	<10	<10	<10	<10
Trichlorofluoromethane	µg/L	<10	<10	<10	<10	<10
1,1-Dichloroethene	µg/L	<1	<1	<1	<1	<1
Trans-1,2-dichloroethene	µg/L	<1	<1	<1	<1	<1
1,1-dichloroethane	µg/L	<1	<1	<1	<1	<1
Cis-1,2-dichloroethene	µg/L	<1	<1	<1	<1	<1
Bromochloromethane	µg/L	<1	<1	<1	<1	<1
Chloroform	µg/L	<1	<1	<1	<1	<1
2,2-dichloropropane	µg/L	<1	<1	<1	<1	<1
1,2-dichloroethane	µg/L	<1	<1	<1	<1	<1
1,1,1-trichloroethane	µg/L	<1	<1	<1	<1	<1
1,1-dichloropropene	µg/L	<1	<1	<1	<1	<1
Cyclohexane	µg/L	<1	<1	<1	<1	<1
Carbon tetrachloride	µg/L	<1	<1	<1	<1	<1
Benzene	µg/L	8,100	8,800	<1	<1	<1
Dibromomethane	µg/L	<1	<1	<1	<1	<1
1,2-dichloropropane	µg/L	<1	<1	<1	<1	<1
Trichloroethene	µg/L	<1	<1	<1	<1	<1
Bromodichloromethane	µg/L	<1	<1	<1	<1	<1
trans-1,3-dichloropropene	µg/L	<1	<1	<1	<1	<1
cis-1,3-dichloropropene	µg/L	<1	<1	<1	<1	<1
1,1,2-trichloroethane	µg/L	<1	<1	<1	<1	<1
Toluene	µg/L	1,400	1,300	<1	<1	<1
1,3-dichloropropane	µg/L	<1	<1	<1	<1	<1
Dibromochloromethane	µg/L	<1	<1	<1	<1	<1
1,2-dibromoethane	µg/L	<1	<1	<1	<1	<1
Tetrachloroethene	µg/L	<1	<1	<1	<1	<1
1,1,1,2-tetrachloroethane	µg/L	<1	<1	<1	<1	<1
Chlorobenzene	µg/L	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	65	280	<1	<1	<1
Bromoform	µg/L	<1	<1	<1	<1	<1

VOCs in water						
Our Reference		178095-1	178095-2	178095-3	178095-4	178095-5
Your Reference	UNITS	MW3	MW04	MW05	MW08	MW13
Date Sampled		18/10/2017	18/10/2017	18/10/2017	18/10/2017	18/10/2017
Type of sample		Water	Water	Water	Water	Water
m+p-xylene	µg/L	250	230	<2	<2	<2
Styrene	µg/L	72	58	<1	<1	<1
1,1,2,2-tetrachloroethane	µg/L	<1	<1	<1	<1	<1
o-xylene	µg/L	140	130	<1	<1	<1
1,2,3-trichloropropane	µg/L	<1	<1	<1	<1	<1
Isopropylbenzene	µg/L	<1	13	<1	<1	<1
Bromobenzene	µg/L	<1	<1	<1	<1	<1
n-propyl benzene	µg/L	2	8	<1	<1	<1
2-chlorotoluene	µg/L	<1	<1	<1	<1	<1
4-chlorotoluene	µg/L	<1	<1	<1	<1	<1
1,3,5-trimethyl benzene	µg/L	8	8	<1	<1	<1
Tert-butyl benzene	µg/L	<1	<1	<1	<1	<1
1,2,4-trimethyl benzene	µg/L	29	31	<1	<1	<1
1,3-dichlorobenzene	µg/L	<1	<1	<1	<1	<1
Sec-butyl benzene	µg/L	<1	<1	<1	<1	<1
1,4-dichlorobenzene	µg/L	<1	<1	<1	<1	<1
4-isopropyl toluene	µg/L	<1	<1	<1	<1	<1
1,2-dichlorobenzene	µg/L	<1	<1	<1	<1	<1
n-butyl benzene	µg/L	<1	2	<1	<1	<1
1,2-dibromo-3-chloropropane	µg/L	<1	<1	<1	<1	<1
1,2,4-trichlorobenzene	µg/L	<1	<1	<1	<1	<1
Hexachlorobutadiene	µg/L	<1	<1	<1	<1	<1
1,2,3-trichlorobenzene	µg/L	<1	<1	<1	<1	<1
Surrogate Dibromofluoromethane	%	93	88	96	104	119
Surrogate toluene-d8	%	92	108	99	98	96
Surrogate 4-BFB	%	81	90	82	78	79

vTRH(C6-C10)/BTEXN in Water

Our Reference		178095-1	178095-2	178095-3	178095-4	178095-5
Your Reference	UNITS	MW3	MW04	MW05	MW08	MW13
Date Sampled		18/10/2017	18/10/2017	18/10/2017	18/10/2017	18/10/2017
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	23/10/2017	23/10/2017	23/10/2017	23/10/2017	23/10/2017
Date analysed	-	24/10/2017	24/10/2017	24/10/2017	24/10/2017	24/10/2017
TRH C_6 - C_9	µg/L	13,000	12,000	<10	<10	<10
TRH C_6 - C_{10}	µg/L	13,000	12,000	<10	<10	<10
TRH C_6 - C_{10} less BTEX (F1)	µg/L	3,000	1,300	<10	<10	<10
Benzene	µg/L	8,100	8,800	<1	<1	<1
Toluene	µg/L	1,400	1,300	<1	<1	<1
Ethylbenzene	µg/L	65	280	<1	<1	<1
m+p-xylene	µg/L	250	230	<2	<2	<2
o-xylene	µg/L	140	130	<1	<1	<1
Naphthalene	µg/L	300	810	<1	<1	<1
Surrogate Dibromofluoromethane	%	93	88	99	100	119
Surrogate toluene-d8	%	92	108	96	96	96
Surrogate 4-BFB	%	81	90	98	99	79

vTRH(C6-C10)/BTEXN in Water

Our Reference		178095-6	178095-7
Your Reference	UNITS	DUPGFW1	TSW
Date Sampled		18/10/2017	18/10/2017
Type of sample		Water	Water
Date extracted	-	23/10/2017	23/10/2017
Date analysed	-	24/10/2017	24/10/2017
TRH C_6 - C_9	µg/L	<10	[NA]
TRH C_6 - C_{10}	µg/L	<10	[NA]
TRH C_6 - C_{10} less BTEX (F1)	µg/L	<10	[NA]
Benzene	µg/L	<1	87%
Toluene	µg/L	<1	96%
Ethylbenzene	µg/L	<1	102%
m+p-xylene	µg/L	<2	104%
o-xylene	µg/L	<1	104%
Naphthalene	µg/L	<1	[NA]
Surrogate Dibromofluoromethane	%	129	99
Surrogate toluene-d8	%	97	101
Surrogate 4-BFB	%	76	104

svTRH (C10-C40) in Water						
Our Reference		178095-1	178095-2	178095-3	178095-4	178095-5
Your Reference	UNITS	MW3	MW04	MW05	MW08	MW13
Date Sampled		18/10/2017	18/10/2017	18/10/2017	18/10/2017	18/10/2017
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	23/10/2017	23/10/2017	23/10/2017	23/10/2017	23/10/2017
Date analysed	-	24/10/2017	24/10/2017	24/10/2017	24/10/2017	24/10/2017
TRH C_{10} - C_{14}	µg/L	640	1,800	<50	<50	<50
TRH C_{15} - C_{28}	µg/L	100	200	<100	<100	<100
TRH C_{29} - C_{36}	µg/L	<100	<100	<100	<100	<100
TRH >C_{10} - C_{16}	µg/L	510	1,600	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	µg/L	210	800	<50	<50	<50
TRH >C_{16} - C_{34}	µg/L	<100	150	<100	<100	<100
TRH >C_{34} - C_{40}	µg/L	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	69	72	84	75	63

svTRH (C10-C40) in Water		
Our Reference		178095-6
Your Reference	UNITS	DUPGFW1
Date Sampled		18/10/2017
Type of sample		Water
Date extracted	-	23/10/2017
Date analysed	-	24/10/2017
TRH C_{10} - C_{14}	µg/L	<50
TRH C_{15} - C_{28}	µg/L	<100
TRH C_{29} - C_{36}	µg/L	<100
TRH >C_{10} - C_{16}	µg/L	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	µg/L	<50
TRH >C_{16} - C_{34}	µg/L	<100
TRH >C_{34} - C_{40}	µg/L	<100
Surrogate o-Terphenyl	%	82

PAHs in Water - Low Level						
Our Reference		178095-1	178095-2	178095-3	178095-4	178095-5
Your Reference	UNITS	MW3	MW04	MW05	MW08	MW13
Date Sampled		18/10/2017	18/10/2017	18/10/2017	18/10/2017	18/10/2017
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	23/10/2017	23/10/2017	23/10/2017	23/10/2017	23/10/2017
Date analysed	-	24/10/2017	24/10/2017	24/10/2017	24/10/2017	24/10/2017
Naphthalene	µg/L	170	500	0.5	<0.2	0.5
Acenaphthylene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	µg/L	0.1	0.2	<0.1	<0.1	<0.1
Fluorene	µg/L	<0.1	0.2	<0.1	<0.1	<0.1
Phenanthrene	µg/L	0.3	0.5	<0.1	<0.1	<0.1
Anthracene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Total +ve PAH's	µg/L	170	500	0.50	NIL (+)VE	0.52
Surrogate p-Terphenyl-d14	%	88	63	99	85	80

PAHs in Water - Low Level		
Our Reference		178095-6
Your Reference	UNITS	DUPGFW1
Date Sampled		18/10/2017
Type of sample		Water
Date extracted	-	23/10/2017
Date analysed	-	24/10/2017
Naphthalene	µg/L	0.3
Acenaphthylene	µg/L	<0.1
Acenaphthene	µg/L	<0.1
Fluorene	µg/L	<0.1
Phenanthrene	µg/L	<0.1
Anthracene	µg/L	<0.1
Fluoranthene	µg/L	<0.1
Pyrene	µg/L	<0.1
Benzo(a)anthracene	µg/L	<0.1
Chrysene	µg/L	<0.1
Benzo(b,j+k)fluoranthene	µg/L	<0.2
Benzo(a)pyrene	µg/L	<0.1
Indeno(1,2,3-c,d)pyrene	µg/L	<0.1
Dibenzo(a,h)anthracene	µg/L	<0.1
Benzo(g,h,i)perylene	µg/L	<0.1
Benzo(a)pyrene TEQ	µg/L	<0.5
Total +ve PAH's	µg/L	0.32
Surrogate p-Terphenyl-d14	%	103

HM in water - dissolved						
Our Reference		178095-1	178095-2	178095-3	178095-4	178095-5
Your Reference	UNITS	MW3	MW04	MW05	MW08	MW13
Date Sampled		18/10/2017	18/10/2017	18/10/2017	18/10/2017	18/10/2017
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	23/10/2017	23/10/2017	23/10/2017	23/10/2017	23/10/2017
Date analysed	-	23/10/2017	23/10/2017	23/10/2017	23/10/2017	23/10/2017
Arsenic-Dissolved	µg/L	1	6	3	6	<1
Cadmium-Dissolved	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium-Dissolved	µg/L	<1	<1	<1	<1	<1
Copper-Dissolved	µg/L	5	11	<1	<1	<1
Lead-Dissolved	µg/L	<1	<1	<1	<1	<1
Mercury-Dissolved	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Nickel-Dissolved	µg/L	3	4	1	11	<1
Zinc-Dissolved	µg/L	7	5	12	48	3

HM in water - dissolved		
Our Reference		178095-6
Your Reference	UNITS	DUPGFW1
Date Sampled		18/10/2017
Type of sample		Water
Date prepared	-	23/10/2017
Date analysed	-	23/10/2017
Arsenic-Dissolved	µg/L	6
Cadmium-Dissolved	µg/L	<0.1
Chromium-Dissolved	µg/L	<1
Copper-Dissolved	µg/L	<1
Lead-Dissolved	µg/L	<1
Mercury-Dissolved	µg/L	<0.05
Nickel-Dissolved	µg/L	12
Zinc-Dissolved	µg/L	50

Miscellaneous Inorganics						
Our Reference	UNITS	178095-1	178095-2	178095-3	178095-4	178095-5
Your Reference		MW3	MW04	MW05	MW08	MW13
Date Sampled		18/10/2017	18/10/2017	18/10/2017	18/10/2017	18/10/2017
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	20/10/2017	20/10/2017	20/10/2017	20/10/2017	20/10/2017
Date analysed	-	20/10/2017	20/10/2017	20/10/2017	20/10/2017	20/10/2017
Total Cyanide	mg/L	0.088	2.4	0.012	<0.004	0.48
Free Cyanide in Water	mg/L	<0.004	<0.004	<0.004	<0.004	0.005
Ammonia as N in water	mg/L	98	100	0.29	0.22	5.5

Method ID	Methodology Summary
Inorg-014	Cyanide - free, total, weak acid dissociable by segmented flow analyser (in line dialysis with colourimetric finish). Solids are extracted in a caustic media prior to analysis.
Inorg-057	Ammonia - determined colourimetrically, based on APHA latest edition 4500-NH3 F. Soils are analysed following a KCl extraction.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Metals-022	Determination of various metals by ICP-MS.
Org-003	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-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.
Org-013	Water samples are analysed directly by purge and trap GC-MS.
Org-016	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: VOCs in water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			23/10/2017	[NT]	[NT]	[NT]	[NT]	23/10/2017	[NT]
Date analysed	-			24/10/2017	[NT]	[NT]	[NT]	[NT]	24/10/2017	[NT]
Dichlorodifluoromethane	µg/L	10	Org-013	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chloromethane	µg/L	10	Org-013	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Vinyl Chloride	µg/L	10	Org-013	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bromomethane	µg/L	10	Org-013	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chloroethane	µg/L	10	Org-013	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Trichlorofluoromethane	µg/L	10	Org-013	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,1-Dichloroethene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Trans-1,2-dichloroethene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,1-dichloroethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	114	[NT]
Cis-1,2-dichloroethene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bromochloromethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chloroform	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	114	[NT]
2,2-dichloropropane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2-dichloroethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	112	[NT]
1,1,1-trichloroethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	111	[NT]
1,1-dichloropropene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Cyclohexane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Carbon tetrachloride	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibromomethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2-dichloropropane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Trichloroethene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	105	[NT]
Bromodichloromethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	115	[NT]
trans-1,3-dichloropropene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
cis-1,3-dichloropropene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,1,2-trichloroethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Toluene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,3-dichloropropane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibromochloromethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	112	[NT]
1,2-dibromoethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Tetrachloroethene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	102	[NT]
1,1,1,2-tetrachloroethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chlorobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ethylbenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bromoform	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
m+p-xylene	µg/L	2	Org-013	<2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Styrene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,1,2,2-tetrachloroethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
o-xylene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]

