ENVIRONMENTAL INVESTIGATION SERVICES

REPORT

TO

DESIGNINC SYDNEY PTY LTD

ON

PRELIMINARY REMEDIATION ACTION PLAN

FOR

NEW ULTIMO PYRMONT PUBLIC SCHOOL

AT

189 JONES STREET, ULTIMO

15 JANUARY 2018 **REF: E30361KHrpt2-RAP**

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Document Distribution Record		
Report Reference	**Distribution**	**Report Date**
E30361KHrpt2-RAP	1 * e-copy	15 January 2018

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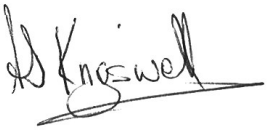

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ABBREVIATIONS

Ambient Background Concentrations	**ABC**
Added Contaminant Limits	**ACL**
Asbestos Containing Material	**ACM**
Australian Drinking Water Guidelines	**ADWG**
Area of Environmental Concern	**AEC**
Australian Height Datum	**AHD**
Asbestos Health Screening Levels	**ASL**
Acid Sulfate Soil	**ASS**
Above Ground Storage Tank	**AST**
Below Ground Level	**BGL**
Bureau of Meteorology	**BOM**
Benzene, Toluene, Ethylbenzene, Xylene, Naphthalene	**BTEXN**
Cation Exchange Capacity	**CEC**
Contaminated Land Management	**CLM**
Construction Management Plan	**CMP**
Chain of Custody	**COC**
Contaminant of Primary Concern	**CoPC**
Conceptual Site Model	**CSM**
Data Quality Indicator	**DQI**
Data Quality Objective	**DQO**
Detailed Site Investigation	**DSI**
Ecological Assessment Criteria	**EAC**
Ecological Investigation Levels	**EILs**
Ecological Screening Level	**ESL**
Environmental Management Plan	**EMP**
Excavated Natural Material	**ENM**
Environmental Protection Agency	**EPA**
Environmental Site Assessment	**ESA**
Ecological Screening Level	**ESL**
General Approvals of Immobilisation	**GAI**
General Solid Waste	**GSW**
Health Investigation Level	**HILs**
Hardness Modified Trigger Values	**HMTV**
Health Screening Level	**HSLs**
International Organisation of Standardisation	**ISO**
Lab Control Spike	**LCS**
Light Non-Aqueous Phase Liquid	**LNAPL**
Local Government Authority	**LGA**
Map Grid of Australia	**MGA**
National Association of Testing Authorities	**NATA**
National Environmental Protection Measure	**NEPM**
Organochlorine Pesticides	**OCP**
Organophosphate Pesticides	**OPP**
Polycyclic Aromatic Hydrocarbons	**PAH**
Potential Contaminants of Concern	**PCC**
Photo-ionisation Detector	**PID**
Practical Quantitation Limit	**PQL**
Preliminary Site Investigation	**PSI**
Quality Assurance	**QA**
Quality Control	**QC**

ABBREVIATIONS

Remediation Action Plan	**RAP**
Relative Percentage Difference	**RPD**
Restricted Solid Waste	**RSW**
Site Assessment Criteria	**SAC**
Sampling, Analysis and Quality Plan	**SAQP**
Site Audit Statement	**SAS**
Site Audit Report	**SAR**
Specific Contamination Concentration	**SCC**
Standard Penetration Test	**SPT**
Semi-Volatile Organic Compounds	**sVOC**
Standard Operating Practice	**SOP**
Standard Water Level	**SWL**
Standard Sampling Procedure	**SSP**
Trip Blank	**TB**
Toxicity Characteristic Leaching Procedure	**TCLP**
Total Recoverable Hydrocarbons	**TRH**
Trip Spike	**TS**
Upper Confidence Limit	**UCL**
United States Environmental Protection Agency	**USEPA**
Underground Storage Tank	**UST**
Virgin Excavated Natural Material	**VENM**
Volatile Organic Compounds	**VOC**
Volatile Organic Chlorinated Compound	**VOCC**
Workplace, Health and Safety	**WHS**

1 INTRODUCTION

Designinc Sydney Pty Ltd ('the client') commissioned Environmental Investigation Services (EIS)[1] to prepare a Preliminary Remediation Action Plan (RAP) for the new Ultimo Pyrmont Public School at 189 Jones Street, Ultimo. The site location is shown on Figure 1 and the site extent is shown on Figure 2.

1.1 Proposed Development Details

From the supplied architectural drawings by DesignInc Sydney Pty Ltd (Project No: S15124, Drawing Nos: DA-2301 to DA-2306, DA-3001, DA-3002, DA-4001 and DA-4002, Revision 1, dated 16/12/16) the existing school will be completely demolished and a new school constructed. The new school will extend to all site boundaries. The new development will step up the hillside and will be formed at three main floor levels of RL4.5m at the western end, RL11.7m within the central portion and RL15.3m at the eastern end. However, a lower parking area is proposed within the north-western corner at RL2.9m. To achieve these levels excavation will be required to maximum depths of approximately 6m at the eastern edge of each step in level. At the western end of each level the proposed level will be up to approximately 2m higher than the existing surface. At this point it is unknown if fill will be placed in areas where the finished level is above the existing level or a void left below the lowest floor slabs.

1.2 Previous Investigations

EIS have previously prepared a Preliminary Environmental Site Assessment (ESA) for the site[2]. This RAP should be read in conjunction with the ESA report.

This Preliminary RAP is based on information contained in the above report and will need to be updated once additional investigations have been completed.

1.3 Remediation Goal, Aims and Objectives

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

The primary aim of the remediation in the new school area is to remove the source(s) of contamination in order to eliminate the risks posed by the contaminants detected in soil. Depending on the specific requirements of the development, remediation across some areas may aim to cap the contamination beneath a suitable barrier.

The objectives of the RAP are to:

- Provide a methodology for additional data gap investigation(s);
- Provide a methodology to remediate and validate the site;

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

[2] Report to DesignInc Sydney Pty Ltd on Preliminary Environmental Site Assessment for New Ultimo Pyrmont Public School at 189 Jones Street, Ultimo (ref: E30361KHrpt-rev2, dated 24 October 2017)

- Provide a framework for staged remediation and validation of the various site areas;
- Provide a contingency plan for the remediation works;
- Outline site management procedures to be implemented during remediation work; and
- Provide an unexpected finds protocol to be implemented during the development works.

1.4 Scope of Work

The RAP was prepared generally in accordance with an EIS proposal (Ref: EP46068KH) of 2 November 2017 and written acceptance from the client of 13 December 2017.

The scope of work included the following:

- A review of the EIS Preliminary ESA;
- Review of the proposed development details; and
- Preparation of the RAP report.

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

Table 1-1: Guidelines

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

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

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

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

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

[7] 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 and Regional Setting

Table 2-1: Site Identification

Current Site Owner:	Minister for Education and Training
Site Address:	189 Jones Street, Ultimo
Lot & Deposited Plan:	Lot 101 DP 1105527
Current Land Use:	Primary School
Proposed Land Use:	Primary School
Local Government Authority (LGA):	City of Sydney
Current Zoning:	B4 Mixed Use
Site Area (m^2):	5,350
RL (AHD in m) (approx.):	10
Geographical Location (decimal degrees) (approx.):	Latitude: -33.8777 Longitude: 151.1956

2.2 Site Description

The site is located in a predominantly residential area of Ultimo and is bound by Jones, Quarry and Wattle Streets to the east, north and west, respectively. The site is located approximately 500m to the south-east of Blackwattle Bay.

The regional topography generally falls to the west at 5-10° with a north-south orientated ridgeline located to the east of the site. The site itself falls to the west at approximately 5-10° overall, however, several terraces have been cut into the slope to create level areas.

A walkover inspection of the site was undertaken by EIS on 12 April 2017. The inspection was limited to accessible areas of the site and immediate surrounds. An internal inspection of buildings was not undertaken.

At the time of the inspection the site was occupied by Ultimo Public School, including various school buildings and playground areas. School buildings were located in the north, west and south sections of the site. The buildings in the north and west were multi-storey classroom buildings. The building in the

south section included common rooms and a library. A demountable classroom building was located in the north-west corner of the site.

The school was fully fenced along all boundaries and included retaining walls along the east and south boundaries. The retaining wall along the east boundary was approximately 1.6m high and retained Jones Street above the site. The retaining wall along the south boundary was of variable height and generally followed the existing tiers at the site.

The majority of the site was paved and included an Asphaltic Concrete car park in the west section, a concrete playground in the central section and artificial grass in the east section.

A batter slope was located west of the artificial turf that fell to the west at approximately 30° and included a 1m high retaining wall at the base of the batter. A series of four retaining walls and terraces were located immediately west of the concrete paved playground. The terraces included garden areas.

2.3 Summary of Geology and Hydrogeology

Regional geological maps reviewed for the ESA indicated that the site is underlain by Hawkesbury Sandstone, which typically consists of medium to coarse grained quartz sandstone with minor shale and laminite lenses. An area underlain by man-made fill is located immediately west of the site. The map indicates that this man-made fill potentially includes dredged estuarine sand and mud, demolition rubble, industrial and household waste.

The depth of fill varies from approximately 1.5mbgl to 8.1mbgl. The fill was typically more shallow (approximately 2m) in the west section of the site. The origin and source of fill is unknown and may contain CoPC. The fill contained inclusions of igneous, ironstone and sandstone gravel, slag, ash and brick fragments. Metal fragments were encountered in the fill in BH6.

Natural soil and sandstone bedrock was encountered beneath the fill during the ESA.

Groundwater seepage was encountered in BH1 and BH2 at depths of 2m to 2.2m. Groundwater was encountered at a depth of approximately 7.6m in BH3, which was slightly above the bedrock.

Groundwater across the majority of the site is expected to be associated with perched water on the surface of the bedrock. Groundwater may be present in the lower (west) section of the site. Groundwater would be expected to flow to the north-west.

2.4 Summary of Site History

The site has been owned by the Minister for Education and Training since 1989. Between 1921 and 1989, the land was Crown Land. From 1914 to 1921, the Railway Commissioner for NSW owned the land. Between 1867 and 1914, the land was privately owned. The historical information indicated that the development of the present school features, including the majority of the building construction

and slope formation occurred in the 1960s. Placement of the imported topsoil in the upper terrace (eastern playing field) area probably occurred around the mid-1980s. Construction for the administration block was underway in 2002, and the building and current carpark at the western end of the school (lower terrace) were completed prior to 2004. The softfall surface on the upper terrace was placed at some time after 2005.

2.5 Summary of Soil Results

The lead results in the BH6 (1.5-1.95m) and BH6 (3-3.45m) were 310mg/kg and 400mg/kg, respectively, and exceeded the HIL-A criterion.

The B(a)P TEQ result of 13mg/kg in the BH6 (0.5-0.95m) sample exceeded the HIL-A criterion. The remaining PAHs results were below the HIL-A criteria.

The lead results in selected fill samples from BH5, BH6 and BH7, the nickel result in the BH2 (0.4-0.5m) sample and the zinc result in the BH6 (3-3.45m) sample exceeded the EIL-UR&POS criteria. It should be noted that for the majority of these exceedances, the pH, CEC and clay content were not analysed.

The TRH F3 result of 590mg/kg in the BH6 (0.5-0.95m) sample exceeded the ESL-URPOS criterion.

The source of the PAHs and lead including lead in the fill samples is considered to be associated with the ash and slag inclusions encountered in the fill matrix. The natural soil samples analysed below the fill profile were not impacted by the contaminants. The TRH F3 encountered in the fill in BH6 is considered likely to be associated with elevated PAHs rather than a fuel or other hydrocarbon source.

2.6 Conceptual Site Model (Site Characterisation)

The CSM is based on information presented in the EIS 2017 ESA.

Table 2-2: CSM

Contaminant source(s)	The primary contamination source at the site is fill. The fill is impacted by heavy metals (lead, nickel, zinc), benzo(a)pyrene and TRH. For the purpose of this Preliminary RAP, all fill is considered to be impacted by these contaminants.
Affected media	Soil/fill has been identified as the affected media.
Receptor identification	Human receptors include: site occupants; visitors; development and maintenance workers. Off-site land users may also be potential receptors. Environmental receptors include flora and fauna in the immediate surrounds and in the proposed landscaped/street-scaped areas, and the nearest, down-gradient receiving water body (i.e. Blackwattle Bay).

Exposure pathways	Potential exposure pathways (relevant to the receptors) include ingestion, dermal absorption and inhalation of dust (all contaminants) and vapours (volatile TRH, BTEX, naphthalene and VOCs only).
Evaluation of data gaps	The following data gaps have been identified: 1) The historical assessment was undertaken as part of previous investigations; 2) Groundwater sampling and analysis was outside the scope of the 2017 ESA; 3) Areas beneath the existing buildings have not been included in the assessment; and 4) The horizontal extent of the contamination has not been adequately assessed. The data gaps have been adequately considered in the RAP as outlined in Section 3.

3 DATA GAP INVESTIGATION

The works outlined in this section of the RAP should be addressed prior to preparation of the final RAP and prior to the commencement of the remediation works outlined in Section 6.

Data Gap 1 is not considered likely to alter the outcome or design of any future assessment as the major potential contamination source is imported fill material. The historical assessment was considered to have identified the likely timing of the filling works adequately.

The EIS 2017 ESA included soil sampling from 8 boreholes. To address Data Gaps 3 and 4 soil sampling will be required from an additional 8 locations. This total number of sampling locations meets the minimum density recommended in the NSW EPA Sampling Design Guidelines (1995) for the site area of approximately 5,350m^2.

As part of the soil sampling, groundwater samples should be obtained from 2 monitoring wells to address Data Gap 2.

3.1 Objectives

The objectives of the additional data gap investigation are to:

- Characterise the soil and groundwater contamination conditions;
- Assess whether the soil or groundwater in this area of the site poses a risk to the receptors;
- Better assess the extent of the contamination encountered during the EIS 2017 ESA;
- Assess the potential for Acid Sulfate Soils (ASS) in the lower (west) section of the site; and
- Confirm whether the remediation and validation strategies outlined in this RAP are appropriate to be applied to the site, or whether a supplementary strategy needs to be developed.

3.2 Additional Sampling

- As stated above, soil samples should be collected from 8 additional locations distributed evenly across the site and including the previously inaccessible areas;
- Samples should be collected from the fill and natural soil using a drill rig. A selection of samples (fill and natural) should be analysed for heavy metals, TRH, BTEX, PAHs, OCPs, OPPs, PCBs and asbestos. Leachate testing (TCLPs) should also be undertaken as required for waste classification purposes. As a minimum, at least one sample should be analysed from each fill profile identified at each location;
- All soil samples should be screened using a PID;
- Two groundwater monitoring wells are to be installed in selected boreholes. Two wells are considered to be adequate (in light of the previous investigation findings) to close out any uncertainty in relation to potential groundwater impacts at the site;
- The wells should be installed to a depth of 5-6m below ground level, with the screened interval intersecting the water table. Appropriate sand filter packs and bentonite seals should be installed as required depending on the site conditions. Groundwater samples will be obtained from the well as outlined below;
- The monitoring wells should be developed using an electric pump prior to sampling. A minimum of three well volumes of water should be removed prior to sampling;
- Groundwater samples should be obtained approximately five to seven days after development (in order to allow recharge/equilibrium) using low-flow sampling equipment. Based on the depth of the water column encountered in the monitoring well, the sampling tube inlet should be placed approximately in the middle of the water column;
- A PID should be used to measure the well headspace prior to sampling;
- Prior to development and sampling, the well should be gauged with an interface probe to assess the standing water level and the presence of phase-separated hydrocarbons;
- Groundwater samples should be analysed for heavy metals, low level PAHs, TRH, BTEX and PAHs. Groundwater samples for dissolved heavy metals analysis should be field filtered using single-use, 0.45µm filters; and
- During development and sampling the pH, electrical conductivity, redox potential, dissolved oxygen and temperature should be measured and recorded using a calibrated portable water meter in order to evaluate steady state conditions.

3.3 Decontamination and Sample Preservation

Any re-usable equipment should be decontaminated using a scrubbing brush and potable water and Decon 90 solution (phosphate free detergent) followed by rinsing with potable water. Single use disposal sampling equipment (i.e. development pump tubing, low-flow pump tubing etc.) will be discarded after each use.

Samples will be preserved by immediate storage in an insulated sample container with ice. Any additional sample preservation requirements for specific analytes should also be adopted as required.

On completion of the fieldwork, the samples should be delivered in the insulated sample container to a NATA registered laboratory for analysis under standard chain of custody (COC) procedures.

3.4 Quality Assurance/Quality Control (QA/QC)

Rinsate samples should be obtained during the decontamination process of re-usable equipment as part of the field QA/QC requirements. Inter and intra-laboratory duplicates should be collected and analysed for the soil and groundwater assessment at a rate of 5% for inter-laboratory (soil only) and 5% for intra-laboratory analysis. A trip spike and trip blank should also be submitted and analysed with each batch of samples (soil only).

3.5 Data Assessment

The soil and groundwater data should be assessed using the criteria outlined in Sections 2.5 and 1.4 of this report.

3.6 Reporting

On completion of the investigation, a Stage 2 ESA report should be completed presenting the results of the assessment. The report should include a revised/updated RAP.

3.6.1 PASS Management

Preparation of an ASS management plan (ASSMP) will be required prior to the commencement of any bulk excavation works at the site if ASS are encountered at the site during the Stage 2 ESA.

4 REMEDIATION EXTENT

4.1 Known Extent

The known remediation extent for the purpose of the RAP includes fill material across the entire site. This is a conservative estimate, made due to the data gaps associated with insufficient sampling undertaken to date.

4.2 Unknown Extent

The aim of the Stage 2 ESA is to better assess the extent of the contamination at the site and, therefore, the extent of the remediation at the site. The extent of contamination in accessible areas of the site such as beneath buildings is unknown. The precise extent of the remediation works will not be defined until successful validation data has been obtained.

5 REMEDIATION OPTIONS

5.1 Soil Remediation

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

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

Or if the above are not practicable:

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

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.

5.2 Site Specific Remediation Options

The tables below summarise the site specific remediation options:

Table 5-1: Site Specific Remediation Options

Option	Discussion	Applicability
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. Not suitable for all contaminants. Soil Washing: Soil is stripped of contaminants via a leaching process and the concentrated contaminated liquid product retained for disposal or additional treatment. Air Sparging and Extraction: Air is forced through the contaminated soil to volatilise organic contaminants. The air is then extracted and captured for treatment leaving reduced contaminant concentrations within the sub-strata. Thermal Desorption: Contaminated soils are heated within an incinerator to volatilise or combust the contaminants. Contaminants are either broken down to water and carbon dioxide or alternatively trapped within an air filtration system. Licenses are necessary for specific individual waste streams due to the potential for air pollution and the formation of harmful by-products during the incineration process.	Generally not applicable for this project. On-site treatment options are generally very expensive and time consuming. These are applicable for large scale remediation work of sites with large areas impacted by contaminants that can be treated. The CoPC at this site include heavy metals, B(a)P TEQ and TRH F2. Most of these compounds are very difficult to treat as they don't breakdown easily. Considering the costs and the nature of the CoPC, this option is not considerable to be viable.

Option	Discussion	Applicability
Option 2 Off-site treatment of contaminated soil	Contaminated soils are excavated, transported to an approved/ licensed treatment facility, treated to remove/stabilise the contaminants then returned to the subject site, transported to an alternative site or disposed to an approved landfill facility. This option provides for a relatively short program of on-site works, however there may be some delays if the material is to be returned to the site following treatment. The cost per tonne for transport to and from the site and for treatment is considered to be relatively high. The material would also have to be assessed in terms of suitability for reuse as part of the proposed development works.	Not applicable for this project.
Option 3 Removal of contaminated material to an appropriate facility and reinstatement with clean material	Contaminated soils would be classified in accordance with NSW EPA guidelines for waste disposal, excavated and disposed of off-site to a NSW EPA licensed landfill. The material would have to meet the requirements for landfill disposal. Landfill gate fees (which may be significant) would apply in addition to transport costs.	Considered to be the most viable option for areas of this project that includes extensive excavation.
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.	This option is considered to be a viable option for the fill material remaining on-site on completion of earthworks. The majority of the site will be paved with concrete which will limit the exposure to receptors.

Option	Discussion	Applicability
	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 S.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.	

6 REMEDIATION DETAILS

Prior to commencement of remediation work, the data gap requirements detailed in Section 3 should be addressed and the site management plan for remediation works (see Section 9) should be reviewed and implemented by the remediation contractor.

Prior to the commencement of remediation, geotechnical advice should be sought with regards to the stability of the proposed excavation and adjacent structures/features. Geotechnical advice should also be sought regarding the requirements of any backfill material used for the reinstatement (temporary or otherwise) of the remediation areas.

6.1 Sequence of Remediation Works

Remediation is likely to be staged with the proposed excavation and development works. Provided that suitable precautions are taken to minimise the potential for cross-contamination (e.g. leaving the pavements in-situ until remediation commences), EIS are of the opinion that the sequence of the remediation works should have no significant impact on the outcome of the validation.

6.2 Remediation of the Proposed Excavation Areas

6.2.1 Rationale for Selection of Remedial Strategy

The most viable option for remediation of the areas of the site where excavation is proposed is removal of all fill followed by off-site disposal to an appropriate facility (Option 3). In some cases the fill material may be significantly deeper than the depth of proposed excavation. In this event, the most viable option for remediation will include cap and containment (Option 4).

The site is to be terraced as part of the proposed development, with the eastern side of each terrace requiring excavation. Removing all fill in conjunction with the excavation works (in selected areas of the site) will provide the shortest program for the remediation, with limited delays for validation.

6.2.2 Remediation Details – Excavation Areas

The specific remediation details for the proposed mixed use development area are described in the table below:

Table 6-1: Remediation Details – Proposed Mixed Use Development Area

Step	Procedure
1.	Site Set-Up: Prior to the commencement of excavation, the excavation areas should be clearly marked with spray paint and/or pegs. The proposed depth of excavation should be compared with the estimated fill depth in each area. If the proposed excavation depth extends to or beyond the fill depth then remediation should proceed as below.
2.	Personal Protective Equipment (PPE) and Work Health and Safety (WHS): Check PPE and WHS requirements prior to commencement of remediation works. This should be done daily. The minimum PPE required for the remediation includes the following: • Disposable gloves; • Eye protection; and • Hard hat, covered clothing and steel toed boots. Machinery and equipment should be sprayed with water prior to exiting the site, preferably over the truck bay wash.
3.	Address Stability Issues: Geotechnical advice should be sought regarding the stability of the adjacent structures and/or adjacent areas prior to commencing the excavation (as required).
4.	Removal of fill: Remediation of the area will be undertaken as follows: • Submit an application to dispose of the fill (in accordance with the assigned waste classifications) to a landfill licensed by the NSW EPA to receive the waste and obtain authorisation to dispose; • It is noted that no asbestos contamination was encountered at the site prior to preparation of this RAP, however, if asbestos is encountered within the fill material, the remediation contractor will be required to register with the NSW EPA WasteLocate tracking system to comply with the legislation in regards to transporting/movement of asbestos waste; • The fill material should be excavated down to the surface of the underlying natural soil/bedrock; • Load the fill onto trucks and dispose in accordance with the assigned waste classification. If the fill contains asbestos, the receiving licenced landfill facility will also need to be registered with the NSW EPA WasteLocate system in order to receive the waste; • Once the excavation reaches the proposed horizontal and vertical limits, obtain validation samples from the walls and base of the excavation (see the validation plan below for more details); • Following removal of all fill, the site should be inspected to confirm there are no obvious indicators of contamination such as stained or odorous soil, or residual underground infrastructure. Any unexpected conditions should be considered in the validation sampling program which should be adjusted accordingly;

Step	Procedure
	• Validate the natural soil in accordance with Section 7; and • All documents including landfill dockets, asbestos air monitoring etc. should be retained and forwarded to the client for inclusion into the validation report prepared.

6.3 Remediation of Non-Excavation Areas

If possible the fill material in these areas should be removed across the entire site in accordance with the methodology outlined in Section 6.2. EIS understand this is unlikely to occur and that fill material will remain at the site. The following remedial strategy will be required for areas where fill material will remain including areas of no excavation and areas where excavation will not penetrate the full depth of the fill material.