QUALITY CONTROL: VOCs in water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
1,2,3-trichloropropane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Isopropylbenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bromobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
n-propyl benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
2-chlorotoluene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
4-chlorotoluene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,3,5-trimethyl benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Tert-butyl benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2,4-trimethyl benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,3-dichlorobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Sec-butyl benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,4-dichlorobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
4-isopropyl toluene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2-dichlorobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
n-butyl benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2-dibromo-3-chloropropane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2,4-trichlorobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Hexachlorobutadiene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2,3-trichlorobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-013	100	[NT]	[NT]	[NT]	[NT]	106	[NT]
Surrogate toluene-d8	%		Org-013	95	[NT]	[NT]	[NT]	[NT]	97	[NT]
Surrogate 4-BFB	%		Org-013	74	[NT]	[NT]	[NT]	[NT]	108	[NT]

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			23/10/2017	[NT]	[NT]	[NT]	[NT]	23/10/2017	[NT]
Date analysed	-			24/10/2017	[NT]	[NT]	[NT]	[NT]	24/10/2017	[NT]
TRH C_6 - C_9	µg/L	10	Org-016	<10	[NT]	[NT]	[NT]	[NT]	90	[NT]
TRH C_6 - C_{10}	µg/L	10	Org-016	<10	[NT]	[NT]	[NT]	[NT]	90	[NT]
Benzene	µg/L	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	93	[NT]
Toluene	µg/L	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	94	[NT]
Ethylbenzene	µg/L	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	89	[NT]
m+p-xylene	µg/L	2	Org-016	<2	[NT]	[NT]	[NT]	[NT]	88	[NT]
o-xylene	µg/L	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	87	[NT]
Naphthalene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-016	104	[NT]	[NT]	[NT]	[NT]	103	[NT]
Surrogate toluene-d8	%		Org-016	102	[NT]	[NT]	[NT]	[NT]	106	[NT]
Surrogate 4-BFB	%		Org-016	101	[NT]	[NT]	[NT]	[NT]	103	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	[NT]
Date extracted	-			23/10/2017	[NT]	[NT]	[NT]	[NT]	23/10/2017	[NT]
Date analysed	-			23/10/2017	[NT]	[NT]	[NT]	[NT]	23/10/2017	[NT]
TRH C_{10} - C_{14}	µg/L	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	109	[NT]
TRH C_{15} - C_{28}	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	112	[NT]
TRH C_{29} - C_{36}	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	86	[NT]
TRH >C_{10} - C_{16}	µg/L	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	109	[NT]
TRH >C_{16} - C_{34}	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	112	[NT]
TRH >C_{34} - C_{40}	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	86	[NT]
Surrogate o-Terphenyl	%		Org-003	98	[NT]	[NT]	[NT]	[NT]	87	[NT]

QUALITY CONTROL: PAHs in Water - Low Level					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W4	[NT]
Date extracted	-			23/10/2017	2	23/10/2017	23/10/2017		23/10/2017	[NT]
Date analysed	-			24/10/2017	2	24/10/2017	24/10/2017		24/10/2017	[NT]
Naphthalene	µg/L	0.2	Org-012	<0.2	2	500	670	29	70	[NT]
Acenaphthylene	µg/L	0.1	Org-012	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	µg/L	0.1	Org-012	<0.1	2	0.2	0.4	67	[NT]	[NT]
Fluorene	µg/L	0.1	Org-012	<0.1	2	0.2	0.4	67	73	[NT]
Phenanthrene	µg/L	0.1	Org-012	<0.1	2	0.5	0.8	46	70	[NT]
Anthracene	µg/L	0.1	Org-012	<0.1	2	<0.1	0.1	0	[NT]	[NT]
Fluoranthene	µg/L	0.1	Org-012	<0.1	2	<0.1	0.1	0	70	[NT]
Pyrene	µg/L	0.1	Org-012	<0.1	2	<0.1	0.1	0	74	[NT]
Benzo(a)anthracene	µg/L	0.1	Org-012	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Chrysene	µg/L	0.1	Org-012	<0.1	2	<0.1	<0.1	0	81	[NT]
Benzo(b,j+k)fluoranthene	µg/L	0.2	Org-012	<0.2	2	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	µg/L	0.1	Org-012	<0.1	2	<0.1	<0.1	0	77	[NT]
Indeno(1,2,3-c,d)pyrene	µg/L	0.1	Org-012	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	µg/L	0.1	Org-012	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	µg/L	0.1	Org-012	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	87	2	63	84	29	100	[NT]

QUALITY CONTROL: HM in water - dissolved					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date prepared	-			23/10/2017	6	23/10/2017	23/10/2017		23/10/2017	[NT]
Date analysed	-			23/10/2017	6	23/10/2017	23/10/2017		23/10/2017	[NT]
Arsenic-Dissolved	µg/L	1	Metals-022	<1	6	6	[NT]		98	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	6	<0.1	[NT]		101	[NT]
Chromium-Dissolved	µg/L	1	Metals-022	<1	6	<1	[NT]		96	[NT]
Copper-Dissolved	µg/L	1	Metals-022	<1	6	<1	[NT]		98	[NT]
Lead-Dissolved	µg/L	1	Metals-022	<1	6	<1	[NT]		104	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	6	<0.05	<0.05	0	98	[NT]
Nickel-Dissolved	µg/L	1	Metals-022	<1	6	12	[NT]		97	[NT]
Zinc-Dissolved	µg/L	1	Metals-022	<1	6	50	[NT]		95	[NT]

QUALITY CONTROL: Miscellaneous Inorganics						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	178095-2
Date prepared	-			20/10/2017	1	20/10/2017	20/10/2017		20/10/2017	20/10/2017
Date analysed	-			20/10/2017	1	20/10/2017	20/10/2017		20/10/2017	20/10/2017
Total Cyanide	mg/L	0.004	Inorg-014	<0.004	1	0.088	0.095	8	91	#
Free Cyanide in Water	mg/L	0.004	Inorg-014	<0.004	1	<0.004	<0.004	0	90	93
Ammonia as N in water	mg/L	0.005	Inorg-057	<0.005	1	98	98	0	106	#

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.

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: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

Report Comments

MISC_INORG: Total Cyanide # Percent recovery is not possible to report due to the high concentration of the analyte in the sample. However an acceptable recovery was obtained for the LCS.

MISC_INORG: Ammonia # Percent recovery is not possible to report due to the high concentration of the compound/s in the sample/s.
However an acceptable recovery was obtained for the LCS.

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	Environmental Investigation Services
Attention	Rob Muller

Sample Login Details

Your reference	E24542KF - Pymble
Envirolab Reference	178095
Date Sample Received	20/10/2017
Date Instructions Received	20/10/2017
Date Results Expected to be Reported	27/10/2017

Sample Condition

Samples received in appropriate condition for analysis	YES
No. of Samples Provided	7 Water
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	10.1
Cooling Method	Ice
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	VOCs in water	vTRH(C6-C10)/BTEXN in Water	svTRH (C10-C40) in Water	PAHs in Water - Low Level	HM in water - dissolved	Total Cyanide	Free Cyanide in Water	Ammonia as N in water
MW3	✓	✓	✓	✓	✓	✓	✓	✓
MW04	✓	✓	✓	✓	✓	✓	✓	✓
MW05	✓	✓	✓	✓	✓	✓	✓	✓
MW08	✓	✓	✓	✓	✓	✓	✓	✓
MW13	✓	✓	✓	✓	✓	✓	✓	✓
DUPGFW1		✓	✓	✓	✓			
TSW		✓						

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.

SAMPLE AND CHAIN OF CUSTODY FORM

TO:
ENVIROLAB SERVICES PTY LTD
12 ASHLEY STREET
CHATSWOOD NSW 2067
P: (02) 99106200
F: (02) 99106201

Attention: Aileen

EIS Job Number: **E24542KF**

Date Results Required: **STANDARD**

Page: 1 of 1

FROM:
ENVIRONMENTAL INVESTIGATION SERVICES
REAR OF 115 WICKS ROAD
MACQUARIE PARK, NSW 2113
P: 02-9888 5000 **F: 02-9888 5001**
Attention: **Rob Muller**

EIS

Location: **Pymble**

Sampler: **GF**

Sample Preserved in Esky on Ice

Tests Required

Date Sampled	Lab Ref:	Sample Number	Sample Containers	PID	Sample Description		Combo 3L	VOCs (including carbon	Cyanide (total and free)	Ammonia			BTEX				
18/10/2017	1	MW3	G1, S, V, H, N	211	Groundwater		X	X	X	X							
18/10/2017	2	MW04	G1, S, V, H, N	342	Groundwater		X	X	X	X							
19/10/2017	3	MW05	G1, S, V, H, N	0	Groundwater		X	X	X	X							
18/10/2017	4	MW08	G1, S, V, H, N	0	Groundwater		X	X	X	X							
18/10/2017	5	MW13	G1, S, V, H, N	0	Groundwater		X	X	X	X							
18/10/2017	6	DUPGFW1	G1, S, V, H, N	-	Groundwater		X										
18/10/2017		DUPGFW2	G1, S, V, H, N	-	Groundwater		X										
18/10/2017	7	TSW	V	-	Trip Spike								X				

ENVIROLAB GROUP
Envirolab Service
12 Ashley S
Chatswood NSW 2067
Ph: (02) 9910 620
Job No: 178095
Date Received: 20.10.17
Time Received: 09:40
Received by: JE
Temp: [✓ Cool]/Ambient 10.1°c
Cooling: [✓ Ice]/Icepack
Security: [✓ Intact]/Broken/None

Remarks (comments/detection limits required):

All analysis PQLs to ANZECC (2000) Detection Limits Please
Please send to Envirolab Melbourne.

Sample Containers:
G1 - 500mL Amber Glass Bottle **N - Sodium Hydroxide Wash**
V - BTEX Vial **H - HNO3 Wash PVC** **S - H2SO4 Wash PVC**

Relinquished By:	**Date:**	**Time:**	**Received By:**	**Date:**
Geoff	19/10/17	14:00	ELS JE	20/10

1 Dalmore Drive, Scoresby VIC 3179
+61 3 9763 2500

melbourne@envirolab.com.au
envirolab.com.au

Envirolab Services Pty Ltd - Melbourne | ABN 37 112 5645 - 002

CERTIFICATE OF ANALYSIS 12159

Client:
Environmental Investigation Services
PO Box 976
North Ryde BC
NSW 1670

Attention: Rob Muller

Sample log in details:
Your Reference: **E24542KF Pymble**
No. of samples: 1 water
Date samples received / completed instructions received 23/10/2017 / 23/10/2017

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.
Please refer to the last page of this report for any comments relating to the results.

Report Details:
Date results requested by: / Issue Date: 30/10/17 / 30/10/17
Date of Preliminary Report: Not Issued
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:

Chris De Luca
Senior Chemist

vTRH(C6-C10)/BTEXN in Water		
Our Reference:	UNITS	12159-1
Your Reference	-------------	DUPGFW2
Date Sampled	------------	18/10/2017
Type of sample		Water
Date extracted	-	27/10/2017
Date analysed	-	27/10/2017
TRHC$_6$ - C$_9$	µg/L	<10
TRHC$_6$ - C$_{10}$	µg/L	<10
TRHC$_6$ - C$_{10}$ less BTEX (F1)	µg/L	<10
Benzene	µg/L	<1
Toluene	µg/L	<1
Ethylbenzene	µg/L	<1
m+p-xylene	µg/L	<2
o-xylene	µg/L	<1
Naphthalene	µg/L	<1
Surrogate Dibromofluoromethane	%	106
Surrogate toluene-d8	%	100
Surrogate 4-BFB	%	99

NATA
ACCREDITED FOR
TECHNICAL
COMPETENCE

TRH Water(C10-C40) NEPM		
Our Reference:	UNITS	12159-1
Your Reference	-------------	DUPGFW2
Date Sampled	------------	18/10/2017
Type of sample		Water
Date extracted	-	24/10/2017
Date analysed	-	24/10/2017
TRH C_{10} - C_{14}	µg/L	<50
TRH C_{15} - C_{28}	µg/L	<100
TRH C_{29} - C_{36}	µg/L	<100
TRH >C_{10} - C_{16}	µg/L	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	µg/L	<50
TRH >C_{16} - C_{34}	µg/L	<100
TRH >C_{34} - C_{40}	µg/L	<100
Surrogate o-Terphenyl	%	86

PAHs in Water - Low Level Our Reference: Your Reference Date Sampled Type of sample	UNITS ------------- ------------	12159-1 DUPGFW2 18/10/2017 Water
Date extracted	-	24/10/2017
Date analysed	-	25/10/2017
Naphthalene	µg/L	<0.1
Acenaphthylene	µg/L	<0.1
Acenaphthene	µg/L	<0.1
Fluorene	µg/L	<0.1
Phenanthrene	µg/L	<0.1
Anthracene	µg/L	<0.1
Fluoranthene	µg/L	<0.1
Pyrene	µg/L	<0.1
Benzo(a)anthracene	µg/L	<0.1
Chrysene	µg/L	<0.1
Benzo(b,j&k)fluoranthene	µg/L	<0.2
Benzo(a)pyrene	µg/L	<0.1
Indeno(1,2,3-c,d)pyrene	µg/L	<0.1
Dibenzo(a,h)anthracene	µg/L	<0.1
Benzo(g,h,i)perylene	µg/L	<0.1
Total +ve PAH's	µg/L	NIL (+)VE PAH
Benzo(a)pyrene TEQ	µg/L	<0.5
Surrogate p-Terphenyl-d_{14}	%	90