6.3.1 Rationale for Selection of Remedial Strategy

The site is to be terraced as part of the proposed development, with no excavation and some filling proposed on the western side of each terrace. The most viable option for remediation of the areas where fill will remain on site is a combination of excavation and off-site disposal (Option 3) or cap and containment (Option 4).

6.3.2 Remediation Details – Non-Excavation Areas

The specific remediation details are described below:

Table 6-2: Remediation Details – Non-Excavation Areas

Step	Procedure
1.	Address Stability Issues and Underground Services: Geotechnical advice should be sought regarding the stability of the adjacent structures and/or adjacent areas prior to commencing the excavation and/or filling (as required).
2.	Personal Protective Equipment and Work Health and Safety: Check PPE and WHS requirements prior to commencement of remediation works. The minimum PPE required for the remediation includes the following: • Disposable gloves; • P2 dust mask; • Eye protection; and • Hard hat, covered clothing and steel toed boots.
3.	Site Preparation: The pavement in the remediation areas should be cut and removed with care using an excavator or similar.

Step	Procedure
5.	Excavation of fill material from the surface In areas where the existing ground surface is at or above the proposed levels, excavation of surficial fill material will be required. Remediation of the areas will be undertaken as follows: • Submit an application to dispose of the fill soil (in accordance with the assigned waste classification) to a NSW landfill licensed (by the EPA) to receive the waste, and obtain authorisation to dispose; • Load the fill soil onto trucks and dispose in accordance with the assigned waste classification; and • Backfill the excavation (if required) with virgin excavated natural material (VENM) which should be compacted to the requirements of the proposed development. All documents including landfill dockets, UST disposal dockets, liquid waste disposal etc. should be retained and forwarded to the client for inclusion into the validation report to be prepared by the validation consultant. Considering the above, remediation of capped areas will be undertaken as follows: • The existing fill depths, existing ground levels and proposed finished ground levels should be evaluated in the context of the above "minimum acceptable capping standards". Any surplus fill required to be removed to achieve the capping requirements should be removed in accordance with the fill remediation procedures outlined previously in this RAP and below; and • The marker layer placement should be inspected by the validation consultant prior to the placement of the overlying clean capping materials. This should be documented photographically.
6.	Capping Procedures: If contaminated fill is to remain in-situ, the following are considered to be the minimum acceptable capping standards for the purpose of remediation: • Unpaved areas including landscaped or grassed areas with shallow plantings – visual marker layer comprising geogrid (e.g. TriAx) and geofabric (high visibility, orange, non-woven) over the contaminated fill, overlain by 0.2m to 0.5m of clean (validated) soil; • Unpaved areas including landscaped or grassed areas with tree plantings – tree plantings should be boxed out to 1m deep over a 1m by 1m area. The base and sidewalls of the tree pits should be lined with visual marker layer comprising geogrid (e.g. TriAx) and geofabric over the contaminated fill. Areas where no trees are to be planted can include the marker layers and 0.2-0.5m of clean soil as noted above. The root ball of the tree should be approximately 0.5m above the marker layer; • Paved areas – In areas where there is continuous paving (i.e. concrete) the pavement itself is considered to be a suitable capping layer; In areas where non-continuous paving is proposed (i.e. brick pavers) the capping should consist of visual marker layer comprising geogrid (e.g. TriAx) and geofabric over the contaminated fill, overlain by pavement materials; and • Underground services – base and walls of service trenches are to be lined with a visual marker layer comprising geofabric over the contaminated fill. Service trenches are to be backfilled with clean (validated) materials. Overlying capping requirements to meet the specification for paved or unpaved areas as noted above.

Step	Procedure
	Considering the above, remediation of capped areas will be undertaken as follows: • The existing fill depths, existing ground levels and proposed finished ground levels should be evaluated in the context of the above "minimum acceptable capping standards". Any surplus fill required to be removed to achieve the capping requirements should be removed in accordance with the fill remediation procedures outlined previously in this RAP; • The marker layer placement should be inspected by the validation consultant prior to the placement of the overlying clean capping materials. This should be documented photographically; • In any unpaved areas, a levels survey should be completed by a registered surveyor to document the ground levels at the time the visual marker layers are installed (and prior to placement of the clean capping materials); • Any tree pits and service trenches should be inspected and documented by the validation consultant; • Imported capping materials should be validated in accordance with Section 7.1; • Construct the capping layers to meet the requirements of the development and address the "minimum acceptable capping standards"; and • Following installation of the capping materials in unpaved areas, a levels survey should be completed by a registered surveyor to document the finished ground levels. This survey will be compared to the previous survey to confirm the minimum capping thickness of 0.5m is achieved in the unpaved areas.

6.4 Remediation Documentation

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

- UST destruction certificate;
- Liquid waste disposal;
- Soil disposal dockets;
- Imported materials information;
- Photographs of remediation works, including photographs of marker layers prior to placement of the overlying capping materials; and
- Site surveys of any capped areas after the marker layers are installed, and again after the capping layers are constructed.

Copies of these documents must be forwarded to the environmental consultant on completion of the remediation for inclusion in the final validation report.

6.5 Soil Disposal - Volume and Disposal Analysis

A soil volume analysis should be undertaken on completion of the works and reconciled with the quantities shown on the soil disposal dockets. A review of the disposal facility's licence issued under the Protection of the Environment Operations (POEO) Act (1997)[8] should also be undertaken to confirm whether or not each facility is appropriately licensed to receive the waste.

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

7 VALIDATION PLAN

Validation is necessary to demonstrate that remedial measures described in this RAP have been successful and that the site is suitable for the intended land use. The validation can be staged if required to permit the various areas of the site to be remediated, validated and signed off progressively.

The sampling program for the validation is outlined in Section 7.1. This is the minimum requirement based on conditions anticipated to exist at the site. Additional validation sampling may be required based on site observations made during remediation.

Site observations will also be used as a validation tool to assess the extent of site contamination. In particular visual and olfactory indicators such as petroleum odours and staining should be recorded.

7.1 Validation Sampling and Documentation

The table below outlines the validation requirements for the site.

Table 7-1: Validation Requirements

Aspect	Sampling	Analysis	Observations and Documentation
Proposed Mixed Use Development Area			
Excavation base (following fill removal)	10m grid (1 sample per 100m^2), with additional samples targeting any potentially impacted areas identified during the visual/olfactory assessment The excavation walls are likely to be retained and inaccessible for sampling. In the event soils are exposed on the walls, samples should be collected at a rate of one sample per 10m lineal, with sampling targeting distinct fill profiles based on field observations.	Heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc) and PAHs. Additional sampling and analysis for TRH/BTEX may be required for VENM/waste classification purposes	Samples to be screened using PID Observations of staining and odour to be recorded Photographs to be taken Disposal dockets to be retained

Aspect	Sampling	Analysis	Observations and Documentation
Capping (if this option is selected)	Refer to imported materials validation requirements following sections of this table	Refer to imported materials validation requirements following sections of this table	Visual inspection and photo-documentation of marker layer installation Levels surveys prior to and following placement of capping layers Validation of imported materials used as capping (as outlined below) Disposal dockets to be retained for any fill requiring off-site disposal
Imported Materials (all site areas)			
Imported VENM backfill	Minimum of three samples per source	Heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), TRH, BTEX PAHs, OCP/OPP, PCBs and asbestos	VENM documentation/ report required (should include source site history to demonstrate analytes are appropriate). Additional analysis may be required depending on site history Material to be inspected upon importation to confirm it is free of visible/olfactory indicators of contamination and is consistent with documentation
Imported engineering materials such as recycled aggregate, road base etc	Minimum of three samples per source/material type	Heavy metals (as above), TRHs, BTEX, PAHs, OCP/OPP, PCBs and asbestos	Documentation required to confirm material has been classified with reference to a relevant exemption and is fit for purpose on site Material to be inspected upon importation to confirm it is free of visible/olfactory indicators of contamination and is consistent with documentation Dockets for imported material to be provided

Aspect	Sampling	Analysis	Observations and Documentation
Imported engineering materials comprising only natural quarried products such as blue metal etc	At the validation consultants discretion based on supplier documentation	At the validation consultants discretion based on supplier documentation	Documentation to be provided from the supplier confirming the material is a product comprising only VENM (i.e. quarried product) Review of quarry POEO licence Material to be inspected upon importation to confirm it is free of anthropogenic materials, visible and olfactory indicators of contamination, and is consistent with documentation Dockets for imported material to be provided
Imported landscaping materials	Minimum of three samples per source/material type	Heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), TRHs, BTEX, PAHs, OCPs, OPPs, PCBs and asbestos	Documentation required to confirm material has been produced under an appropriate standard and is fit for purpose on site Material to be inspected upon importation to confirm it is free of visible/olfactory indicators of contamination and is consistent with documentation Dockets for imported material to be provided

7.2 Validation Assessment Criteria and Data Assessment

The validation assessment criteria (VAC) to be adopted for the validation assessment are outlined in the table below:

Table 7-2: VAC

Validation Aspect	Criteria
Waste classification (soil disposal)	In accordance with the procedures and criteria outlined in the NSW EPA Waste Classification Guidelines - Part 1: Classifying Waste (2014[9])
Soil validation	HSL-A and HIL-A criteria based on NEPM (2013). HSLs will include the most conservative criteria based on sand and 0m to 1m depth range. NEPM (2013) EIL/ESL criteria will be considered for validation samples collected in proposed landscaped areas. Capping: surveys to demonstrate capping thickness of 0.2-0.5m is achieved in unpaved areas. Aesthetics: soils to be free of staining and odours
Imported materials	Heavy metal concentrations to be consistent with background range, organic compounds to be less than the laboratory PQLs and asbestos to be absent. Imported landscaping materials are also to consider EILs and ESLs based on NEPM 2013. Aesthetics: soils to be free of staining and odours
Imported materials	Heavy metal concentrations to be consistent with background range, organic compounds to be less than the laboratory PQLs and asbestos to be absent. Imported landscaping materials are also to consider EILs and ESLs based on NEPM 2013. Aesthetics: soils to be free of staining and odours

Data should initially be assessed as above or below the VAC. Statistical analysis may be applied if deemed appropriate by the consultant and undertaken in accordance with the NEPM (2013).

7.3 Validation Report

As part of the validation process, a site validation report will be prepared by the environmental/validation consultant. The report will outline the remediation work undertaken at the site and any deviations to the remediation strategy. The report will summarise the results of the validation assessment and will be prepared in accordance with the Reporting Guidelines 2011. The

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

report should draw conclusions regarding the success of the remediation/validation and the suitability of the site for the proposed development (from a contamination viewpoint). Staged validation reporting may occur progressively for each area as the development proceeds.

Any areas where contaminated material is capped in-situ will require on-going management. The validation reporting for these areas will also include the preparation of a long term EMP. The EMP will require public notification via an appropriate mechanism (e.g. land title, Section 149, Dial Before You Dig register), and the consent authority is required to provide written confirmation that they accept the EMP.

7.4 Data Quality

Appropriate QA/QC samples should be obtained during the validation and analysed for the contaminants of concern. As a minimum, QA/QC sampling should include duplicates (5% inter-laboratory and 5% intra-laboratory), trip spikes, trip blanks and rinsate samples.

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

DQOs should be established for the validation with regards to the seven-step process outlined in the Site Auditor Guidelines 2017 and with reference to USEPA documents Data Quality Objectives Processes for Hazardous Waste Site Investigations (2000) and Guidance on Systematic Planning Using the Data Quality Objectives Process (2006). The seven steps include the following:

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

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

8 CONTINGENCY PLAN

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

8.1 Unexpected Finds

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: underground tanks, asbestos in soil, and odorous or stained hydrocarbon impacted soils.

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

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

8.2 Groundwater Contamination

In the event that volatile groundwater contamination is identified during the data gap investigation (or potentially during dewatering activities during construction), a Tier 2 human health risk assessment should be undertaken to establish the risk to the receptors under the proposed development scenario. In the event of significant contamination, an addendum to the RAP may be required to further consider potential groundwater remediation options.

8.3 Contingency for Further Groundwater Investigation after Removal of Fill

Further validation/assessment of groundwater may be required if significant staining, odours or soil exceedances of the VAC are identified following removal of the fill, which could suggest a localised point source of groundwater contamination.

8.4 Continual Soil Validation Failure

Where validation sampling indicates that the contaminated material extends further than anticipated, there are two options:

- Re-excavate and re-sample until the validation sample results meet the VAC; or
- Revise the remedial strategy to include the cap and contain approach (if possible).

8.5 Importation Failure for VENM or other Imported Materials

Where material to be imported onto the site does not meet the importation acceptance criteria detailed in Section 7, the only option is to not accept the material. Alternative material must be sourced that meets the importation requirements.

8.6 Disposal of Hazardous Waste

Material classed as 'Hazardous Waste' under the Waste Classification Guidelines (2014) may require further assessment and stabilisation prior to off-site disposal. Disposal approval may also be required from the NSW EPA and EPA licensed landfill facility. The presence of Hazardous Waste may result in significant delays and additional cost to the project.

9 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.

9.1 Interim Site Management

The following interim measures should be adopted:

- Maintain fences to prevent access to the remediation area/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;
- Erect appropriate warning signage as required; and
- The requirements detailed in the hazardous building materials survey report and management plan should be implemented.

9.2 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 contact details of key project personnel are summarised below.

Table 9-1: Project Contacts

Task	Company	Contact Details
Project Manager (PM)	TBA	TBA
Remediation Contractor (RC)	TBA	TBA
Environmental Consultant (EC)	Environmental Investigation Services	9888 5000
Certifier	TBA	TBA
NSW EPA	Pollution Line	131 555
Emergency Services	Ambulance, Police, Fire	000

9.3 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.

9.4 Timing and Sequencing of Remediation Works

In general, all remedial works should be completed prior to the commencement of site construction and excavation works for the proposed development. In the event that remedial works are undertaken in conjunction with the development, all remediation areas should be clearly marked and covered with builder's plastic (or similar) in order to reduce the dust generation, surface water run-off and/or exposure to receptors.

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

9.5 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.

9.6 Noise and Vibration Control Plan

The guidelines for minimisation of noise on construction sites outlined in Australian Standard AS-2460 (2002[10]) 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 PM/Site Foreman/RC, specifying the expected duration of the noisy works.

9.7 Dust Control Plan

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

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

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

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

- Use of water sprays on unsealed or exposed soil surfaces;
- Covering of stockpiled materials and excavation faces (particularly during 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 3 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.

9.8 Air Monitoring

The requirement for air monitoring should be assessed following completion of the data gaps investigation.

9.9 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[11];
- 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
- Use of protective covers (e.g. HDPE).

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.

Disturbance of hydrocarbon contaminated soils is likely to result 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.

9.10 Health and Safety Plan

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

As a minimum requirement, personnel must wear appropriate protective clothing, including long sleeve shirts, long trousers and steel cap boots. Gloves and dust masks should be worn when working on remediation activities (additional asbestos-related PPE is also required as outlined previously in this

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

RAP). 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.

9.11 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.

9.12 Incident Management Contingency

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

9.13 Hours of Operation

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

10 CONCLUSION

EIS are of the opinion that the site can be made suitable for the proposed development provided this RAP is implemented accordingly. A site validation report (and EMP, if required) should be prepared on completion of remediation activities.

10.1 Remediation Category

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

Table 10-1: 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.

Considering the above, EIS understand that the remediation work is Category 2 remediation. However, it is noted that the RAP is likely to be assessed by Council as part of the development application/consent process.

10.2 Regulatory Requirements

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

Table 10-2: Regulatory Requirement

Guideline	Applicability
Duty to Report Contamination (2015)[12]	At this stage, EIS consider that there is no requirement to notify the NSW EPA of the site contamination. This requirement should be reassessed following review of the validation results.
Public Notification of EMP	The EMP will require public notification under Section 149(2) of the EPAA 1979 or a covenant registered on the title to land under Section 88B of the Conveyancing Act *1919*.
POEO Act 1997	Section 143 of the POEO Act 1997 states that if waste is transported to a place that cannot lawfully be used as a waste facility for that waste, then the transporter and owner of the waste are each guilty of an offence. The transporter and owner of the waste have a duty to ensure that the waste is disposed of in an appropriate manner. Appropriate waste tracking is required for all waste that is disposed off-site.
Water Management Act 2000[13]	The remediation of contaminated groundwater may require treatment. Council and other relevant approvals (e.g. NSW Office of Water / DPI Water) will be required prior to disposal of groundwater into the stormwater system.
WHS Code of Practice 2011[14]	Sites contaminated with asbestos become a 'workplace' when work is carried out there and require a register and asbestos management plan. Appropriate SafeWork NSW notification will be required for asbestos removal works or handling. Contractors are also required to be appropriately licensed for the asbestos works undertaken (i.e. bonded or friable asbestos works).

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

[13] NSW Government Water Management Act 2000

[14] WHS Regulation, (2011), *Code of Practice – How to Manage and Control Asbestos in the Workplace.*

11 LIMITATIONS

The report limitations are outlined below:

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

LIST OF IN-TEXT TABLES

IMPORTANT INFORMATION ABOUT THIS REPORT

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

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

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

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

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

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

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

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

Misinterpretation of Site Assessments by Design Professionals:

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

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

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

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

REPORT FIGURES

AERIAL IMAGE SOURCE: 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: ULTIMO PUBLIC SCHOOL
189 JONES STREET, ULTIMO, NSW

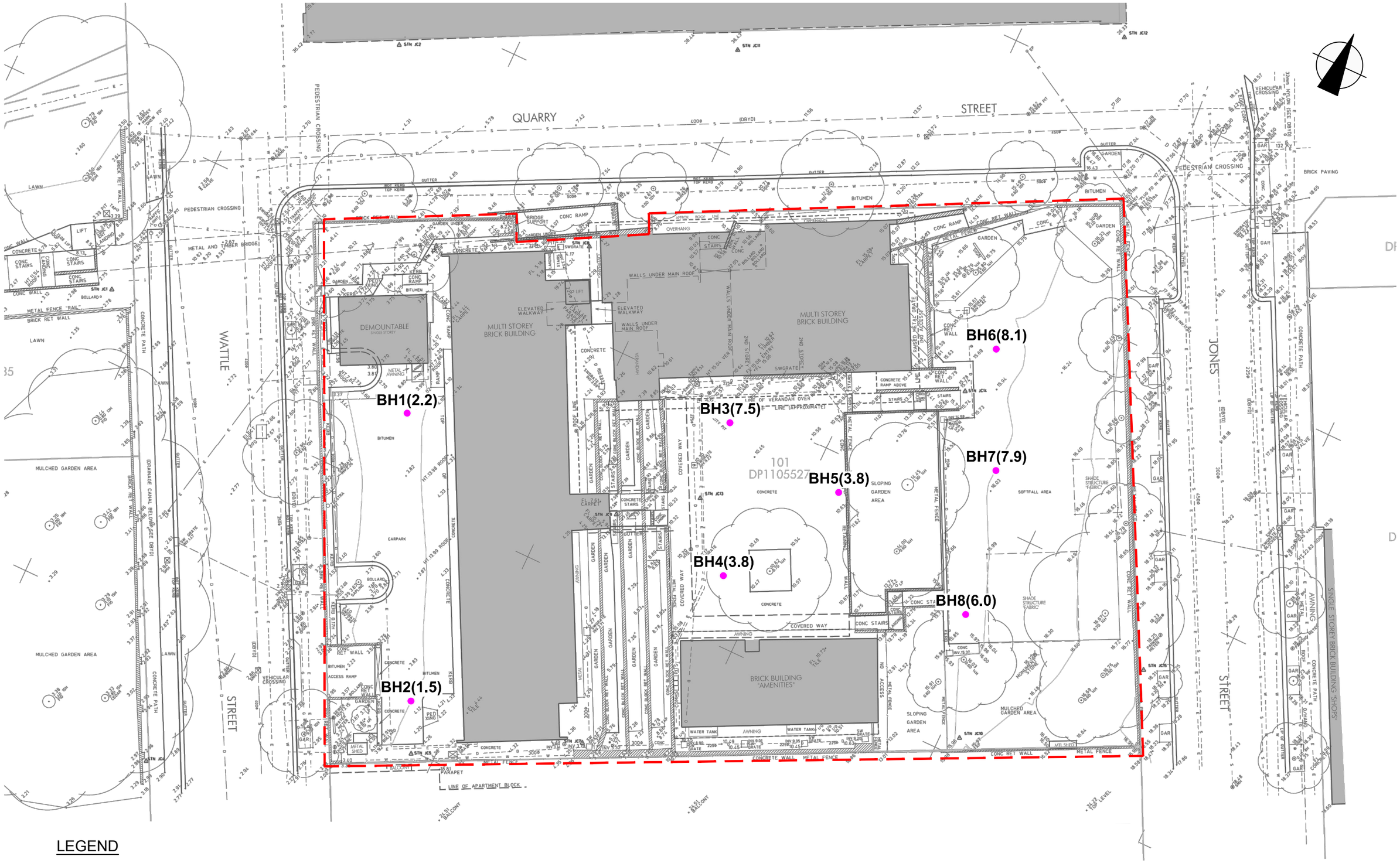
Report No: E30361KH

Figure No: 1

ENVIRONMENTAL INVESTIGATION SERVICES

EIS

PLOT DATE: 25/05/2017 3:30:13 PM DWG FILE: S:\5 EIS\5G- EIS JOBS\30000'S\E30361KH ULTIMO\CAD\E30361KH.DWG



LEGEND

- APPROXIMATE SITE BOUNDARY
- BH (Fill Depth) — BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m)