HM in water - dissolved		
Our Reference:	UNITS	12159-1
Your Reference	-------------	DUPGFW2
Date Sampled	------------	18/10/2017
Type of sample		Water
Date prepared	-	23/10/2017
Date analysed	-	23/10/2017
Arsenic-Dissolved	µg/L	<1
Cadmium-Dissolved	µg/L	<0.1
Chromium-Dissolved	µg/L	<1
Copper-Dissolved	µg/L	<1
Lead-Dissolved	µg/L	<1
Nickel-Dissolved	µg/L	<1
Zinc-Dissolved	µg/L	5
Mercury-Dissolved	µg/L	<0.05

Method ID	Methodology Summary
Org-016	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.
Org-013	Water samples are analysed directly by purge and trap GC-MS.
Org-003	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-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater 2013.
Metals-022 ICP-MS	Determination of various metals by ICP-MS.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			27/10/2017	[NT]	[NT]	LCS-1	27/10/2017
Date analysed	-			27/10/2017	[NT]	[NT]	LCS-1	27/10/2017
TRHC_6 - C_9	µg/L	10	Org-016	<10	[NT]	[NT]	LCS-1	100%
TRHC_6 - C_{10}	µg/L	10	Org-016	<10	[NT]	[NT]	LCS-1	100%
Benzene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-1	95%
Toluene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-1	99%
Ethylbenzene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-1	103%
m+p-xylene	µg/L	2	Org-016	<2	[NT]	[NT]	LCS-1	101%
o-xylene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-1	100%
Naphthalene	µg/L	1	Org-013	<1	[NT]	[NT]	LCS-1	95%
Surrogate Dibromofluoromethane	%		Org-016	102	[NT]	[NT]	LCS-1	98%
Surrogate toluene-d8	%		Org-016	99	[NT]	[NT]	LCS-1	99%
Surrogate 4-BFB	%		Org-016	103	[NT]	[NT]	LCS-1	100%

QUALITY CONTROL TRH Water(C10-C40) NEPM	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			24/10/2017	[NT]	[NT]	LCS-1	24/10/2017
Date analysed	-			24/10/2017	[NT]	[NT]	LCS-1	24/10/2017
TRHC_{10} - C_{14}	µg/L	50	Org-003	<50	[NT]	[NT]	LCS-1	89%
TRHC_{15} - C_{28}	µg/L	100	Org-003	<100	[NT]	[NT]	LCS-1	115%
TRHC_{29} - C_{36}	µg/L	100	Org-003	<100	[NT]	[NT]	LCS-1	93%
TRH>C_{10} - C_{16}	µg/L	50	Org-003	<50	[NT]	[NT]	LCS-1	89%
TRH>C_{16} - C_{34}	µg/L	100	Org-003	<100	[NT]	[NT]	LCS-1	115%
TRH>C_{34} - C_{40}	µg/L	100	Org-003	<100	[NT]	[NT]	LCS-1	93%
Surrogate o-Terphenyl	%		Org-003	84	[NT]	[NT]	LCS-1	89%

QUALITY CONTROL PAHs in Water - Low Level	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			24/10/2017	[NT]	[NT]	LCS-1	24/10/2017
Date analysed	-			25/10/2017	[NT]	[NT]	LCS-1	25/10/2017
Naphthalene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	LCS-1	82%
Acenaphthylene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	LCS-1	86%
Acenaphthene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Fluorene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	LCS-1	84%
Phenanthrene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	LCS-1	86%
Anthracene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Fluoranthene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	LCS-1	94%
Pyrene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	LCS-1	88%
Benzo(a)anthracene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Chrysene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	LCS-1	112%
Benzo(b,j&k) fluoranthene	µg/L	0.2	Org-012	<0.2	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	LCS-1	104%
Indeno(1,2,3-c,d)pyrene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d_{14}	%		Org-012	94	[NT]	[NT]	LCS-1	90%

QUALITY CONTROL HM in water - dissolved	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			23/10/2017	[NT]	[NT]	LCS-1	23/10/2017
Date analysed	-			23/10/2017	[NT]	[NT]	LCS-1	23/10/2017
Arsenic-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-1	103%
Cadmium-Dissolved	µg/L	0.1	Metals-022 ICP-MS	<0.1	[NT]	[NT]	LCS-1	105%
Chromium-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-1	106%
Copper-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-1	105%
Lead-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-1	93%
Nickel-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-1	105%
Zinc-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-1	104%
Mercury-Dissolved	µg/L	0.05	Metals-021 CV-AAS	<0.05	[NT]	[NT]	LCS-1	109%

Report Comments:

Asbestos ID was analysed by Approved Identifier:	Not applicable for this job
Asbestos ID was authorised by Approved Signatory:	Not applicable for this job

INS: Insufficient sample for this test	PQL: Practical Quantitation Limit	NT: Not tested
NR: Test not required	RPD: Relative Percent Difference	NA: Test not required
<: Less than	>: Greater than	LCS: Laboratory Control Sample

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.

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 batched 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: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

A division of Envirolab Group

Envirolab Services Pty Ltd - Melbourne
ABN 37 112 535 645 -02
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Ph +613 9763 2500 Fax +613 9763 2633
melbourne@envirolab.com.au
www.envirolab.com.au

SAMPLE RECEIPT ADVICE

Client Details	
Client	Environmental Investigation Services
Attention	Rob Muller

Sample Login Details	
Your Reference	E24542KF Pymble
Envirolab Reference	**12159**
Date Sample Received	23/10/2017
Date Instructions Received	23/10/2017
Date Results Expected to be Reported	**30/10/2017**

Sample Condition	
Samples received in appropriate condition for analysis	YES
No. of Samples Provided	1 water
Turnaround Time Requested	Standard
Temperature on receipt (°C)	16.6C
Cooling Method	Ice Pack
Sampling Date Provided	YES

Comments
Samples will be held for 1 month for water samples and 2 months for soil samples from date of receipt of samples

Please direct any queries to:

Pamela Adams	**Analisa Mathrick**
Phone: 03 9763 2500	Phone: 03 9763 2500
Fax: 03 9763 2633	Fax: 03 9763 2633
Email: padams@envirolab.com.au	Email: amathrick@envirolab.com.au

Sample and Testing Details on following page

Sample Id	***vTRH(C6-C10)/BTEXN in Water***	***TRH Water(C10-C40) NEPM***	***PAHs in Water - Low Level***	***HM in water - dissolved***
DUPGFW2	✓	✓	✓	✓

SAMPLE AND CHAIN OF CUSTODY FORM

TO: **ENVIROLAB SERVICES PTY LTD** **12 ASHLEY STREET** **CHATSWOOD NSW 2067** **P: (02) 99106200** **F: (02) 99106201** **Attention: Aileen**	**EIS Job Number:** E24542KF **Date Results Required:** STANDARD **Page:** 1 of 1	**FROM:** **EIS** **ENVIRONMENTAL INVESTIGATION SERVICES** **REAR OF 115 WICKS ROAD** **MACQUARIE PARK, NSW 2113** **P: 02-9888 5000 F: 02-9888 5001** **Attention:** Rob Muller

Location: Pymble

Sampler: GF

Sample Preserved in Esky on Ice

Tests Required

Date Sampled	Lab Ref:	Sample Number	Sample Containers	PID	Sample Description		Combo 3L	VOCs (including carbon)	Cyanide (total and free)	Ammonia			BTEX				
18/10/2017	1	MW3	G1, S, V, H, N	211	Groundwater		X	X	X	X							
18/10/2017	2	MW04	G1, S, V, H, N	342	Groundwater		X	X	X	X							
19/10/2017	3	MW05	G1, S, V, H, N	0	Groundwater		X	X	X	X							
18/10/2017	4	MW08	G1, S, V, H, N	0	Groundwater		X	X	X	X							
18/10/2017	5	MW13	G1, S, V, H, N	0	Groundwater		X	X	X	X							
18/10/2017	6	DUPGFW1	G1, S, V, H, N	-	Groundwater		X										
18/10/2017		DUPGFW2	G1, S, V, H, N	-	Groundwater		X										
18/10/2017	7	TSW	V	-	Trip Spike								X				

ENVIROLAB
Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200
Job No: 178045
Date Received: 20.10.17
Time Received: 09:40
Received by: JE
Temp: [✓ Cool]/Ambient 10.1°C
Cooling: [✓ Ice]/Icepack
Security: [✓ Intact]/Broken/None

ENVIROLAB
Envirolab Services
1a Dalmore Drive
Caribbean Park
Scoresby VIC 3179
Ph: (03) 9763 2500
Job No: 12159
Date Received: 23/10/17
Time Received: 12:25
Received by: MJ
Temp: [✓ Cool]/Ambient 16.6°C
Cooling: Ice/[✓ Icepack]
Security: [✓ Intact]/Broken/None

Remarks (comments/detection limits required):

All analysis PQLs to ANZECC (2000) Detection Limits Please

[illegible] Sent to Envirolab Melbourne

Sample Containers:
G1 - 500mL Amber Glass Bottle
N - Sodium Hydroxide Wash
V - BTEX Vial
H - HNO3 Wash PVC
S - H2SO4 Wash PVC

Relinquished By:	Date:	Time:	Received By:	Date:
Gwolf	19/10/17	14:00	ELS JE	20/10

Karin Wg 20/10/17

A.B.N. 44 000 964 278
10 / 585 Blackburn Road
Notting Hill, Vic, 3168
Telephone: (03) 9574 3200

Chartered Chemists

25-Oct-2017

REPORT NUMBER: M170998
Site/Client Ref: Pymble
Order No: E24542KF

Environmental Investigation Services

115 Wicks Road
Macquarie Park

New South Wales 2113
Attention: Geoff Fletcher

CERTIFICATE OF ANALYSIS

SAMPLES: Twenty-one samples were received for analysis

DATE RECEIVED: **16-Oct-2017**

DATE COMMENCED: **16-Oct-2017**

METHODS: See Attached Results

RESULTS: Please refer to attached pages for results.

Note: Results are based on samples as received at SGS laboratories

REPORTED BY:

Majid Abdolali
Chemist

NATA Accredited Laboratory Number: 2562
Corporate Site Number: 14420
Accredited for compliance
with ISO/IEC 17025.

ANALYTICAL RESULTS

Matrix: Thermal Desorption Tube
Method: TO-17.01 Volatile Organics (w/v)
Sample units are expressed in µg/m³

Test Started: 20/10/2017

	Leeder ID	2017013771	2017013773	2017013775
	Client ID	SV101 Mi0727852	SV102 Mi155370	SV102 Field Dup Mi167336
Analyte Name	**Sampled Date**	11/10/2017	11/10/2017	11/10/2017
	PQL			
Benzene		<5	<5	<5
Bromobenzene		<5	<5	<5
Bromochloromethane		<5	<5	<5
Bromodichloromethane		<5	<5	<5
n-Butylbenzene		<5	<5	<5
sec-Butylbenzene		<5	<5	<5
tert-Butylbenzene		<5	<5	<5
Carbon tetrachloride		<5	<5	<5
Chlorobenzene		<5	<5	<5
Chloroethane		<5	<5	<5
Chloromethane		<5	<5	<5
2-Chlorotoluene		<5	<5	<5
4-Chlorotoluene		<5	<5	<5
1,2-Dibromo-3-chloropropane		<5	<5	<5
Dibromochloromethane		<5	<5	<5
1,2-Dibromoethane		<5	<5	<5
Dibromomethane		<5	<5	<5
1,2-Dichlorobenzene		<5	<5	<5
1,3-Dichlorobenzene		<5	<5	<5
1,4-Dichlorobenzene		<5	<5	<5
Dichlorodifluoromethane		11	22	8.8
1,2-Dichloroethane		<5	<5	<5
1,1-Dichloroethane		<5	<5	<5
1,1-Dichloroethene		<5	<5	<5
cis-1,2-Dichloroethene		<5	<5	<5
trans-1,2-Dichloroethene		<5	<5	<5
1,2-Dichloropropane		<5	<5	<5
1,3-Dichloropropane		<5	<5	<5
2,2-Dichloropropane		<5	<5	<5
1,1-Dichloropropene		<5	<5	<5
cis-1,3-Dichloropropene		<5	<5	<5
trans-1,3-Dichloropropene		<5	<5	<5
Ethylbenzene		<5	<5	<5
Hexachlorobutadiene		<5	<5	<5
Isopropylbenzene		<5	<5	<5
4-Isopropyltoluene		<5	<5	<5
Naphthalene		<5	<5	<5
Propylbenzene		<5	<5	<5
Styrene		<5	<5	<5
1,1,1,2-Tetrachloroethane		<5	<5	<5

ANALYTICAL RESULTS

Matrix: Thermal Desorption Tube
Method: TO-17.01 Volatile Organics (w/v)
Sample units are expressed in µg/m³

Test Started: 20/10/2017

Analyte Name		2017013771	2017013773	2017013775
	Leeder ID	2017013771	2017013773	2017013775
	Client ID	SV101 Mi0727852	SV102 Mi155370	SV102 Field Dup Mi167336
	Sampled Date	11/10/2017	11/10/2017	11/10/2017
	PQL			
1,1,2,2-Tetrachloroethane		<5	<5	<5
Tetrachloroethene		<5	<5	<5
Toluene		<5	6.0	<5
Tribromomethane		<5	<5	<5
1,2,3-Trichlorobenzene		<5	<5	<5
1,2,4-Trichlorobenzene		<5	<5	<5
1,1,1-Trichloroethane		<5	<5	<5
1,1,2-Trichloroethane		<5	<5	<5
Trichloroethene		<5	<5	<5
Trichlorofluoromethane		<5	<5	<5
Trichloromethane		<5	<5	<5
1,2,3-Trichloropropane		<5	<5	<5
1,2,4-Trimethylbenzene		<5	<5	<5
1,3,5-Trimethylbenzene		<5	<5	<5
Vinyl chloride		<5	<5	<5
o-Xylene		<5	<5	<5
m&p-Xylenes		<5	<5	<5

ANALYTICAL RESULTS

Matrix: Thermal Desorption Tube
Method: TO-17.01 Volatile Organics (w/v)
Sample units are expressed in µg/m³