0 4 8 12 16 20

SCALE 1:400 @A3 METRES

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

Title: **SAMPLE LOCATION PLAN**

Location: ULTIMO PUBLIC SCHOOL
189 JONES STREET, ULTIMO, NSW

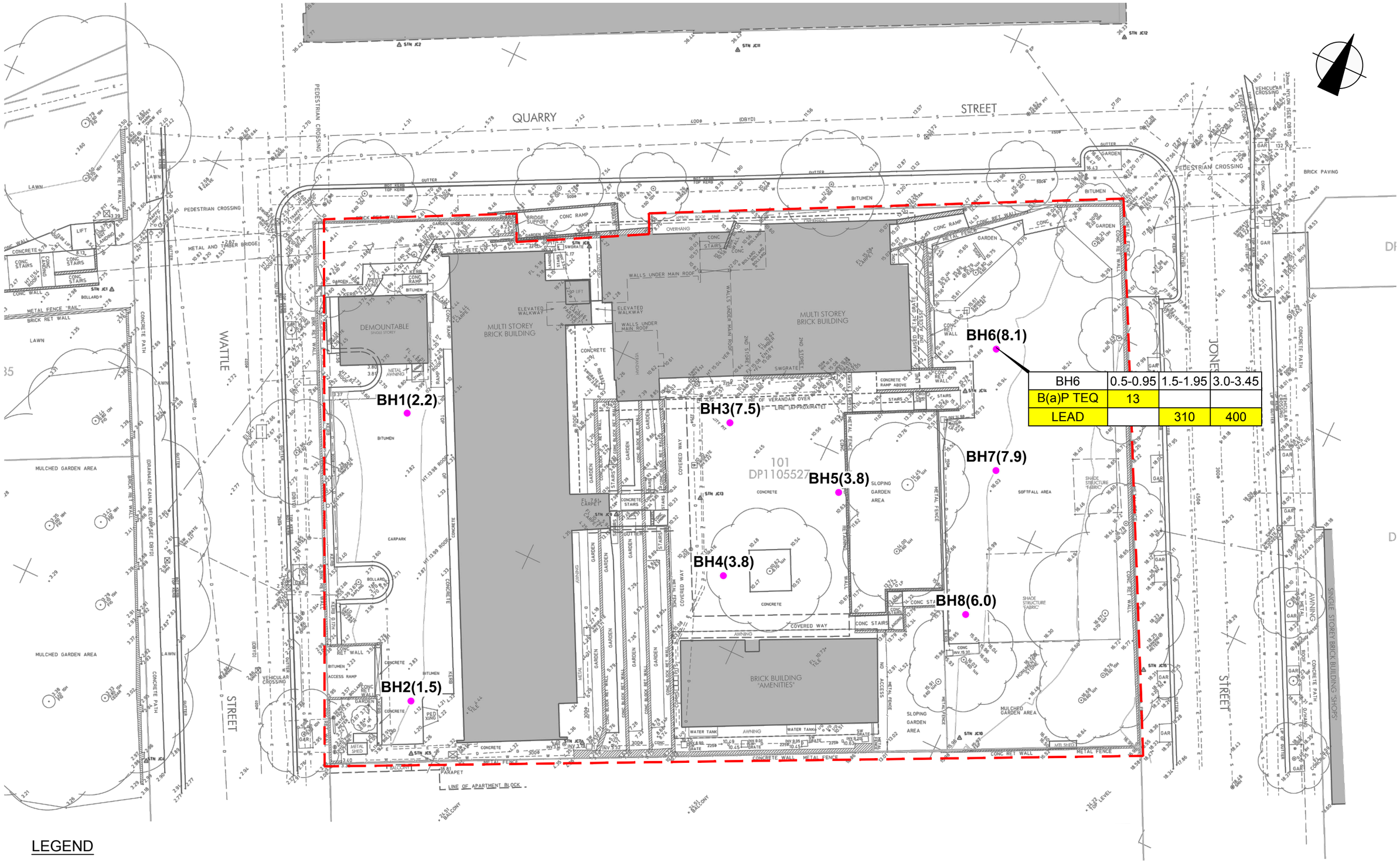
Report No: E30361KH

Figure No: 2

ENVIRONMENTAL INVESTIGATION SERVICES

EIS

PLOT DATE: 25/05/2017 3:29:52 PM DWG FILE: S:\S EIS\SC EIS JOBS\30000'S\SE30361KH ULTIMO\CAD\E30361KH.DWG



BH6	0.5-0.95	1.5-1.95	3.0-3.45
B(a)P TEQ	13		
LEAD		310	400

LEGEND

APPROXIMATE SITE BOUNDARY

BH (Fill Depth) — BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m)

SAMPLE ID	DEPTH (metres)
CHEMICAL	CONCENTRATION (mg/kg)

SOIL CONTAMINATION ABOVE SAC FOR HUMAN HEALTH RISK

0 4 8 12 16 20

SCALE 1:400 @A3 METRES

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

Title: **SITE CONTAMINATION DATA**

Location: ULTIMO PUBLIC SCHOOL
189 JONES STREET, ULTIMO, NSW

Report No: E30361KH

Figure No: 3

ENVIRONMENTAL INVESTIGATION SERVICES

EIS

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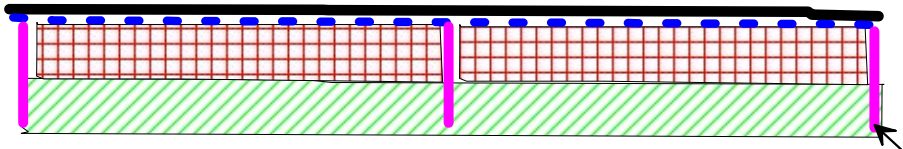
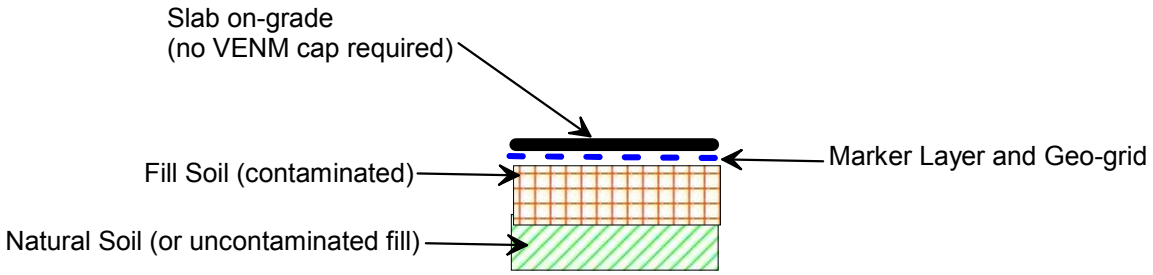
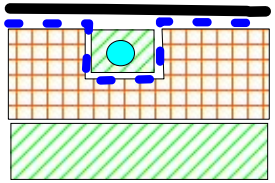




Detail for Building Slabs on Existing Ground Level

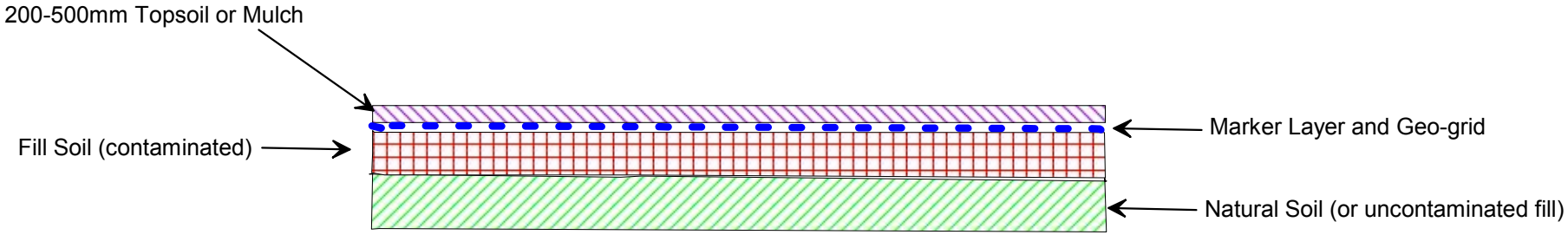


Detail for Service Trenches Beneath Hardstand Areas

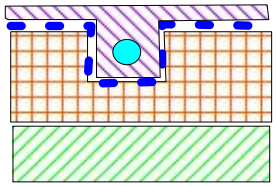
NOTES:
The remediation detail and cross section are indicative only.

Reference should be made to the report text for a full understanding of this plan.

ENVIRONMENTAL INVESTIGATION SERVICES	Project Number: **E30361KH**	Title: **PROPOSED CAPPING IN HARDSTAND AREAS**
	Figure: **4**	Address: **189 JONES STREET, ULTIMO, NSW**



Detail for Capping In Landscaped Areas



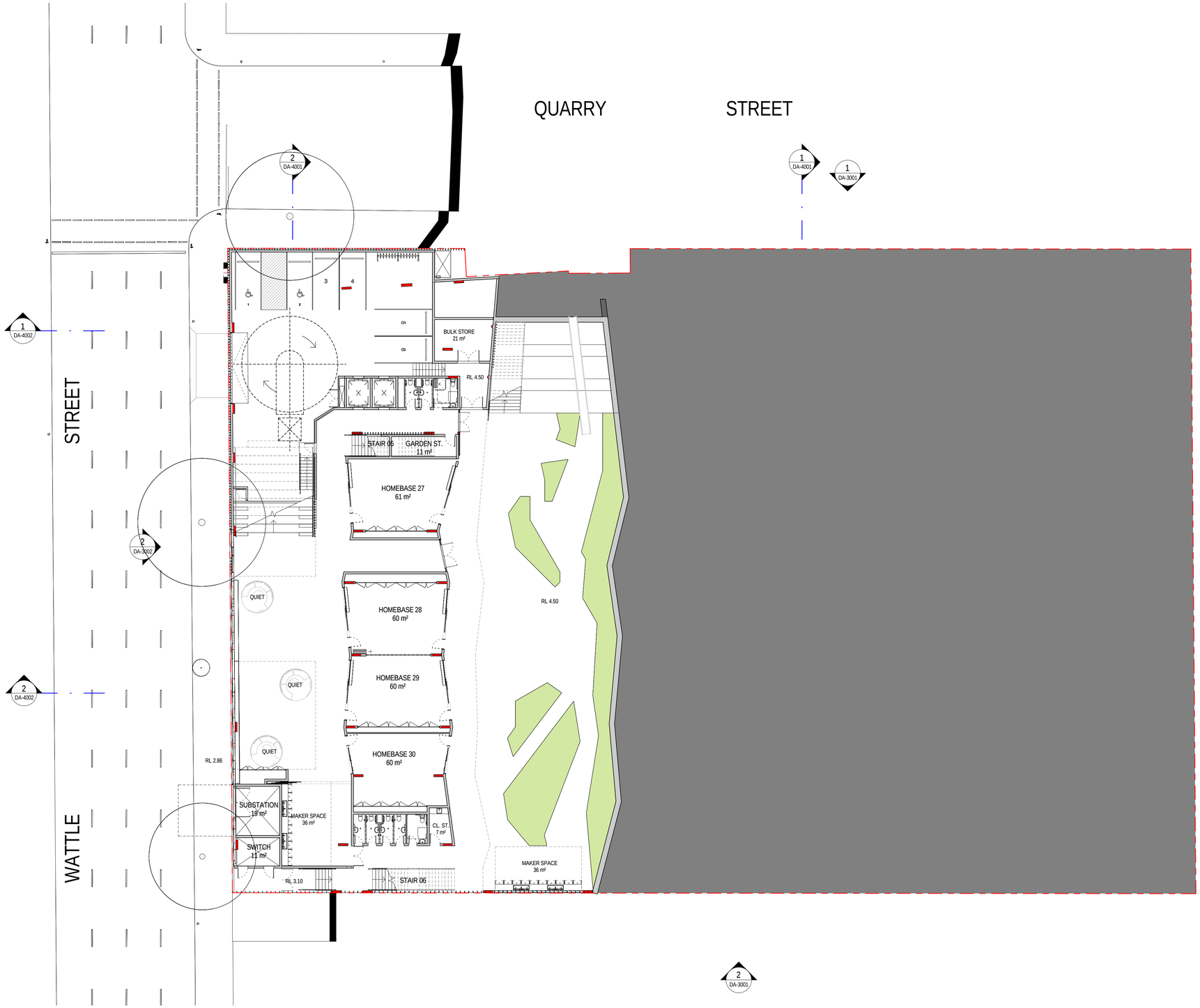
Detail for Service Trenches Beneath Landscaped Areas

NOTES:
The remediation detail and cross section are indicative only.

Reference should be made to the report text for a full understanding of this plan.

ENVIRONMENTAL INVESTIGATION SERVICES	Project Number: **E30361KH**	Title: **PROPOSED CAPPING IN LANDSCAPED AREAS**
	Figure: **5**	Address: **189 JONES STREET, ULTIMO, NSW**

Appendix A: Site Information – Development Plans



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NOMINATED ARCHITECTS:
Ghislain Coulon 4669 · Anthony Quan 5421 · Sandeep Amin 7337

No	DATE	REVISIONS	BY
1	16.12.16	TECHINCAL STAKEHOLDERS REVIEW	BD

ARCHITECTS IN ASSOCIATION
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www.designinc.com.au
Architecture Urban Design Interiors

CLIENT: DEPARTMENT OF EDUCATION

PROJECT: ULTIMO PYRMONT PUBLIC SCHOOL REDEVELOPMENT
Quarry St, Ultimo NSW

TITLE: GROUND - LOWER PLAYGROUND
GENERAL ARRANGEMENT PLAN - RL 4.60

DRAWN BY	TB
SCALES	1 : 200 @ A1
PLOT DATE	24/06/16
PROJECT N°.	S15124
REVISION	1
DRAWING N°.	DA-2301

DRAWING STATUS	REVIEWED BY	SIGNATURE	DATE
COMPETITION	BD		

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1	16.12.16	TECHINCAL STAKEHOLDERS REVIEW	BD

QUARRY STREET

STREET

JONES STREET

WATTLE STREET

HOMEBASE 22
60 m²

HOMEBASE 23
60 m²

HOMEBASE 24
60 m²

HOMEBASE 25
60 m²

HOMEBASE 26
60 m²

WET AREA
34 m²

WET AREA
34 m²

WET AREA
15 m²

STORE
6 m²

OFFICE
23 m²

QUIET

QUIET

QUIET

QUIET

VOID

VOID

VOID

STAIR 05

STAIR 06

RL 8.10

RL 8.10

RL 8.10

RL 8.10

RL 8.70

RL 8.10

RL 3.10

1 DA-4001

1 DA-3001

1 DA-4002

2 DA-4001

2 DA-3002

1 DA-3002

2 DA-4002

2 DA-3001

0 2 4 6 8 10 m

SCALE BAR - 1:200

ARCHITECTS IN ASSOCIATION
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www.designinc.com.au
Architecture Urban Design Interiors