Test Started: 20/10/2017

	Leeder ID	2017013777
	Client ID	SV103 Mi180118
Analyte Name	**Sampled Date**	11/10/2017
	PQL	
Benzene		15
Bromobenzene		<5
Bromochloromethane		<5
Bromodichloromethane		<5
n-Butylbenzene		<5
sec-Butylbenzene		<5
tert-Butylbenzene		<5
Carbon tetrachloride		<5
Chlorobenzene		<5
Chloroethane		<5
Chloromethane		<5
2-Chlorotoluene		<5
4-Chlorotoluene		<5
1,2-Dibromo-3-chloropropane		<5
Dibromochloromethane		<5
1,2-Dibromoethane		<5
Dibromomethane		<5
1,2-Dichlorobenzene		<5
1,3-Dichlorobenzene		<5
1,4-Dichlorobenzene		<5
Dichlorodifluoromethane		14
1,2-Dichloroethane		<5
1,1-Dichloroethane		<5
1,1-Dichloroethene		<5
cis-1,2-Dichloroethene		<5
trans-1,2-Dichloroethene		<5
1,2-Dichloropropane		<5
1,3-Dichloropropane		<5
2,2-Dichloropropane		<5
1,1-Dichloropropene		<5
cis-1,3-Dichloropropene		<5
trans-1,3-Dichloropropene		<5
Ethylbenzene		6.5
Hexachlorobutadiene		<5
Isopropylbenzene		<5
4-Isopropyltoluene		<5
Naphthalene		<5
Propylbenzene		<5
Styrene		<5
1,1,1,2-Tetrachloroethane		<5

ANALYTICAL RESULTS

Matrix: Thermal Desorption Tube
Method: TO-17.01 Volatile Organics (w/v)
Sample units are expressed in µg/m³ Test Started: 20/10/2017

	Leeder ID	2017013777
	Client ID	SV103 Mi180118
Analyte Name	**Sampled Date**	11/10/2017
	PQL	
1,1,2,2-Tetrachloroethane		<5
Tetrachloroethene		<5
Toluene		37
Tribromomethane		<5
1,2,3-Trichlorobenzene		<5
1,2,4-Trichlorobenzene		<5
1,1,1-Trichloroethane		<5
1,1,2-Trichloroethane		<5
Trichloroethene		<5
Trichlorofluoromethane		<5
Trichloromethane		<5
1,2,3-Trichloropropane		<5
1,2,4-Trimethylbenzene		10
1,3,5-Trimethylbenzene		5.1
Vinyl chloride		<5
o-Xylene		13
m&p-Xylenes		22

ANALYTICAL RESULTS

Matrix: Thermal Desorption Tube
Method: TO-17.02 Volatile Organics
Sample units are expressed in ng/tube

Test Started: 20/10/2017

Analyte Name	Leeder ID	2017013780
	Client ID	Trip Blank Mi101165
	Sampled Date	11/10/2017
	PQL	
Benzene	5	nd
Bromobenzene	5	nd
Bromochloromethane	5	nd
Bromodichloromethane	5	nd
n-Butylbenzene	5	nd
sec-Butylbenzene	5	nd
tert-Butylbenzene	5	nd
Carbon tetrachloride	5	nd
Chlorobenzene	5	nd
Chloroethane	5	nd
Chloromethane	5	nd
2-Chlorotoluene	5	nd
4-Chlorotoluene	5	nd
1,2-Dibromo-3-chloropropane	5	nd
Dibromochloromethane	5	nd
1,2-Dibromoethane	5	nd
Dibromomethane	5	nd
1,2-Dichlorobenzene	5	nd
1,3-Dichlorobenzene	5	nd
1,4-Dichlorobenzene	5	nd
Dichlorodifluoromethane	5	nd
1,2-Dichloroethane	5	nd
1,1-Dichloroethane	5	nd
1,1-Dichloroethene	5	nd
cis-1,2-Dichloroethene	5	nd
trans-1,2-Dichloroethene	5	nd
1,2-Dichloropropane	5	nd
1,3-Dichloropropane	5	nd
2,2-Dichloropropane	5	nd
1,1-Dichloropropene	5	nd
cis-1,3-Dichloropropene	5	nd
trans-1,3-Dichloropropene	5	nd
Ethylbenzene	5	nd
Hexachlorobutadiene	5	nd
Isopropylbenzene	5	nd
4-Isopropyltoluene	5	nd
Naphthalene	5	nd
Propylbenzene	5	nd
Styrene	5	nd
1,1,1,2-Tetrachloroethane	5	nd

Matrix: Thermal Desorption Tube
Method: TO-17.02 Volatile Organics
Sample units are expressed in ng/tube

Test Started: 20/10/2017

	Leeder ID	2017013780
	Client ID	Trip Blank Mi101165
Analyte Name	**Sampled Date**	11/10/2017
	PQL	
1,1,2,2-Tetrachloroethane	5	nd
Tetrachloroethene	5	nd
Toluene	5	nd
Tribromomethane	5	nd
1,2,3-Trichlorobenzene	5	nd
1,2,4-Trichlorobenzene	5	nd
1,1,1-Trichloroethane	5	nd
1,1,2-Trichloroethane	5	nd
Trichloroethene	5	nd
Trichlorofluoromethane	5	nd
Trichloromethane	5	nd
1,2,3-Trichloropropane	5	nd
1,2,4-Trimethylbenzene	5	nd
1,3,5-Trimethylbenzene	5	nd
Vinyl chloride	5	nd
o-Xylene	5	nd
m&p-Xylenes	5	nd

ANALYTICAL RESULTS

Matrix: Thermal Desorption Tube
Method: TO-17.02 Volatile Organics
Sample units are expressed in ng/tube

Test Started: 20/10/2017

	Leeder ID	2017013781
	Client ID	Method
Analyte Name	**Sampled Date**	
	PQL	Blank
Benzene	5	nd
Bromobenzene	5	nd
Bromochloromethane	5	nd
Bromodichloromethane	5	nd
n-Butylbenzene	5	nd
sec-Butylbenzene	5	nd
tert-Butylbenzene	5	nd
Carbon tetrachloride	5	nd
Chlorobenzene	5	nd
Chloroethane	5	nd
Chloromethane	5	nd
2-Chlorotoluene	5	nd
4-Chlorotoluene	5	nd
1,2-Dibromo-3-chloropropane	5	nd
Dibromochloromethane	5	nd
1,2-Dibromoethane	5	nd
Dibromomethane	5	nd
1,2-Dichlorobenzene	5	nd
1,3-Dichlorobenzene	5	nd
1,4-Dichlorobenzene	5	nd
Dichlorodifluoromethane	5	nd
1,2-Dichloroethane	5	nd
1,1-Dichloroethane	5	nd
1,1-Dichloroethene	5	nd
cis-1,2-Dichloroethene	5	nd
trans-1,2-Dichloroethene	5	nd
1,2-Dichloropropane	5	nd
1,3-Dichloropropane	5	nd
2,2-Dichloropropane	5	nd
1,1-Dichloropropene	5	nd
cis-1,3-Dichloropropene	5	nd
trans-1,3-Dichloropropene	5	nd
Ethylbenzene	5	nd
Hexachlorobutadiene	5	nd
Isopropylbenzene	5	nd
4-Isopropyltoluene	5	nd
Naphthalene	5	nd
Propylbenzene	5	nd
Styrene	5	nd
1,1,1,2-Tetrachloroethane	5	nd

Matrix: Thermal Desorption Tube
Method: TO-17.02 Volatile Organics
Sample units are expressed in ng/tube

Test Started: 20/10/2017

	Leeder ID	2017013781
	Client ID	Method
Analyte Name	**Sampled Date**	
	PQL	Blank
1,1,2,2-Tetrachloroethane	5	nd
Tetrachloroethene	5	nd
Toluene	5	nd
Tribromomethane	5	nd
1,2,3-Trichlorobenzene	5	nd
1,2,4-Trichlorobenzene	5	nd
1,1,1-Trichloroethane	5	nd
1,1,2-Trichloroethane	5	nd
Trichloroethene	5	nd
Trichlorofluoromethane	5	nd
Trichloromethane	5	nd
1,2,3-Trichloropropane	5	nd
1,2,4-Trimethylbenzene	5	nd
1,3,5-Trimethylbenzene	5	nd
Vinyl chloride	5	nd
o-Xylene	5	nd
m&p-Xylenes	5	nd

Matrix: Thermal Desorption Tube
Method: TO-17 TPH.03 mg/m3 (w/v)
Sample units are expressed in mg/m³

Test Started: 20/10/2017

	Leeder ID	2017013771	2017013773	2017013775
	Client ID	SV101 Mi0727852	SV102 Mi155370	SV102 Field Dup Mi167336
Analyte Name	**Sampled Date**	11/10/2017	11/10/2017	11/10/2017
	PQL			
C6-C10		<0.1	0.41	0.27
C6-C10 (less BTEX)		<0.1	0.39	0.26
>C10-C16		0.29	0.49	0.26
>C10-C16 (less Naphthalene)		0.29	0.49	0.26

Matrix: Thermal Desorption Tube
Method: TO-17 TPH.03 mg/m3 (w/v)
Sample units are expressed in mg/m³ Test Started: 20/10/2017

	Leeder ID	2017013777
	Client ID	SV103 Mi180118
Analyte Name	**Sampled Date**	11/10/2017
	PQL	
C6-C10		1.5
C6-C10 (less BTEX)		1.4
>C10-C16		0.15
>C10-C16 (less Naphthalene)		0.15

Matrix: Thermal Desorption Tube
Method: TO-17 TPH.04 ug Total
Sample units are expressed in µg total Test Started: 20/10/2017

	Leeder ID	2017013780
	Client ID	Trip Blank Mi101165
Analyte Name	**Sampled Date**	11/10/2017
	PQL	
>C10-C16	0.1	nd
>C10-C16 (less Naphthalene)	0.1	nd
C6-C10	0.1	nd
C6-C10 (less BTEX)	0.1	nd

Matrix: Thermal Desorption Tube
Method: TO-17 TPH.04 ug Total
Sample units are expressed in µg total Test Started: 20/10/2017

	Leeder ID	2017013781
	Client ID	Method
Analyte Name	**Sampled Date**	
	PQL	Blank
>C10-C16	0.1	nd
>C10-C16 (less Naphthalene)	0.1	nd
C6-C10	0.1	nd
C6-C10 (less BTEX)	0.1	nd

Matrix: Thermal Desorption Tube
Method: TO-17 Isopropanol (w/v)
Sample units are expressed in mg/m³ Test Started: 20/10/2017

	Leeder ID	2017013771	2017013773	2017013775
	Client ID	SV101 Mi0727852	SV102 Mi155370	SV102 Field Dup Mi167336
Analyte Name	**Sampled Date**	11/10/2017	11/10/2017	11/10/2017
	PQL			
Isopropanol		<0.5	<0.5	<0.5

Matrix: Thermal Desorption Tube
Method: TO-17 Isopropanol (w/v)
Sample units are expressed in mg/m³ Test Started: 20/10/2017

	Leeder ID	2017013777	2017013779
	Client ID	SV103 Mi180118	IPA Shroud Mi155274
Analyte Name	**Sampled Date**	11/10/2017	11/10/2017
	PQL		
Isopropanol		<0.5	4100 E, L

Matrix: Thermal Desorption Tube
Method: TO-17 Isopropanol
Sample units are expressed in µg total Test Started: 20/10/2017

	Leeder ID	2017013780
	Client ID	Trip Blank Mi101165
Analyte Name	**Sampled Date**	11/10/2017
	PQL	
Isopropanol	0.5	nd

Matrix: Thermal Desorption Tube
Method: TO-17 Isopropanol
Sample units are expressed in µg total Test Started: 20/10/2017

	Leeder ID	2017013781
	Client ID	Method
Analyte Name	**Sampled Date**	
	PQL	Blank
Isopropanol	0.5	nd

ANALYTICAL RESULTS

Matrix: Carbon Tube
Method: MA-5.ST.ADD.02 Additional Volatile Organics
Sample units are expressed in mg/m³ Test Started: 19/10/2017

	Leeder ID	2017013782
	Client ID	IPA Shroud 10074
Analyte Name	**Sampled Date**	11/10/2017
	PQL	
Isopropanol		29000

Matrix: Carbon Tube
Method: MA-5.ST.ADD.01 Additional Volatile Organics
Sample units are expressed in µg total Test Started: 19/10/2017

	Leeder ID	2017013783
	Client ID	Method
Analyte Name	**Sampled Date**	
	PQL	Blank
Isopropanol	0.5	nd

Matrix: Silica Gel Tube
Method: MA-1146.AIR.02 Nitrogens
Sample units are expressed in mg/m³ Test Started: 18/10/2017

	Leeder ID	2017013784	2017013785
	Client ID	SV101 268	SV101 272
Analyte Name	**Sampled Date**	11/10/2017	11/10/2017
	PQL		
Ammonia as N		<1	<1

Matrix: Silica Gel Tube
Method: MA-1146.AIR.02 Nitrogens
Sample units are expressed in mg/m³ Test Started: 18/10/2017

	Leeder ID	2017013786	2017013787
	Client ID	SV102 267	SV103 264
Analyte Name	**Sampled Date**	11/10/2017	11/10/2017
	PQL		
Ammonia as N		<1	<4

ANALYTICAL RESULTS

Matrix: Silica Gel Tube
Method: MA-1146.AIR.01 Nitrogens
Sample units are expressed in µg total

Test Started: 18/10/2017

	Leeder ID	2017013788	2017013789
	Client ID	Trip Blank 269	Method
Analyte Name	**Sampled Date**	11/10/2017	
	PQL		Blank
Ammonia as N	1	nd	nd

Matrix: XAD Tube
Method: MA-72.ST.02 Polynuclear Aromatic Hydrocarbons (ug/m3)
Sample units are expressed in µg/m³

Test Started: 19/10/2017

	Leeder ID	2017013790
	Client ID	SV101 1720
Analyte Name	**Sampled Date**	11/10/2017
	PQL	
Acenaphthene	20	nd
Acenaphthylene	20	nd
Anthracene	20	nd
Benzo(a)anthracene	20	nd
Benzo (a) pyrene	20	nd
Benzo (b) fluoranthene	20	nd
Benzo (ghi) perylene	20	nd
Benzo (k) fluoranthene	20	nd
Chrysene	20	nd
Dibenz (ah) anthracene	20	nd
7,12-Dimethylbenz(a)anthracene	20	nd
Fluoranthene	20	nd
Fluorene	20	nd
Indeno (1,2,3-cd) pyrene	20	nd
3-Methylcholanthrene	20	nd
Naphthalene	20	nd
Phenanthrene	20	nd
Pyrene	20	nd

ANALYTICAL RESULTS

Matrix: XAD Tube
Method: MA-72.ST.02 Polynuclear Aromatic Hydrocarbons (ug/m3)
Sample units are expressed in µg/m³

Test Started: 19/10/2017

	Leeder ID	2017013791	2017013792	2017013793
	Client ID	SV102 1724	SV103 1728	SV103 1723
Analyte Name	**Sampled Date**	11/10/2017	11/10/2017	11/10/2017
	PQL			
Acenaphthene	20	nd	nd	nd
Acenaphthylene	20	nd	nd	nd
Anthracene	20	nd	nd	nd
Benzo(a)anthracene	20	nd	nd	nd
Benzo (a) pyrene	20	nd	nd	nd
Benzo (b) fluoranthene	20	nd	nd	nd
Benzo (ghi) perylene	20	nd	nd	nd
Benzo (k) fluoranthene	20	nd	nd	nd
Chrysene	20	nd	nd	nd
Dibenz (ah) anthracene	20	nd	nd	nd
7,12-Dimethylbenz(a)anthracene	20	nd	nd	nd
Fluoranthene	20	nd	nd	nd
Fluorene	20	nd	nd	nd
Indeno (1,2,3-cd) pyrene	20	nd	nd	nd
3-Methylcholanthrene	20	nd	nd	nd
Naphthalene	20	nd	nd	nd
Phenanthrene	20	nd	nd	nd
Pyrene	20	nd	nd	nd

ANALYTICAL RESULTS

Matrix: XAD Tube
Method: MA-72.ST.01 Polynuclear Aromatic Hydrocarbons
Sample units are expressed in µg total

Test Started: 19/10/2017

	Leeder ID	2017013794	2017013795
	Client ID	Trip Blank 1725	Method
Analyte Name	**Sampled Date**	11/10/2017	
	PQL		Blank
Acenaphthene	0.1	nd	nd
Acenaphthylene	0.1	nd	nd
Anthracene	0.1	nd	nd
Benzo(a)anthracene	0.1	nd	nd
Benzo (a) pyrene	0.1	nd	nd
Benzo (b) fluoranthene	0.1	nd	nd
Benzo (ghi) perylene	0.1	nd	nd
Benzo (k) fluoranthene	0.1	nd	nd
Chrysene	0.1	nd	nd
Dibenz (ah) anthracene	0.1	nd	nd
7,12-Dimethylbenz(a)anthracene	0.1	nd	nd
Fluoranthene	0.1	nd	nd
Fluorene	0.1	nd	nd
Indeno (1,2,3-cd) pyrene	0.1	nd	nd
3-Methylcholanthrene	0.1	nd	nd
Naphthalene	0.1	nd	nd
Phenanthrene	0.1	nd	nd
Pyrene	0.1	nd	nd

Matrix: Thermal Desorption Tube
Method: TO-17.02 Volatile Organics
Quality Control Results are expressed in Percent Recovery of expected result Test Started: 20/10/2017

	Leeder ID	2017013796	2017013797
	Client ID	Method	Method
Analyte Name	**Sampled Date**		
	PQL	Spike	Spike Dup
Benzene		82	84
Bromodichloromethane		85	86
Carbon tetrachloride		78	80
Chlorobenzene		81	83
Dibromochloromethane		79	81
1,2-Dichlorobenzene		66	70
1,3-Dichlorobenzene		69	73
1,4-Dichlorobenzene		68	72
1,2-Dichloroethane		82	84
1,1-Dichloroethene		74	77
cis-1,2-Dichloroethene		73	74
trans-1,2-Dichloroethene		92	93
1,2-Dichloropropane		82	84
Ethylbenzene		79	81
Styrene		75	80

Matrix: Thermal Desorption Tube
Method: TO-17.02 Volatile Organics
Quality Control Results are expressed in Percent Recovery of expected result Test Started: 20/10/2017

	Leeder ID	2017013796	2017013797
	Client ID	Method	Method
Analyte Name	**Sampled Date**		
	PQL	Spike	Spike Dup
Tetrachloroethene		75	78
Toluene		82	83
Tribromomethane		70	72
1,2,4-Trichlorobenzene		65	68
1,1,1-Trichloroethane		79	81
1,1,2-Trichloroethane		80	82
Trichloroethene		79	82
Trichloromethane		82	82
Vinyl chloride		83	85
o-Xylene		80	84
m&p-Xylenes		79	81

QA/QC RESULTS

Matrix: Carbon Tube
Method: MA-5.ST.ADD.01 Additional Volatile Organics
Quality Control Results are expressed in Percent Recovery of expected result — Test Started: 19/10/2017

Analyte Name	Leeder ID Client ID Sampled Date PQL	2017013798 Method Spike	2017013799 Method Spike Dup
Isopropanol		98	94

Matrix: Silica Gel Tube
Method: MA-1146.AIR.01 Nitrogens
Quality Control Results are expressed in Percent Recovery of expected result — Test Started: 18/10/2017

Analyte Name	Leeder ID Client ID Sampled Date PQL	2017013800 Method Spike
Ammonia as N		104

Matrix: Silica Gel Tube
Method: MA-1146.AIR.01 Nitrogens
Quality Control Results are expressed in Percent Recovery of expected result — Test Started: 18/10/2017

Analyte Name	Leeder ID Client ID Sampled Date PQL	2017013801 Method Spike Dup
Ammonia as N		90

Matrix: XAD Tube
Method: MA-72.ST.01 Polynuclear Aromatic Hydrocarbons
Quality Control Results are expressed in Percent Recovery of expected result — Test Started: 19/10/2017

Analyte Name	Leeder ID Client ID Sampled Date PQL	2017013802 Method Spike	2017013803 Method Spike Dup
Acenaphthene		108	102
Pyrene		72	68

QUALIFIERS / NOTES FOR REPORTED RESULTS

PQL	Practical Quantitation Limit
nd	Not Detected – The analyte was not detected above the reported PQL.
is	Insufficient Sample to perform this analysis.
T	Tentative identification based on computer library search of mass spectra.
NC	Not calculated and/or Results below PQL
NV	No Vacuum, Canister received above standard atmospheric pressure
nr	Not Requested for analysis.
R	Rejected Result – results for this analysis failed QC checks.
SQ	Semi-Quantitative result – quantitation based on a generic response factor for this class of analyte.
IM	Inappropriate method of analysis for this compound
U	Unable to provide Quality Control data – high levels of compounds in sample interfered with analysis of QC results.
UF	Unable to provide Quality Control data- Surrogates failed QC checks due to sample matrix effects
L	Analyte detected at a level above the linear response of calibration curve.
E	Estimated result. NATA accreditation does not cover estimated results.
C1	These compounds co-elute.
--	Parameter Not Determined
CT	Elevated concentration. Results reported from carbon tube analysis
**	Sample shows non-petroleum hydrocarbon profile

APPENDIX ONE.

CHAIN OF CUSTODY DOCUMENT

WHEN YOU NEED TO BE SURE

Site Log Sheet and Chain of Custody

Soil Gas and Sub-slab Gas Monitoring

Company: EIS (JK group)
Client Address:
Client Contact: Geoff Fletch
Client Email:
Project / Site: Pymble
Sampling Methods: LS:101 + PAH's & Amonia

Job Number: M170998
Purchase Order Number:
ABN:
Weather: overcast
Leak Testing: IPA
Sheet: 1 / 2

Location ID: SV101
Time / Date: 11-10-17
Purge Volume: 200mls.
PID: 0.1
Shut in Test: Pass
Vacuum (in. Hg): -0.2
Rotameter #: 71138-1
Pump #: 884532
Sampled by: Dane. E

Tube ID Number	Time	Flow (L/min)	Volume (L)	Analysis Required	Comments:
Mi 0727852	10	0.1	1	TO-17	
Mi 101186	2.5	0.1	0.25	"	
268	10	0.1	1	Ammonia	Silica Gel
1720	2	1	2	PAH	
272	10	0.1	1	Ammonia	Duplicate

Notes: TO-17 = VOC's, IPA & NEPM TPH
PAH tubs sampled with syringe/Hand pump.

Location ID: SV102
Time / Date: 11-10-17
Purge Volume: 200ml's
PID: 1ppm
Shut in Test: Pass
Vacuum (in. Hg): -0.1
Rotameter #: 71138-1
Pump #: 884532
Sampled by: D.E

Tube ID Number	Time	Flow (L/min)	Volume (L)	Analysis Required	Comments:
Mi 155370	10	0.1	1	TO-17	
Mi 167336	10	"	1	"	
Mi 180146	2.5	"	0.25	"	
225609	2.5	"	0.25	"	
267	5	0.2	1	Ammonia	
1724	2	1	2	PAH	

Notes:

Location ID: SV103
Time / Date: 11-10-17
Purge Volume: 200ml's
PID:
Shut in Test: Pass
Vacuum (in. Hg): -0.13
Rotameter #: 71138-1
Pump #: 884532
Sampled by: D.E

Tube ID Number	Time	Flow (L/min)	Volume (L)	Analysis Required	Comments:
Mi 180118	10	0.1	1	TO-17	
Mi 167260	2.5	"	0.25	"	
264		"		Ammonia	
1728				PAH	
1723				"	

Notes:

Relinquished by: Dane. E	Received by: Benedict Robinson	In esky? [✓ Yes]/No
Signature:	Signature:	With ice brick? [✓ Yes]/No
Date: 13/10/17 Time: 10am	Date: 16/10/17 Time: 10:00am	

WHEN YOU NEED TO BE SURE

SGS

Site Log Sheet and Chain of Custody

Soil Gas and Sub-slab Gas Monitoring

Company: ETS
Client Address:
Client Contact: Geoff. F
Client Email:
Project / Site: Pymble
Sampling Methods: LS:101

Job Number: MI70998
Purchase Order Number:
ABN:
Weather: Light Showers - 20°
Leak Testing: IPA
Sheet: 2 / 2

Location ID: QA/QC
Time / Date: 11-10-17
Purge Volume:
PID: –
Shut in Test: –
Vacuum (in. Hg): –
Rotameter #: T138-1
Pump #: 884532
Sampled by:

Tube ID Number	Time	Flow (L/min)	Volume (L)	Analysis Required	Comments:
269				Ammonia	TRIP BLANK
1725				PAHS	"
Mi 155274				TO-17	"
Mi155274	15s	0.1	0.025	IPA	SHROUD
10074	"	"	"	"	"

Notes:

Location ID:
Time / Date:
Purge Volume:
PID:
Shut in Test:
Vacuum (in. Hg):
Rotameter #:
Pump #:
Sampled by:

Tube ID Number	Time	Flow (L/min)	Volume (L)	Analysis Required	Comments:

Notes:

Location ID:
Time / Date:
Purge Volume:
PID:
Shut in Test:
Vacuum (in. Hg):
Rotameter #:
Pump #:
Sampled by:

Tube ID Number	Time	Flow (L/min)	Volume (L)	Analysis Required	Comments:

Notes:

Relinquished by: Dave. E	Received by: Benedict Robinson	In esky? [✓ Yes]/No
Signature:	Signature:	With ice brick? [✓ Yes]/No
Date: 13/10/17 Time: 10am	Date: 16/10/17 Time: 10:00am	

SGS

A.B.N. 44 000 964 278
10 / 585 Blackburn Road
Notting Hill, Vic, 3168
Telephone: (03) 9574 3200

Chartered Chemists

REPORT NUMBER: M170998S

9-Oct-2017

Site/Client Ref: Supply of Tubes

Environmental Investigation Services

115 Wicks Road
Macquarie Park

New South Wales 2113
Attention: Geoff Fletcher

CERTIFICATE OF CLEANLINESS FOR TO-17 TUBES

TO-17 Tubes as detailed on the following pages have been certified as 'CLEAN'

DATE OF CERTIFICATION ANALYSIS **6-Oct-2017**

CERTIFIED BY:

J. Phillips

James Phillips
Chemist

This report has been prepared in accordance with the quality system of SGS and may not be reproduced except in full.