CLIENT: DEPARTMENT OF EDUCATION

PROJECT: ULTIMO PYRMONT PUBLIC SCHOOL REDEVELOPMENT

Quarry St, Ultimo NSW

TITLE: LEVEL 01 - LIBRARY

GENERAL ARRANGEMENT PLAN - RL 8.10

DRAWN BY	TB
SCALES	1 : 200 @ A1
PLOT DATE	24/06/16
PROJECT N°.	S15124
REVISION	1
DRAWING N°.	DA-2302

DRAWING STATUS	REVIEWED	SIGNATURE	DATE
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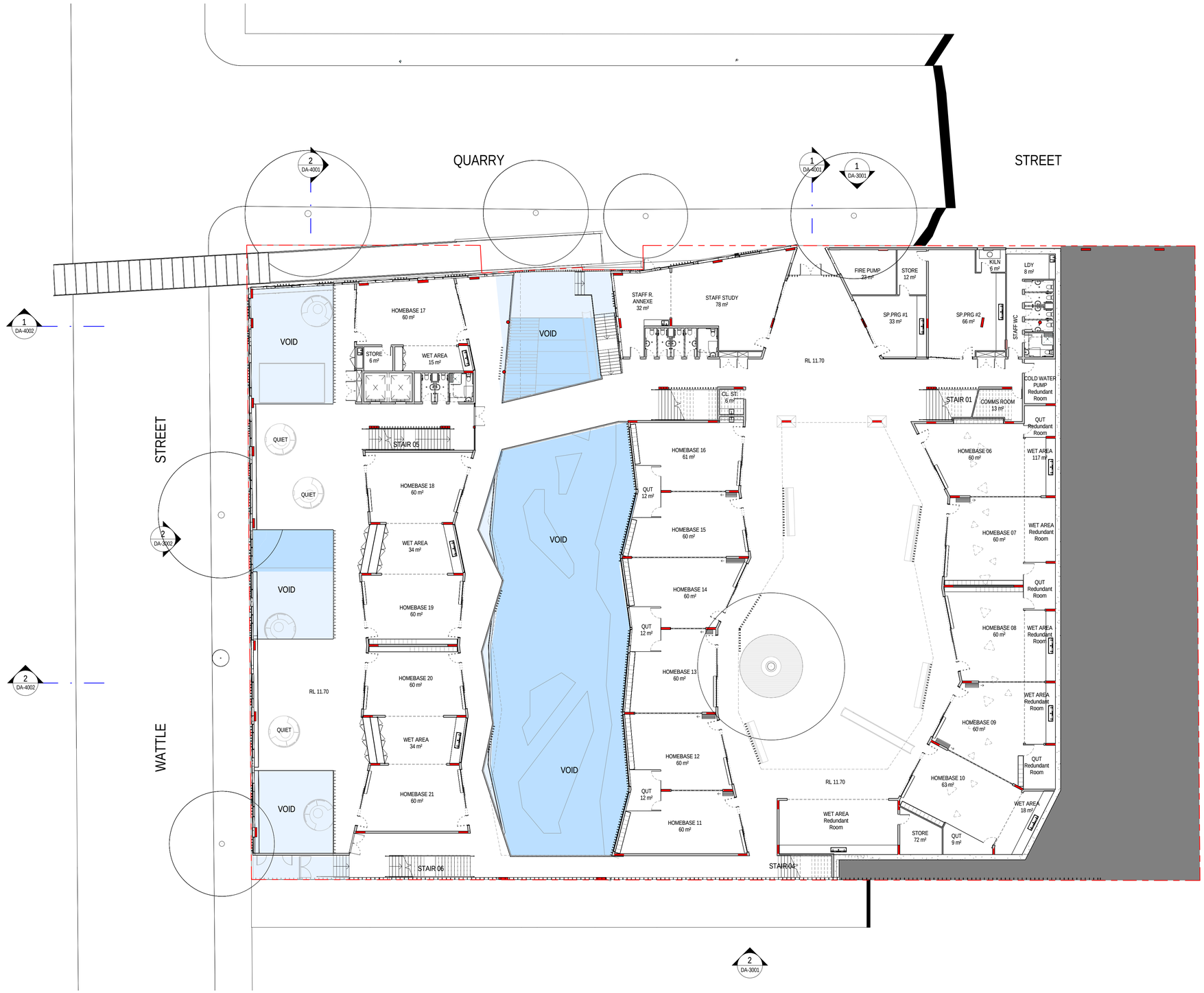

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Architecture Urban Design Interiors

CLIENT: DEPARTMENT OF EDUCATION

PROJECT: ULTIMO PYRMONT PUBLIC SCHOOL REDEVELOPMENT

Quarry St, Ultimo NSW

TITLE: LEVEL 02 - MIDDLE PLAYGROUND
GENERAL ARRANGEMENT PLAN - RL 11.70

DRAWN BY	TB
SCALES	1 : 200 @ A1
PLOT DATE	24/06/16
PROJECT N°.	S15124
REVISION	1
DRAWING N°.	DA-2303

DRAWING STATUS	REVIEWED BY	SIGNATURE	DATE
COMPETITION	BD		

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SCHEMATIC DESIGN

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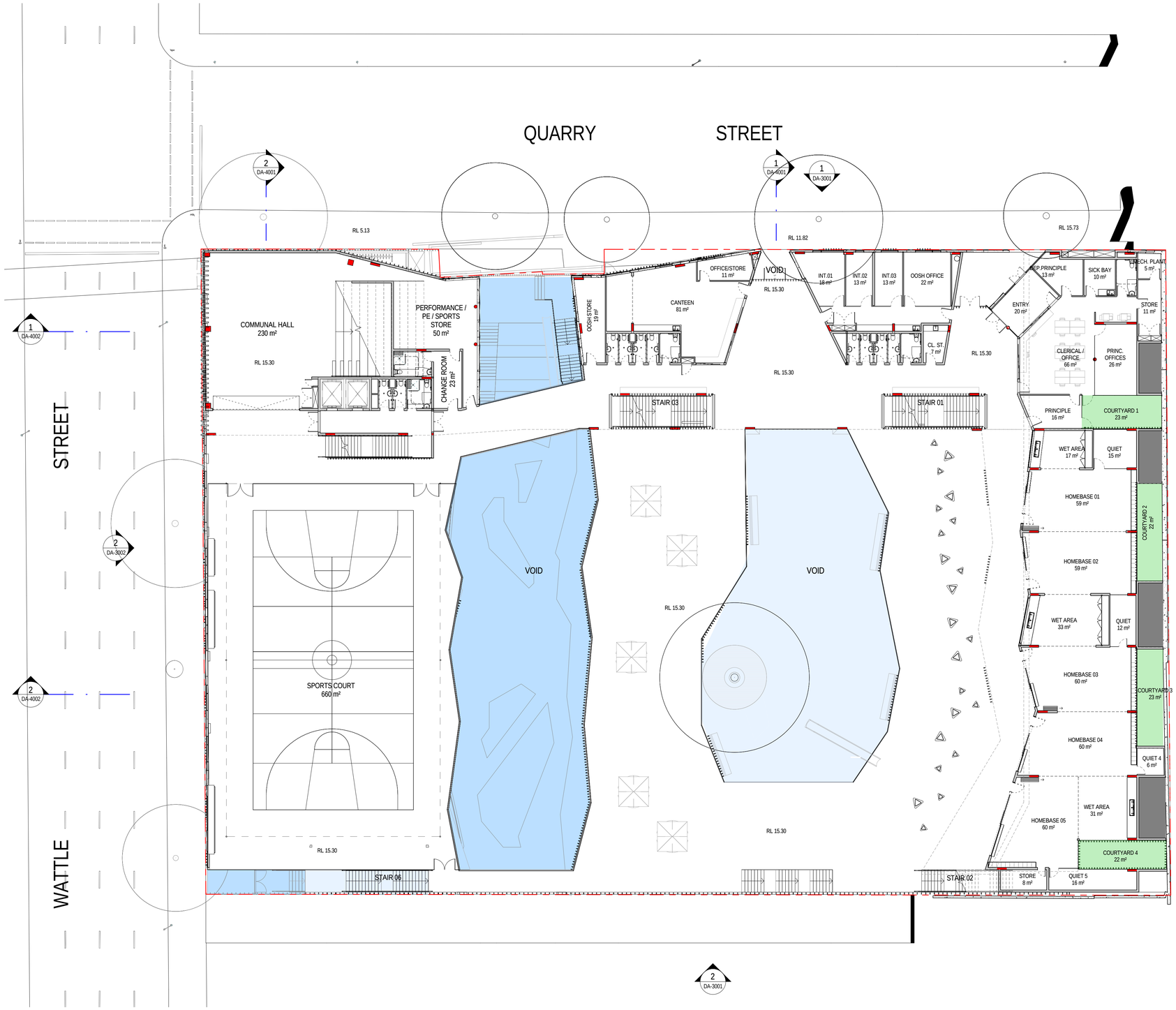

SCALE BAR - 1:200

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No	DATE	REVISIONS	BY
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www.designinc.com.au
Architecture Urban Design Interiors

CLIENT: DEPARTMENT OF EDUCATION

PROJECT: ULTIMO PYRMONT PUBLIC SCHOOL REDEVELOPMENT

Quarry St, Ultimo NSW

TITLE: LEVEL 03 - UPPER PLAYGROUND

GENERAL ARRANGEMENT PLAN - RL 16.30

DRAWN BY	TB
SCALES	1 : 200 @ A1
PLOT DATE	24/06/16
PROJECT N°.	S15124
REVISION	1
DRAWING N°.	DA-2304

DRAWING STATUS	REVIEWED BY	SIGNATURE	DATE
COMPETITION	BD		

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Ghislain Coulon 4669 · Anthony Quan 5421 · Sandeep Amin 7337

No	DATE	REVISIONS	BY
1	16.12.16	TECHINCAL STAKEHOLDERS REVIEW	BD

QUARRY

STREET

STREET

STREET

WATTLE

JONES

GARDENS

ENTRY
69 m²
RL 18.90

COLA.
512 m²

RL 18.90

SOUND +
CHAIR STORE
19 m²

STAIR 03

STAIR 01

VOID

PRE SCHOOL
PLAY R.
58 m²

WC
14 m²

CRAFT
13 m²

VOID

TODDLER
PLAY R.
37 m²

PANTRY
5 m²

STORE
5 m²

KITCHEN
12 m²

VOID

DINING ROOM
20 m²

RL 18.90
EXTERNAL
PLAY AREA
280 m²

STAFF
12 m²

STAFF
9 m²

STAFF
18 m²

REC
15 m²

INFANT PLAY
R.
40 m²

COTS
14 m²

NAP CH
9 m²

PRAMS
9 m²

VOID

VOID

VOID

RL 15.30

STAIR 02

1 DA-4001

2 DA-4001

1 DA-3001

1 DA-4002

2 DA-4002

2 DA-3002

1 DA-3002

2 DA-3001

0 2 4 6 8 10 m

SCALE BAR - 1:200

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CLIENT: DEPARTMENT OF EDUCATION

PROJECT: ULTIMO PYRMONT PUBLIC SCHOOL REDEVELOPMENT

Quarry St, Ultimo NSW

TITLE: LEVEL 04 - COLA

GENERAL ARRANGEMENT PLAN - RL 18.90

DRAWN BY	TB
SCALES	1 : 200 @ A1
PLOT DATE	24/06/16
PROJECT N°.	S15124
REVISION	1
DRAWING N°.	DA-2305

DRAWING STATUS	REVIEWED	SIGNATURE	DATE
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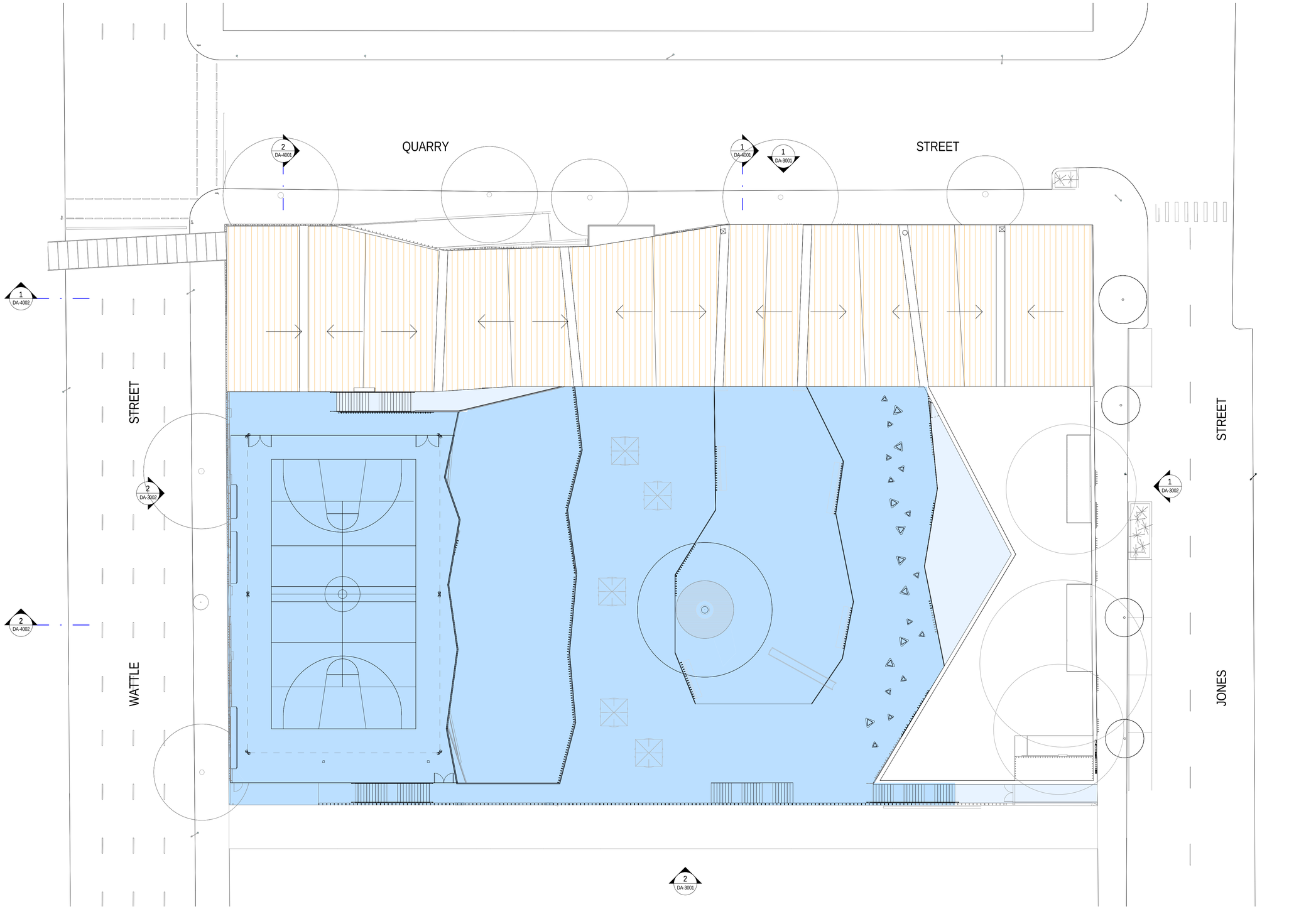

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No	DATE	REVISIONS	BY
1	16.12.16	TECHINCAL STAKEHOLDERS REVIEW	BD

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www.designinc.com.au
Architecture Urban Design Interiors

CLIENT: DEPARTMENT OF EDUCATION

PROJECT: ULTIMO PYRMONT PUBLIC SCHOOL REDEVELOPMENT

Quarry St, Ultimo NSW

TITLE: ROOF LEVEL

GENERAL ARRANGEMENT PLAN

DRAWN BY	TB
SCALES	1 : 200
PLOT DATE	24/06/16
PROJECT N°.	S15124
REVISION	1
DRAWING N°.	DA-2306

DRAWING STATUS	REVIEWED BY	SIGNATURE	DATE
DA	BD		

QUALITY CERTIFIED ISO 9001

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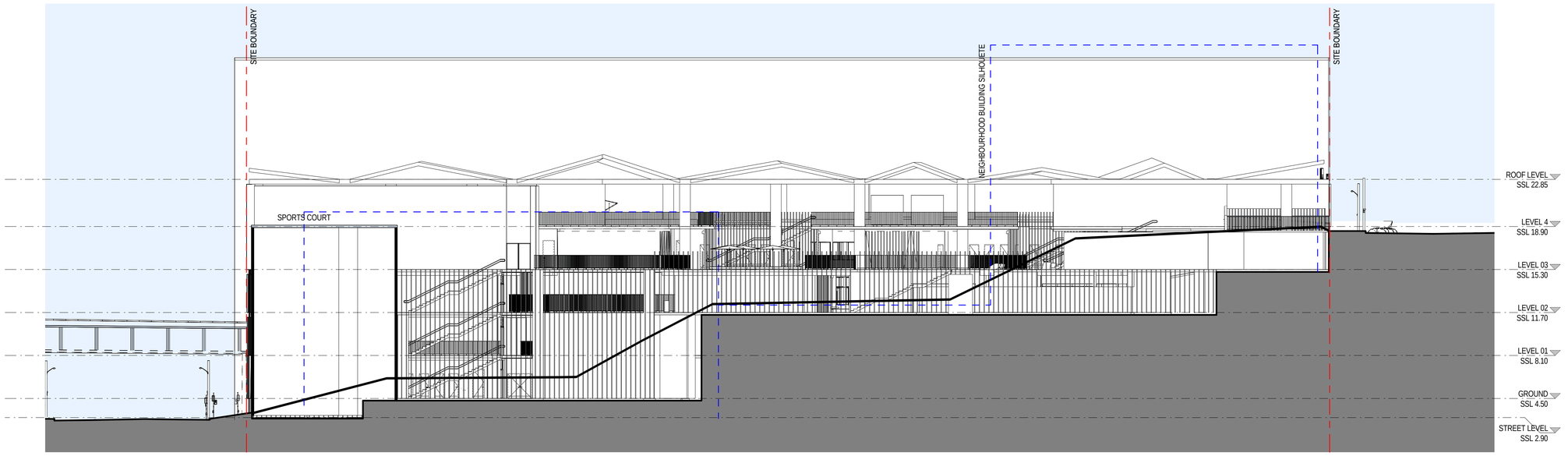
1 NORTH ELEVATION - QUARRY STREET
AR-2301 SCALE 1 : 200



2 SOUTH ELEVATION - NEIGHBOURHOOD
AR-2301 SCALE 1 : 200

0 2 4 6 8 10 m
SCALE BAR - 1:200

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Ghislain Coulon 4669 · Anthony Quan 5421 · Sandeep Amin 7337

No	DATE	REVISIONS	BY

ARCHITECTS IN ASSOCIATION
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www.designinc.com.au
Architecture Urban Design Interiors

CLIENT: DEPARTMENT OF EDUCATION

PROJECT: ULTIMO PYRMONT PUBLIC SCHOOL REDEVELOPMENT

Quarry St, Ultimo NSW

TITLE: NORTH + SOUTH ELEVATIONS

DRAWN BY	TB
SCALES	1 : 200 @ A1
PLOT DATE	02/03/17
PROJECT N°.	S15124
DRAWING N°.	DA-3001
REVISION	

DRAWING STATUS	REVIEWED BY	SIGNATURE	DATE
DA	BH		

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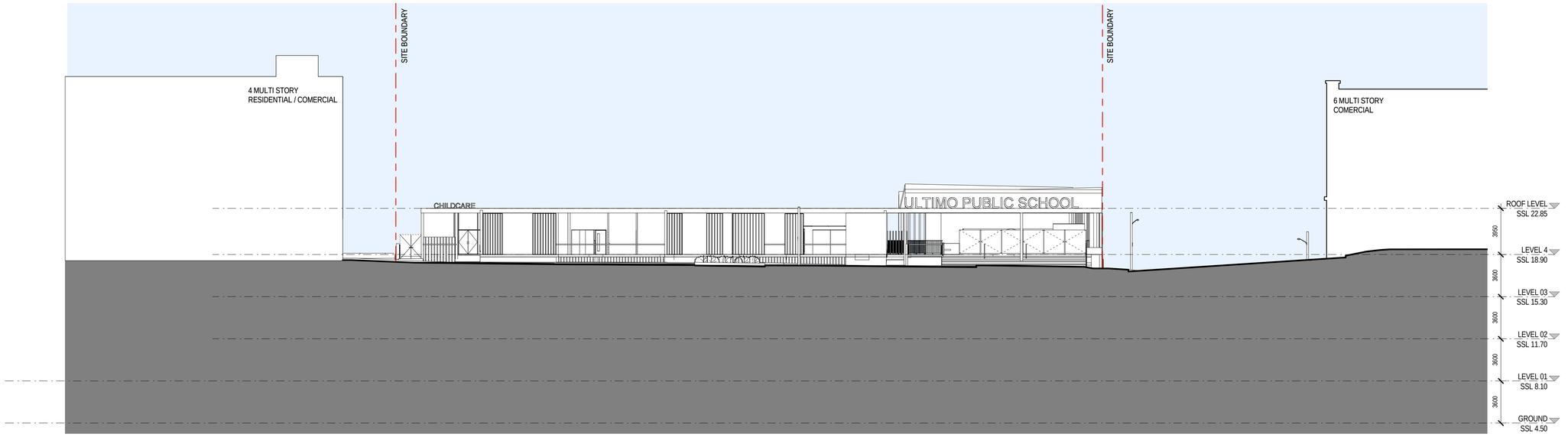
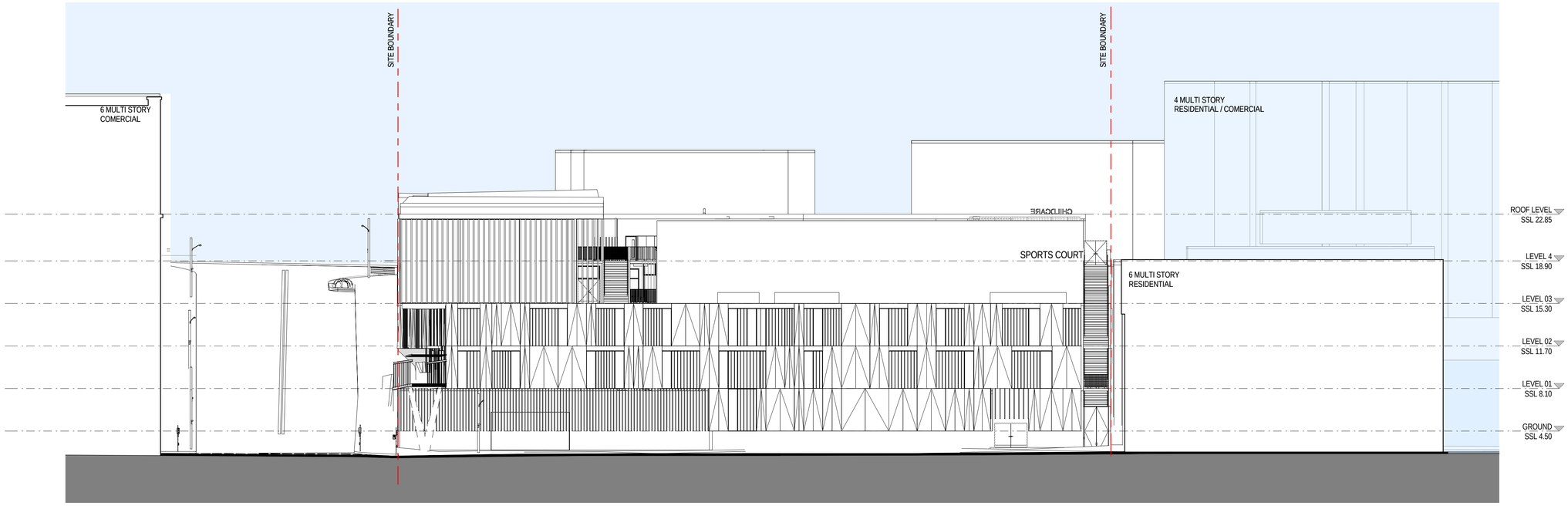