(I) RESULTS

Report N°: M170998S

Matrix: Thermal Desorption Tube

Method: TO-17.02 Volatile Organics

Sample units are expressed in ng/tube

	Leeder ID	2017013478	2017013479	2017013480	2017013481	2017013482	2017013483	2017013484
	Client ID	Mi101165	Mi155274	Mi180146	Mi101186	Mi180118	Mi167260	225609
Analyte Name	**PQL**							
Benzene	5	nd	nd	nd	nd	nd	nd	nd
Bromobenzene	5	nd	nd	nd	nd	nd	nd	nd
Bromochloromethane	5	nd	nd	nd	nd	nd	nd	nd
Bromodichloromethane	5	nd	nd	nd	nd	nd	nd	nd
n-Butylbenzene	5	nd	nd	nd	nd	nd	nd	nd
sec-Butylbenzene	5	nd	nd	nd	nd	nd	nd	nd
tert-Butylbenzene	5	nd	nd	nd	nd	nd	nd	nd
Carbon tetrachloride	5	nd	nd	nd	nd	nd	nd	nd
Chlorobenzene	5	nd	nd	nd	nd	nd	nd	nd
Chloroethane	5	nd	nd	nd	nd	nd	nd	nd
Chloromethane	5	nd	nd	nd	nd	nd	nd	nd
2-Chlorotoluene	5	nd	nd	nd	nd	nd	nd	nd
4-Chlorotoluene	5	nd	nd	nd	nd	nd	nd	nd
1,2-Dibromo-3-chloropropane	5	nd	nd	nd	nd	nd	nd	nd
Dibromochloromethane	5	nd	nd	nd	nd	nd	nd	nd
1,2-Dibromoethane	5	nd	nd	nd	nd	nd	nd	nd
Dibromomethane	5	nd	nd	nd	nd	nd	nd	nd
1,2-Dichlorobenzene	5	nd	nd	nd	nd	nd	nd	nd
1,3-Dichlorobenzene	5	nd	nd	nd	nd	nd	nd	nd
1,4-Dichlorobenzene	5	nd	nd	nd	nd	nd	nd	nd
Dichlorodifluoromethane	5	nd	nd	nd	nd	nd	nd	nd
1,2-Dichloroethane	5	nd	nd	nd	nd	nd	nd	nd
1,1-Dichloroethane	5	nd	nd	nd	nd	nd	nd	nd

(I) RESULTS

Report N°: M170998S

Matrix: Thermal Desorption Tube

Method: TO-17.02 Volatile Organics

Sample units are expressed in ng/tube

Leeder ID		2017013478	2017013479	2017013480	2017013481	2017013482	2017013483	2017013484
Client ID		Mi101165	Mi155274	Mi180146	Mi101186	Mi180118	Mi167260	225609
Analyte Name	**PQL**							
1,1-Dichloroethene	5	nd	nd	nd	nd	nd	nd	nd
cis-1,2-Dichloroethene	5	nd	nd	nd	nd	nd	nd	nd
trans-1,2-Dichloroethene	5	nd	nd	nd	nd	nd	nd	nd
1,2-Dichloropropane	5	nd	nd	nd	nd	nd	nd	nd
1,3-Dichloropropane	5	nd	nd	nd	nd	nd	nd	nd
2,2-Dichloropropane	5	nd	nd	nd	nd	nd	nd	nd
1,1-Dichloropropene	5	nd	nd	nd	nd	nd	nd	nd
cis-1,3-Dichloropropene	5	nd	nd	nd	nd	nd	nd	nd
trans-1,3-Dichloropropene	5	nd	nd	nd	nd	nd	nd	nd
Ethylbenzene	5	nd	nd	nd	nd	nd	nd	nd
Hexachlorobutadiene	5	nd	nd	nd	nd	nd	nd	nd
Isopropylbenzene	5	nd	nd	nd	nd	nd	nd	nd
4-Isopropyltoluene	5	nd	nd	nd	nd	nd	nd	nd
Naphthalene	5	nd	nd	nd	nd	nd	nd	nd
Propylbenzene	5	nd	nd	nd	nd	nd	nd	nd
Styrene	5	nd	nd	nd	nd	nd	nd	nd
1,1,1,2-Tetrachloroethane	5	nd	nd	nd	nd	nd	nd	nd
1,1,2,2-Tetrachloroethane	5	nd	nd	nd	nd	nd	nd	nd
Tetrachloroethene	5	nd	nd	nd	nd	nd	nd	nd
Toluene	5	nd	nd	nd	nd	nd	nd	nd
Tribromomethane	5	nd	nd	nd	nd	nd	nd	nd
1,2,3-Trichlorobenzene	5	nd	nd	nd	nd	nd	nd	nd
1,2,4-Trichlorobenzene	5	nd	nd	nd	nd	nd	nd	nd
1,1,1-Trichloroethane	5	nd	nd	nd	nd	nd	nd	nd

(I) RESULTS

Matrix: Thermal Desorption Tube

Method: TO-17.02 Volatile Organics

Sample units are expressed in ng/tube

	Leeder ID	2017013478	2017013479	2017013480	2017013481	2017013482	2017013483	2017013484
	Client ID	Mi101165	Mi155274	Mi180146	Mi101186	Mi180118	Mi167260	225609
Analyte Name	**PQL**							
1,1,2-Trichloroethane	5	nd	nd	nd	nd	nd	nd	nd
Trichloroethene	5	nd	nd	nd	nd	nd	nd	nd
Trichlorofluoromethane	5	nd	nd	nd	nd	nd	nd	nd
Trichloromethane	5	nd	nd	nd	nd	nd	nd	nd
1,2,3-Trichloropropane	5	nd	nd	nd	nd	nd	nd	nd
1,2,4-Trimethylbenzene	5	nd	nd	nd	nd	nd	nd	nd
1,3,5-Trimethylbenzene	5	nd	nd	nd	nd	nd	nd	nd
Vinyl chloride	5	nd	nd	nd	nd	nd	nd	nd
o-Xylene	5	nd	nd	nd	nd	nd	nd	nd
m&p-Xylenes	5	nd	nd	nd	nd	nd	nd	nd

(I) RESULTS

Matrix: Thermal Desorption Tube

Method: TO-17.02 Volatile Organics

Sample units are expressed in ng/tube

	Leeder ID	2017013485	2017013486	2017013487
	Client ID	Mi0727852	Mi155370	Mi167336
Analyte Name	**PQL**			
Benzene	5	nd	nd	nd
Bromobenzene	5	nd	nd	nd
Bromochloromethane	5	nd	nd	nd
Bromodichloromethane	5	nd	nd	nd
n-Butylbenzene	5	nd	nd	nd
sec-Butylbenzene	5	nd	nd	nd
tert-Butylbenzene	5	nd	nd	nd
Carbon tetrachloride	5	nd	nd	nd
Chlorobenzene	5	nd	nd	nd
Chloroethane	5	nd	nd	nd
Chloromethane	5	nd	nd	nd
2-Chlorotoluene	5	nd	nd	nd
4-Chlorotoluene	5	nd	nd	nd
1,2-Dibromo-3-chloropropane	5	nd	nd	nd
Dibromochloromethane	5	nd	nd	nd
1,2-Dibromoethane	5	nd	nd	nd
Dibromomethane	5	nd	nd	nd
1,2-Dichlorobenzene	5	nd	nd	nd
1,3-Dichlorobenzene	5	nd	nd	nd
1,4-Dichlorobenzene	5	nd	nd	nd
Dichlorodifluoromethane	5	nd	nd	nd
1,2-Dichloroethane	5	nd	nd	nd
1,1-Dichloroethane	5	nd	nd	nd

(I) RESULTS

Matrix: Thermal Desorption Tube

Method: TO-17.02 Volatile Organics

Sample units are expressed in ng/tube

	Leeder ID	2017013485	2017013486	2017013487
	Client ID	Mi0727852	Mi155370	Mi167336
Analyte Name	**PQL**			
1,1-Dichloroethene	5	nd	nd	nd
cis-1,2-Dichloroethene	5	nd	nd	nd
trans-1,2-Dichloroethene	5	nd	nd	nd
1,2-Dichloropropane	5	nd	nd	nd
1,3-Dichloropropane	5	nd	nd	nd
2,2-Dichloropropane	5	nd	nd	nd
1,1-Dichloropropene	5	nd	nd	nd
cis-1,3-Dichloropropene	5	nd	nd	nd
trans-1,3-Dichloropropene	5	nd	nd	nd
Ethylbenzene	5	nd	nd	nd
Hexachlorobutadiene	5	nd	nd	nd
Isopropylbenzene	5	nd	nd	nd
4-Isopropyltoluene	5	nd	nd	nd
Naphthalene	5	nd	nd	nd
Propylbenzene	5	nd	nd	nd
Styrene	5	nd	nd	nd
1,1,1,2-Tetrachloroethane	5	nd	nd	nd
1,1,2,2-Tetrachloroethane	5	nd	nd	nd
Tetrachloroethene	5	nd	nd	nd
Toluene	5	nd	nd	nd
Tribromomethane	5	nd	nd	nd
1,2,3-Trichlorobenzene	5	nd	nd	nd
1,2,4-Trichlorobenzene	5	nd	nd	nd
1,1,1-Trichloroethane	5	nd	nd	nd

Matrix: Thermal Desorption Tube

Method: TO-17.02 Volatile Organics

Sample units are expressed in ng/tube

	Leeder ID	2017013485	2017013486	2017013487
	Client ID	Mi0727852	Mi155370	Mi167336
Analyte Name	**PQL**			
1,1,2-Trichloroethane	5	nd	nd	nd
Trichloroethene	5	nd	nd	nd
Trichlorofluoromethane	5	nd	nd	nd
Trichloromethane	5	nd	nd	nd
1,2,3-Trichloropropane	5	nd	nd	nd
1,2,4-Trimethylbenzene	5	nd	nd	nd
1,3,5-Trimethylbenzene	5	nd	nd	nd
Vinyl chloride	5	nd	nd	nd
o-Xylene	5	nd	nd	nd
m&p-Xylenes	5	nd	nd	nd

A.B.N. 44 000 964 278
10 / 585 Blackburn Road
Notng Hill, Vic, 3168
Telephone: (03) 9574 3200

A.B.N. 44 000 964 278

Sample Receipt Acknowledgement

To:	Geoff Fletcher	From:	Sample Reception
Fax:	02 9888 5001	Pages:	(1) including this page
Co:	Environmental Investigation Services	Date:	16/10/2017
Email	gfletcher@jkgroup.net.au	Ref:	M170998

SGS has received your samples from the project listed below. If you have any enquiries please contact us quoting our reference number.

Project/Reference No.:	Pymble
Our Reference Number:	**M170998**
Date Received:	16-Oct-2017
Estimated date of report:	25-Oct-2017

Additional Information:

Samples received after 4 pm are considered as received on the next working day for turnaround purposes.
Samples with a 24hr or 48hr TAT are considered as received on the next working day if received after 2:30pm.
Surcharges for urgent turnaround requests may apply.
All analytical work is conducted at our Melbourne office.
Sample Storage - All aqueous samples are stored for **two weeks** after reporting.
- All soils and other samples are stored for **one month** after reporting.

Please direct any technical or turnaround queries to Adam Atkinson at our Melbourne office.

NATA
WORLD RECOGNISED ACCREDITATION

SGS

Specialist Laboratory Services

Website: www.sgs.com.au
Email: AU.SampleReceipt.Melbourne@sgs.com

SGS

WHEN YOU NEED TO BE SURE

Site Log Sheet and Chain of Custody

Soil Gas and Sub-slab Gas Monitoring

Company: EIS (JK group)
Client Address:
Client Contact: Geoff Fletch
Client Email:
Project / Site: Pymble
Sampling Methods: LS:101 + PAH's & Ammonia

Job Number: M170998
Purchase Order Number:
ABN:
Weather: overcast
Leak Testing: IPA
Sheet: 1/2

Location ID: SV101
Time / Date: 11-10-17
Purge Volume: 200mls.
PID: 0.1
Shut in Test: Pass
Vacuum (in. Hg): -0.2
Rotameter #: 71138-1
Pump #: 884532
Sampled by: Dane. E

Tube ID Number	Time	Flow (L/min)	Volume (L)	Analysis Required	Comments:
Mi 0727852	10	0.1	1	TO-17	
Mi 101186	2.5	0.1	0.25	"	
268	10	0.1	1	Ammonia	Silica Gel
1720	2	1	2	PAH	
272	10	0.1	1	Ammonia	Duplicate

Notes: TO-17 = VOC's, IPA & NEPM TPH
PAH tubes sampled with syringe/Hand pump.

Location ID: SV102
Time / Date: 11-10-17
Purge Volume: 200ml's
PID: 1ppm
Shut in Test: Pass
Vacuum (in. Hg): -0.1
Rotameter #: 71138-1
Pump #: 884532
Sampled by: D.E

Tube ID Number	Time	Flow (L/min)	Volume (L)	Analysis Required	Comments:
Mi 155370	10	0.1	1	TO-17	
Mi 167336	10	"	1	"	
Mi 180146	2.5	"	0.25	"	
225609	2.5	"	0.25	"	
267	5	0.2	1	Ammonia	
1724	2	1	2	PAH	

Notes:

Location ID: SV103
Time / Date: 11-10-17
Purge Volume: 200ml's
PID:
Shut in Test: Pass
Vacuum (in. Hg): -0.13
Rotameter #: 71138-1
Pump #: 884532
Sampled by: D.E

Tube ID Number	Time	Flow (L/min)	Volume (L)	Analysis Required	Comments:
Mi 180118	10	0.1	1	TO-17	
Mi 167260	2.5	"	0.25	"	
264		"		Ammonia	
1728				PAH	
1723				"	

Notes:

Relinquished by: Dane. E	Received by: Benedict Robinson	In esky? [✓ Yes]/No
Signature:	Signature:	With ice brick? [✓ Yes]/No
Date: 13/10/17 Time: 10am	Date: 16/10/17 Time: 10:00am	

WHEN YOU NEED TO BE SURE

SGS

Site Log Sheet and Chain of Custody

Soil Gas and Sub-slab Gas Monitoring

Company: ETS
Client Address:
Client Contact: Geoff. F
Client Email:
Project / Site: Pymble
Sampling Methods: LS:101

Job Number: MI70998
Purchase Order Number:
ABN:
Weather: Light Showers -20°
Leak Testing: IPA
Sheet: 2/2

Location ID: QA/QC
Time / Date: 11-10-17
Purge Volume:
PID: –
Shut in Test: –
Vacuum (in. Hg): –
Rotameter #: TT138-1
Pump #: 884532
Sampled by:

Tube ID Number	Time	Flow (L/min)	Volume (L)	Analysis Required	Comments:
269				Ammonia	TRIP BLANK
1725				PAHS	"
Mi 155274				TO-17	"
Mi155274	15s	0.1	0.025	IPA	SHROUD
10074	"	"	"	"	"

Notes:

Location ID:
Time / Date:
Purge Volume:
PID:
Shut in Test:
Vacuum (in. Hg):
Rotameter #:
Pump #:
Sampled by:

Tube ID Number	Time	Flow (L/min)	Volume (L)	Analysis Required	Comments:

Notes:

Location ID:
Time / Date:
Purge Volume:
PID:
Shut in Test:
Vacuum (in. Hg):
Rotameter #:
Pump #:
Sampled by:

Tube ID Number	Time	Flow (L/min)	Volume (L)	Analysis Required	Comments:

Notes:

Relinquished by: Dane. E	Received by: Benedict Robinson	In esky? [✓ Yes]/No
Signature:	Signature:	With ice brick? [✓ Yes]/No
Date: 13/10/17 Time: 10am	Date: 16/10/17 Time: 10:00am	

Appendix C: Report Explanatory Notes

STANDARD SAMPLING PROCEDURE (SSP)

These protocols specify the basic procedures to be used when sampling soils or groundwater for environmental site assessments undertaken by EIS.

The purpose of these protocols is to provide standard methods for: sampling, decontamination procedures for sampling equipment, sample preservation, sample storage and sample handling. Deviations from these procedures must be recorded.

Soil Sampling

- Prepare a borehole/test pit log or made a note of the sample description for stockpiles.
- Layout sampling equipment on clean plastic sheeting to prevent direct contact with ground surface. The work area should be at a distance from the drill rig/excavator such that the machine can operate in a safe manner.
- Ensure all sampling equipment has been decontaminated prior to use.
- Remove any surface debris from the immediate area of the sampling location.
- Collect samples and place in glass jar with a Teflon seal. This should be undertaken as quickly as possible to prevent the loss of any volatiles. If possible, fill the glass jars completely.
- Collect samples for asbestos analysis and place in a zip-lock plastic bag.
- Label the sampling containers with the EIS job number, sample location (e.g. BH1), sampling depth interval and date. If more than one sample container is used, this should also be indicated (e.g. 2 = Sample jar 1 of 2 jars).
- Photoionisation detector (PID) screening of volatile organic compounds (VOCs) should be undertaken on samples using the soil sample headspace method. Headspace measurements are taken following equilibration of the headspace gasses in partly filled zip-lock plastic bags. PID headspace data is recorded on the borehole/test pit log and the chain of custody forms.
- Record the lithology of the sample and sample depth on the borehole/test pit log generally in accordance with AS1726-1993[22].
- Store the sample in a sample container cooled with ice or chill packs. On completion of the sampling the sample container should be delivered to the lab immediately or stored in the refrigerator prior to delivery to the lab. All samples are preserved in accordance with the standards outlined in the report.
- Check for the presence of groundwater after completion of each borehole using an electronic dip metre or water whistle. Boreholes should be left open until the end of fieldwork. All groundwater levels in the boreholes should be rechecked on the completion of the fieldwork.
- Backfill the boreholes/test pits with the excavation cuttings or clean sand prior to leaving the site.

Decontamination Procedures for Soil Sampling Equipment

- All sampling equipment should be decontaminated between every sampling location. This excludes single use PVC tubing used for push tubes etc. Equipment and materials required for the decontamination include:
  - Phosphate free detergent (Decon 90);
  - Potable water;
  - Stiff brushes; and
  - Plastic sheets.

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[22] Standards Australia, (1993), *Geotechnical Site Investigations.* (AS1726-1993)

- Ensure the decontamination materials are clean prior to proceeding with the decontamination.
- Fill both buckets with clean potable water and add phosphate free detergent to one bucket.
- In the bucket containing the detergent, scrub the sampling equipment until all the material attached to the equipment has been removed.
- Rinse sampling equipment in the bucket containing potable water.
- Place cleaned equipment on clean plastic sheets.

If all materials are not removed by this procedure, high-pressure water cleaning is recommended. If any equipment is not completely decontaminated by both these processes, then the equipment should not be used until it has been thoroughly cleaned.

Groundwater Sampling

Groundwater samples are more sensitive to contamination than soil samples and therefore adhesion to this protocol is particularly important to obtain reliable, reproducible results. The recommendations detailed in AS/NZS 5667.1:1998 are considered to form a minimum standard.

The basis of this protocol is to maintain the security of the borehole and obtain accurate and representative groundwater samples. The following procedure should be used for collection of groundwater samples from previously installed groundwater monitoring wells.

- After monitoring well installation, at least three bore volumes should be pumped from the monitoring wells (well development) to remove any water introduced during the drilling process and/or the water that is disturbed during installation of the monitoring well. This should be completed prior to purging and sampling.
- Groundwater monitoring wells should then be left to recharge for at least three days before purging and sampling. Prior to purging or sampling, the condition of each well should observed and any anomalies recorded on the field data sheets. The following information should be noted: the condition of the well, noting any signs of damage, tampering or complete destruction; the condition and operation of the well lock; the condition of the protective casing and the cement footing (raised or cracked); and, the presence of water between protective casing and well.
- Take the groundwater level from the collar of the piezometer/monitoring well using an electronic dip meter. The collar level should be taken (if required) during the site visit using a dumpy level and staff.
- Purging and sampling of piezometers/monitoring wells is done on the same site visit when using micro-purge (or other low flow) techniques.
- Layout and organize all equipment associated with groundwater sampling in a location where they will not interfere with the sampling procedure and will not pose a risk of contaminating samples. Equipment generally required includes:
    - Micropore filtration system or Stericup single-use filters (for heavy metals samples);
    - Filter paper for Micropore filtration system; Bucket with volume increments;
    - Sample containers: teflon bottles with 1 ml nitric acid, 75mL glass vials with 1 mL hydrochloric acid, 1 L amber glass bottles;
    - Bucket with volume increments;
    - Flow cell;
    - pH/EC/Eh/T meters;
    - Plastic drums used for transportation of purged water;
    - Esky and ice;
    - Nitrile gloves;
    - Distilled water (for cleaning);
    - Electronic dip meter;

  - Low flow pump pack and associated tubing; and
  - Groundwater sampling forms.
- If single-use stericup filtration is not used, clean the Micropore filtration system thoroughly with distilled water prior to use and between each sample. Filter paper should be changed between samples. 0.45um filter paper should be placed below the glass fibre filter paper in the filtration system.
- Ensure all non-disposable sampling equipment is decontaminated or that new disposable equipment is available prior to any work commencing at a new location. The procedure for decontamination of groundwater equipment is outlined at the end of this section.
- Disposable gloves should be used whenever samples are taken to protect the sampler and to assist in avoidance of contamination.
- Groundwater samples are obtained from the monitoring wells using low flow/micro-purge sampling equipment to reduce the disturbance of the water column and loss of volatiles.
- During pumping to purge the well, the pH, temperature, conductivity, dissolved oxygen, redox potential and groundwater levels are monitored (where possible) using calibrated field instruments to assess the development of steady state conditions. Steady state conditions are generally considered to have been achieved when the difference in the pH measurements was less than 0.2 units and the difference in conductivity was less than 10%.
- All measurements are recorded on specific data sheets.
- Once steady state conditions are considered to have been achieved, groundwater samples are obtained directly from the pump tubing and placed in appropriate glass bottles, BTEX vials or plastic bottles.
- All samples are preserved in accordance with water sampling requirements detailed in the NEPM 2013 and placed in an insulated container with ice. Groundwater samples are preserved by immediate storage in an insulated sample container with ice as outlined in the report text.
- Record the sample on the appropriate log in accordance with AS1726:1993. At the end of each water sampling complete a chain of custody form.

<u>Decontamination Procedures for Groundwater Sampling Equipment</u>

- All equipment associated with the groundwater sampling procedure (other than single-use items) should be decontaminated between every sampling location.
- The following equipment and materials are required for the decontamination procedure:
  - Phosphate free detergent;
  - Potable water;
  - Distilled water; and
  - Plastic Sheets or bulk bags (plastic bags).
- Fill one bucket with clean potable water and phosphate free detergent, and one bucket with distilled water.
- Flush potable water and detergent through pump head. Wash sampling equipment and pump head using brushes in the bucket containing detergent until all materials attached to the equipment are removed.
- Flush pump head with distilled water.
- Change water and detergent solution after each sampling location.
- Rinse sampling equipment in the bucket containing distilled water.
- Place cleaned equipment on clean plastic sheets.
- If all materials are not removed by this procedure that equipment should not be used until it has been thoroughly cleaned

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[23]) methods and those described in *Environmental Sampling and Analysis, A Practical Guide,* (H. Keith 1991[24]).

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 (MDL) 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.

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). Acceptable targets for precision in this report will be less than 50% RPD for concentrations greater than ten times the PQL, less than 75% RPD for concentrations between five and ten times the PQL and less than 100% RPD for concentrations that are less than five times the PQL.

Accuracy

Accuracy is a measure of the agreement between an experimental result and the true value of the parameter being measured. 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.

The proximity of an averaged result to the true value, where all random errors have been statistically removed. Accuracy is measured by percent recovery. Acceptable limits for accuracy generally lie between 70% to 130% recoveries. Certain laboratory methods may allow for values that lie outside these limits.

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.

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

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

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;
- 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.

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).

Blanks

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

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%.

$$\frac{(\text{Spike Sample Result} - \text{Sample Result}) \times 100}{\text{Concentration of Spike Added}}$$

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.

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 D: MW04 Core Photograph

Photo No.	Date of Photo
1	5 October 2011

Description

MW04 – Complete core

0.6 – 9.0m bgl, or

103.17 – 94.77mAHD

Appendix E: Field Work Documents

ENVIRONMENTAL INVESTIGATION SERVICES
CONSULTING ENVIRONMENTAL ENGINEERS

EIS

Client:	Bunnings Group Limited	**Job No.:**	**E24542KF**
Project:	Proposed Warehouse	**Well No.:**	MW 1
Location:	950 PACIFIC HIGHWAY AND 2 BRIADGE STREET, PYMBLE, NSW	**Depth (m):**	~~[illegible]~~ 7 26

WELL FINISH DETAILS

Gatic Cover ☒ **Standpipe** ☐ **Other (describe)** ☐

WELL DEVELOPMENT DETAILS

Method:	Twister Pump	**SWL – Before (m):**	6.40m
Date:	11/10/17	**Time – Before:**	11:50
Undertaken By:	GF	**SWL – After (m):**	
Total Vol. Removed:	4	**Time – After:**	
PID Reading (ppm):	0.6		

Comments:

DEVELOPMENT MEASUREMENTS

Volume Removed (L)	Temp (°C)	DO (mg/L)	EC (µS/m)	pH	Eh (mV)

Comments:Odours ([✓ **YES**] / **NO**), **NAPL/PSH** (**YES** / [✓ **NO**]) **Sheen** (**YES** / **NO**), **Steady State Achieved** (**YES** / **NO**)

HC odour.

Pumped dry after 4 Litres

Tested By:	GF
Date Tested:	11/10/17
Checked By:	
Date:	

Remarks:
- All measurements are corrected to ground level
- All stated Volumes are in Litres
- SWL is an abbreviation for standing water level
- Steady state conditions - difference in the pH less than 0.2 units and difference in conductivity less than 10%
- Minimum 3 monitoring well volumes are purged

ENVIRONMENTAL INVESTIGATION SERVICES
CONSULTING ENVIRONMENTAL ENGINEERS

EIS

Client:	Bunnings Group Limited	**Job No.:**	**E24542KF**
Project:	Proposed Warehouse	**Well No.:**	MW 3
Location:	950 PACIFIC HIGHWAY AND 2 BRIADGE STREET, PYMBLE, NSW	**Depth (m):**	7.48

WELL FINISH DETAILS

Gatic Cover ☒ **Standpipe** ☐ **Other (describe)** ☐

WELL DEVELOPMENT DETAILS

Method:	Twister Pump	**SWL – Before (m):**	6.09
Date:	11/10/17.	**Time – Before:**	11:20am
Undertaken By:	GF	**SWL – After (m):**	7.25
Total Vol. Removed:	4	**Time – After:**	
PID Reading (ppm):	337		

Comments:

DEVELOPMENT MEASUREMENTS

Volume Removed (L)	Temp (°C)	DO (mg/L)	EC (µS/m)	pH	Eh (mV)
1	19.0	7.1	3927	11.58	44
3	18.9	4.4	4641	11.73	-22.8

Comments:Odours [✓ YES] / NO), **NAPL/PSH (YES /** [✓ NO]), **Sheen (YES /** [✓ NO]) **Steady State Achieved (YES /** [✓ NO])

Hydrocarbon & sweet odor. Pumped effectively dry after 4 Litres.
No recharge.

Tested By:	GF	**Remarks:**
Date Tested:	11/10/17.	- All measurements are corrected to ground level - All stated Volumes are in Litres - SWL is an abbreviation for standing water level - Steady state conditions - difference in the pH less than 0.2 units and difference in conductivity less than 10%
Checked By:		
Date:		- Minimum 3 monitoring well volumes are purged

ENVIRONMENTAL INVESTIGATION SERVICES
CONSULTING ENVIRONMENTAL ENGINEERS

EIS

Client:	Bunnings Group Limited	**Job No.:**	**E24542KF**
Project:	Proposed Warehouse	**Well No.:**	MW 04
Location:	950 PACIFIC HIGHWAY AND 2 BRIADGE STREET, PYMBLE, NSW	**Depth (m):**	8.97m

WELL FINISH DETAILS

Gatic Cover ☒ **Standpipe** ☐ **Other (describe)** ☐

WELL DEVELOPMENT DETAILS

Method:	Twister Pump	**SWL – Before (m):**	7.30m
Date:	11/10/17	**Time – Before:**	11am
Undertaken By:	GF	**SWL – After (m):**	8.95
Total Vol. Removed:	5	**Time – After:**	
PID Reading (ppm):	575		

Comments:

DEVELOPMENT MEASUREMENTS

Volume Removed (L)	Temp (°C)	DO (mg/L)	EC (µS/m)	pH	Eh (mV)
3	19.0	1.0	1229	11.08	-42.2

Comments:Odours [✓ YES] / NO), **NAPL/PSH** (YES / [✓ NO]), **Sheen** (YES / [✓ NO]) **Steady State Achieved** (YES / [✓ NO])

Sweet + Hydrocarbon odour

Purged effectively dry after 5 Litres No recharge.

Tested By:	GF
Date Tested:	11/10/17
Checked By:	
Date:	

Remarks:
- All measurements are corrected to ground level
- All stated Volumes are in Litres
- SWL is an abbreviation for standing water level
- Steady state conditions - difference in the pH less than 0.2 units and difference in conductivity less than 10%
- Minimum 3 monitoring well volumes are purged

ENVIRONMENTAL INVESTIGATION SERVICES
CONSULTING ENVIRONMENTAL ENGINEERS

EIS

Client:	Bunnings Group Limited	**Job No.:**	**E24542KF**
Project:	Proposed Warehouse	**Well No.:**	MW08
Location:	950 PACIFIC HIGHWAY AND 2 BRIADGE STREET, PYMBLE, NSW	**Depth (m):**	9.02

WELL FINISH DETAILS

Gatic Cover ☒ **Standpipe** ☐ **Other (describe)** ☐

WELL DEVELOPMENT DETAILS

Method:	Twister Pump.	**SWL – Before (m):**	6.64
Date:	11/10/17	**Time – Before:**	12:30pm
Undertaken By:	GF	**SWL – After (m):**	
Total Vol. Removed:	10 Litres	**Time – After:**	
PID Reading (ppm):	0		

Comments:

DEVELOPMENT MEASUREMENTS

Volume Removed (L)	**Temp (°C)**	**DO (mg/L)**	**EC (µS/m)**	**pH**	**Eh (mV)**

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

Slight HC.