EAST ELEVATION - JONES STREET Copy 1



2 WEST ELEVATION - WATTLE STREET
AR-2301 SCALE 1 : 200

0 2 4 6 8 10 m
SCALE BAR - 1:200

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NOMINATED ARCHITECTS:
Ghislain Coulon 4669 · Anthony Quan 5421 · Sandeep Amin 7337

No	DATE	REVISIONS	BY

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CLIENT: DEPARTMENT OF EDUCATION

PROJECT: ULTIMO PYRMONT PUBLIC SCHOOL REDEVELOPMENT

Quarry St, Ultimo NSW

TITLE: EAST + WEST ELEVATIONS

DRAWN BY	TB
SCALES	1 : 200 @ A1
PLOT DATE	02/03/17
PROJECT N°.	S15124
DRAWING N°.	DA-3002
REVISION	

DRAWING STATUS	REVIEWED BY	SIGNATURE	DATE
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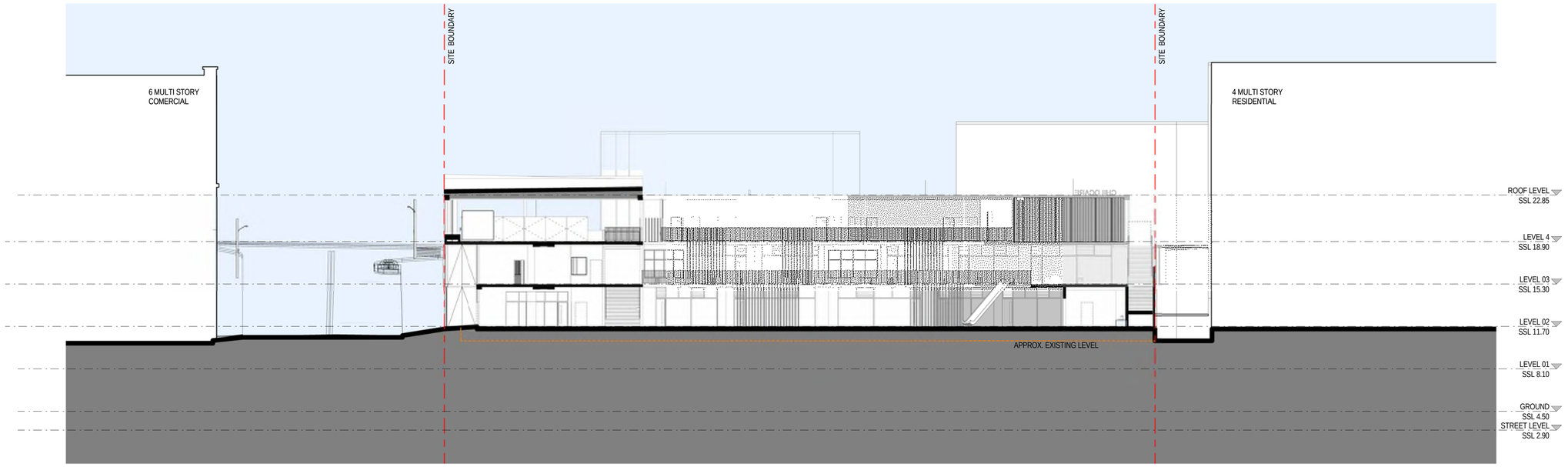
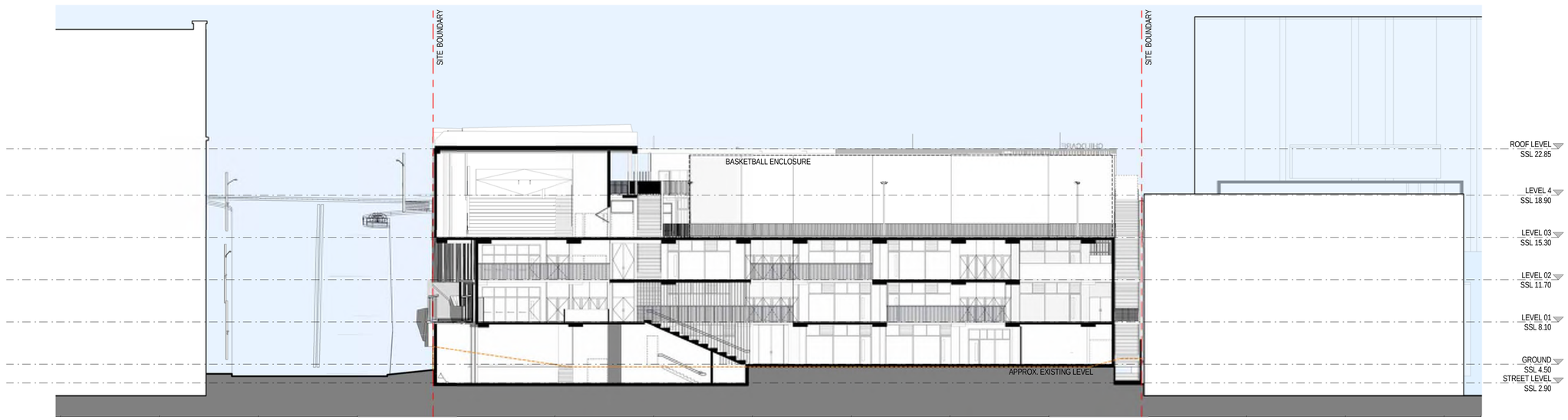


1 AR-2301 SECTION THROUGH PLAYGROUNDS
SCALE 1 : 200



2 AR-2301 SECTION THROUGH LIBRARY
SCALE 1 : 200

0 2 4 6 8 10 m
SCALE BAR - 1:200

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1	16.12.16	TECHINCAL STAKEHOLDERS REVIEW	BD

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CLIENT: DEPARTMENT OF EDUCATION

PROJECT: ULTIMO PYRMONT PUBLIC SCHOOL REDEVELOPMENT

Quarry St, Ultimo NSW

TITLE: BUILDING SECTIONS

BUILDING SECTIONS

DRAWN BY	TB
SCALES	1 : 200 @ A1
PLOT DATE	14/06/16
PROJECT N°.	S15124
REVISION	1
DRAWING N°.	DA-4001

DRAWING STATUS	REVIEWED BY	SIGNATURE	DATE
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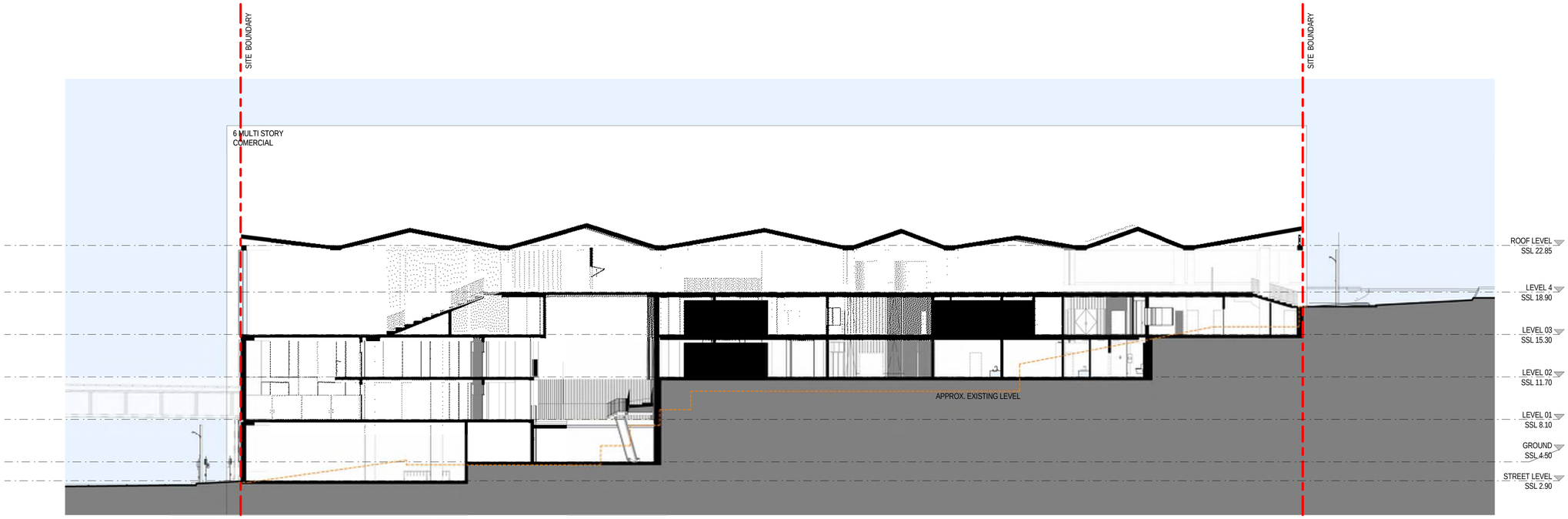
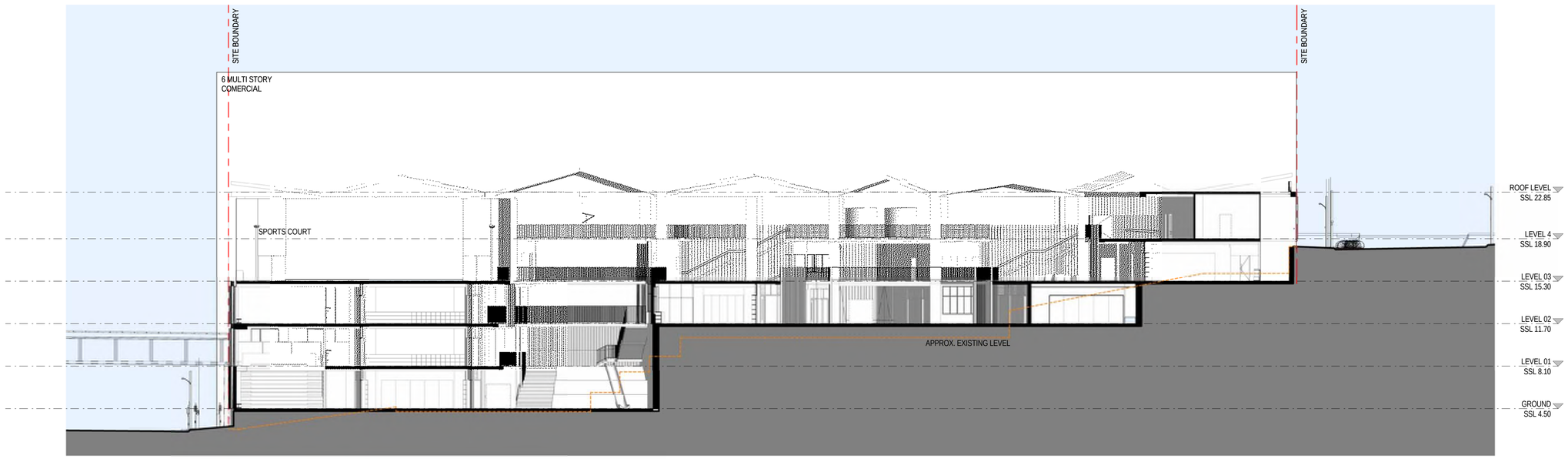


1 AR-2301 SECTION THROUGH COLA
SCALE 1 : 200



2 AR-2301 SECTION THROUGH PLAGROUNDS
SCALE 1 : 200

0 2 4 6 8 10 m
SCALE BAR - 1:200

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No	DATE	REVISIONS	BY

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CLIENT: DEPARTMENT OF EDUCATION

PROJECT: ULTIMO PYRMONT PUBLIC SCHOOL REDEVELOPMENT

Quarry St, Ultimo NSW

TITLE: BUILDING SECTIONS

DRAWN BY	TB
SCALES	1 : 200 @ A1
PLOT DATE	01/06/17
PROJECT N°.	S15124
DRAWING N°.	DA-4002
REVISION	

DRAWING STATUS	REVIEWED BY	SIGNATURE	DATE
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