Pumped dry after 10 Litres.

Tested By:	GF
Date Tested:	11/10/17
Checked By:	
Date:	

Remarks:
- All measurements are corrected to ground level
- All stated Volumes are in Litres
- SWL is an abbreviation for standing water level
- Steady state conditions - difference in the pH less than 0.2 units and difference in conductivity less than 10%
- Minimum 3 monitoring well volumes are purged

ENVIRONMENTAL INVESTIGATION SERVICES
CONSULTING ENVIRONMENTAL ENGINEERS

EIS

Client:	Bunnings Group Limited	**Job No.:**	**E24542KF**
Project:	Proposed Warehouse	**Well No.:**	MW13
Location:	950 PACIFIC HIGHWAY AND 2 BRIADGE STREET, PYMBLE, NSW	**Depth (m):**	14.09

WELL FINISH DETAILS

Gatic Cover ☒ **Standpipe** ☐ **Other (describe)** ☐

WELL DEVELOPMENT DETAILS

Method:	Twister Pump.	**SWL – Before (m):**	9.22
Date:	11/10/17	**Time – Before:**	12:59pm
Undertaken By:	GF	**SWL – After (m):**	
Total Vol. Removed:	11 Litres	**Time – After:**	
PID Reading (ppm):	0		

Comments:

DEVELOPMENT MEASUREMENTS

Volume Removed (L)	Temp (°C)	DO (mg/L)	EC (µS/m)	pH	Eh (mV)

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

HC odour

Pumped dry after 10 Litres

Tested By:	GF	**Remarks:** - All measurements are corrected to ground level - All stated Volumes are in Litres - SWL is an abbreviation for standing water level - Steady state conditions - difference in the pH less than 0.2 units and difference in conductivity less than 10% - Minimum 3 monitoring well volumes are purged
Date Tested:	11/10/17.	
Checked By:		
Date:		

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

EIS

Client:	Bunnings Group Limited	**Job No.:**	**E24542KF**
Project:	Proposed Warehouse	**Well No.:**	MW3
Location:	950 PACIFIC HIGHWAY AND 2 BRIADGE STREET, PYMBLE, NSW	**Depth (m):**	7.48

WELL FINISH

☒	**Gatic Cover**	☐	**Standpipe**	☐	**Other (describe)**

WELL PURGE DETAILS:

Method:	Peristaltic Pump	**SWL – Before:**	6.57
Date:	18/10/17	**Time – Before:**	1:40pm
Undertaken By:	GF	**Total Vol Removed:**	0.25 Litre
Pump Program No:		**PID (ppm):**	211

PURGING / SAMPLING MEASUREMENTS

Time (min)	SWL (m)	Vol (L)	Notes	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
1:47	657	–						
1:49	6.75							
		Flowcell.						

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

HC + Sweet

Not known

Sampling Containers Used: 2 x glass amber, 3 x BTEX vials, 1 x H2NO3 plastic, 1 x H2SO4 plastic, 1 x unpreserved ~~plastic~~ NaOH

Started sampling due to drawdown of SWL before filling flowcell.

Tested By: Geoff Fletcher	**Remarks:**
Date Tested: 18/10/17	- All measurements are corrected to ground level
Checked By:	- SWL is an abbreviation for standing water level
Date:	- Steady state conditions - difference in the pH less than 0.2 units and difference in conductivity less than 10%

ENVIRONMENTAL INVESTIGATION SERVICES
CONSULTING ENVIRONMENTAL ENGINEERS

EIS

Client:	Bunnings Group Limited	**Job No.:**	**E24542KF**
Project:	Proposed Warehouse	**Well No.:**	MW04
Location:	950 PACIFIC HIGHWAY AND 2 BRIADGE STREET, PYMBLE, NSW	**Depth (m):**	8.97m

WELL FINISH

☒ **Gatic Cover** ☐ **Standpipe** ☐ **Other (describe)**

WELL PURGE DETAILS:

Method:	Peristaltic Pump	**SWL – Before:**	7.43
Date:	18/10/17	**Time – Before:**	12:45pm
Undertaken By:	GF	**Total Vol Removed:**	2
Pump Program No:		**PID (ppm):**	342.0

PURGING / SAMPLING MEASUREMENTS

Time (min)	SWL (m)	Vol (L)	Notes	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
12:47 (0)	7.43	—		—	—	—	—	—
12:53 (6)	7.65	Flowcell	Clear	19.9	2.0	712	9.75	-29.5
12:55 (8)	7.70		"	19.9	1.6	708	9.75	-33.0
12:57 (10)	7.74		"	19.9	1.6	706	9.75	-42.5
1:02 (15)	7.85		"	19.9	1.9	702	9.79	-50.4
1:06 (19)	7.91	1	"	19.8	1.8	699	9.85	-54.8
1:07 (20)	7.94		"	19.8	1.8	698	9.87	-55.8
1:08 (21)	7.96		"	19.7	1.7	697	9.89	-57.5
1:09 (22)	7.98		"	19.7	1.7	696	9.91	-56.2
1:10 (23)	8.00		"	19.7	1.7	696	9.91	-58.5
1:11 (24)	8.02		"	19.7	1.6	695	9.92	-58.2
1:12 (25)	8.05		"	19.7	1.6	695	9.93	-58.9
1:13 (26)	8.04	2	"	19.7	1.6	695	9.94	-59.5

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

HC+ Sweet

Not SWL.

Sampling Containers Used: 2 **x glass amber,** 3 **x BTEX vials,** 1 **x H2NO3 plastic,** 1 **x H2SO4 plastic,** 1 **x ~~unpreserved~~** NaOH **plastic**

Tested By: Geoff Fletcher	**Remarks:**
Date Tested: 18/10/17	- All measurements are corrected to ground level
Checked By:	- SWL is an abbreviation for standing water level
Date:	- Steady state conditions - difference in the pH less than 0.2 units and difference in conductivity less than 10%

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

EIS

Client:	Bunnings Group Limited	**Job No.:**	E24542KF
Project:	Proposed Warehouse	**Well No.:**	MW05
Location:	950 PACIFIC HIGHWAY AND 2 BRIADGE STREET, PYMBLE, NSW	**Depth (m):**	8.85

WELL FINISH

☒	Gatic Cover	☐	Standpipe	☐	Other (describe)

WELL PURGE DETAILS:

Method:	Peristaltic Pump.	**SWL – Before:**	6.98
Date:	19/10/17	**Time – Before:**	8am
Undertaken By:	GF	**Total Vol Removed:**	2.5
Pump Program No:		**PID (ppm):**	0.0

PURGING / SAMPLING MEASUREMENTS

Time (min)	SWL (m)	Vol (L)	Notes	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
0839 (0)	6.98		Silty/cloudy					
0850 (11).	7.25	Flowcell	"	18.9	1.1	798	5.82	-50.0
0854	7.34	[illegible]	"	18.9	1.0	799	5.89	-49.5
0856	7.38		"	18.9	0.9	799	5.92	-49.7
0859	7.40		"	18.9	0.8	799	5.94	-49.2
59	7.42		"	18.9	0.8	799	5.94	-48.7
900	7.44		"	18.9	0.8	800	5.94	-48.3
901	7.47		"	19.0	0.8	800	5.95	-47.9
902	7.49		"	19.0	0.8	801	5.95	-47.7
903	7.51	2.5	"	19.0	0.8	801	5.95	-47.5

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

HC+Sweet

Except SWL.

Sampling Containers Used: 2 x glass amber, 3 x BTEX vials, 1 x H2NO3 plastic, 1 x H2SO4 plastic, 1 x un~~preserved plastic~~ NaOH.

Tested By: Geoff Fletcher	**Remarks:**
Date Tested: 19/10/17.	- All measurements are corrected to ground level
Checked By:	- SWL is an abbreviation for standing water level
Date:	- Steady state conditions - difference in the pH less than 0.2 units and difference in conductivity less than 10%

ENVIRONMENTAL INVESTIGATION SERVICES
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EIS

Client:	Bunnings Group Limited	**Job No.:**	**E24542KF**
Project:	Proposed Warehouse	**Well No.:**	MW 08
Location:	950 PACIFIC HIGHWAY AND 2 BRIADGE STREET, PYMBLE, NSW	**Depth (m):**	9.02

WELL FINISH

☒ **Gatic Cover** ☐ **Standpipe** ☐ **Other (describe)**

WELL PURGE DETAILS:

Method:	Peristaltic Pump	**SWL – Before:**	6.74 m
Date:	18/10/17	**Time – Before:**	9am
Undertaken By:	GF	**Total Vol Removed:**	3
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)
0920 (0)	6.74		—	—	—	—	—	—
0927 (7)	6.93	Flowcell	Slightly silty	20.5	1.5	993	5.77	10.2
0930 (10)	7.00		Clear	20.6	1.2	987	5.81	12.8
940 (20)	7.18	2	"	20.6	0.8	985	5.83	15.8
941 (21)	7.20		"	20.6	0.8	985	5.83	16.1
942 (22)	7.21		"	20.5	0.7	984	5.82	16.8
943 (23)	7.22		"	20.5	0.7	984	5.82	17.5
944 (24)	7.23		"	20.5	0.7	984	5.82	18.8
945 (25)	7.24	3	"	20.5	0.7	984	5.82	19.7

Comments: Odours (YES / [✓ NO]) NAPL/PSH (YES / [✓ NO]), Sheen ([✓ YES] / ~~NO~~), Steady State Achieved ([✓ YES] / NO)
Spotted
Not for SWL.

Sampling Containers Used: 2 **x glass amber,** 3 **x BTEX vials,** 1 **x H2NO3 plastic,** 1 **x H2SO4 plastic,** 1 **x ~~unpreserved plastic~~** NaOH

Dp GFW 2x 2x 1x — —

Tested By: Geoff Fletcher	**Remarks:**
Date Tested: 18/10/17	- All measurements are corrected to ground level
Checked By:	- SWL is an abbreviation for standing water level
Date:	- Steady state conditions - difference in the pH less than 0.2 units and difference in conductivity less than 10%

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EIS

Client:	Bunnings Group Limited	**Job No.:**	**E24542KF**
Project:	Proposed Warehouse	**Well No.:**	MW13
Location:	950 PACIFIC HIGHWAY AND 2 BRIADGE STREET, PYMBLE, NSW	**Depth (m):**	14.09

WELL FINISH

X	Gatic Cover		Standpipe		Other (describe)

WELL PURGE DETAILS:

Method:	Peristaltic Pump	**SWL – Before:**	9.32m
Date:	18/10/17	**Time – Before:**	10:45am.
Undertaken By:	GF	**Total Vol Removed:**	2.5
Pump Program No:		**PID (ppm):**	0.0

PURGING / SAMPLING MEASUREMENTS

Time (min)	SWL (m)	Vol (L)	Notes	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
10:54 (0)	9.32	–	Silty.	–	–	–	–	–
11:03 (9)	9.50	Flowcell	Clear.	21.2	1.1	1131	6.61	-98.6
11:05 (11)	9.52		"	21.4	1.0	1137	6.67	-106.5
11:08 (14)	9.53	1	"	21.5	0.9	1146	6.75	-113.9
11:11 (17)	9.54		"	21.5	0.9	1151	6.78	-117.0
11:14 (20).	9.55		"	21.6	0.9	1154	6.79	-119.4
11:16 (22)	9.56		"	21.6	0.8	1155	6.80	-121.2
11:17 (23)	9.57		"	21.6	0.8	1154	6.80	-121.5
11:18 (24)	9.57		"	21.5	0.8	1153	6.80	-121.9
11:19 (25)	9.58		"	21.5	0.8	1153	6.80	-122.4
1120 (26)	9.58		"	21.4	0.8	1152	6.80	-122.7
11:21 (27)	9.58		"	21.4	0.8	1152	6.80	-122.9
11:22 (28	9.59	2.5	"	21.4	0.8	1152	6.80	-123.1

Comments: Odours ([✓ YES] / NO), NAPL/PSH (YES / [✓ NO]) Sheen ([✓ YES] / NO), Steady State Achieved ([✓ YES] / NO)
HC Spotted

Sampling Containers Used: 2x glass amber, 3 x BTEX vials, 1 x H2NO3 plastic, 1 x H2SO4 plastic, 1 x ~~unpreserved~~ NaOH plastic
DPGFW2. 2x 2x 1x – –

Tested By: Geoff Fletcher	**Remarks:**
Date Tested: 18/10/17	- All measurements are corrected to ground level
Checked By:	- SWL is an abbreviation for standing water level
Date:	- Steady state conditions - difference in the pH less than 0.2 units and difference in conductivity less than 10%

ENVIRONMENTAL INVESTIGATION SERVICES
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EIS

FIELD CALIBRATION FORM

CLIENT: Bunnings Group Limited
PROJECT: Proposed Warehouse
LOCATION: 950 PACIFIC HIGHWAY AND 2 BRIADGE STREET, PYMBLE, NSW
JOB NO: E24542KF

EQUIPMENT	MAKE	MODEL	EIS REFERENCE	DATE OF LAST FACTORY CALIBRATION	DATE OF FIELD CALIBRATION	NAME OF CALIBRATOR
YSI 4			YSI 4		10/10/17	Geoff Fletcher
ID			~~YSI~~ 1 PID		10/10/17	Geoff Fletcher 100ppm
PID			PID 1		17/10/17	Geoff Fletcher 100ppm
YSI 3			YSI 3		18/10/17	Geoff Fletcher
YSI 3			YSI 3		19/10/17	Geoff Fletcher.
PID #1			PID 1		19/10/17	Geoff Fletcher 100ppm

Notes:

Field Duplicate Samples: