ENVIRONMENTAL INVESTIGATION SERVICES

REPORT

TO

NBRS ARCHITECTURE

ON

REMEDIATION ACTION PLAN

FOR

PROPOSED SCHOOL ADDITIONS

AT

CANTERBURY SOUTH PUBLIC SCHOOL, OFF HIGH STREET, CANTERBURY, NSW

SEPTEMBER, 2018 **REPORT REF: E31040KBrpt-RAP**

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ABBREVIATIONS

AF/FA	Asbestos Fines/Fibrous Asbestos
ABC	Ambient Background Concentrations
ACL	Added Contaminant Limits
ACM	Asbestos Containing Material
ADWG	Australian Drinking Water Guidelines
AEC	Area of Environmental Concern
AHD	Australian Height Datum
ASS	Acid Sulfate Soil
BGL	Below Ground Level
BaP TEQ	Benzo(a)pyrene Toxicity Equivalent Factor
BOM	Bureau of Meteorology
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
CEC	Cation Exchange Capacity
CLM	Contaminated Land Management
CoPC	Contaminant(s) of Potential Concern
COC	Chain of Custody
CSM	Conceptual Site Model
DQI	Data Quality Indicator
DQO	Data Quality Objective
EIL	Ecological Investigation Level
EIS	Environmental Investigation Services
ESL	Ecological Screening Level
EMP	Environmental Management Plan
ENM	Excavated Natural Material
EPA	Environment Protection Authority
FCF	Fibre Cement Fragment
GAI	General Approval of Immobilisation
HIL	Health Investigation Level
HMTV	Hardness Modified Trigger Values
HSL	Health Screening Level
LCS	Lab Control Spike
LNAPL	Light Non-Aqueous Phase Liquid
NATA	National Association of Testing Authorities
NEPM	National Environmental Protection Measure
OCP	Organochlorine Pesticides
OPP	Organophosphate Pesticides
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PID	Photo-ionisation Detector
POEO	Protection of the Environment Operations
PQL	Practical Quantitation Limit
QA	Quality Assurance
QC	Quality Control
RAP	Remediation Action Plan
RPD	Relative Percentage Difference
SAC	Site Assessment Criteria
SAQP	Sampling, Analysis and Quality Plan
SSA	Site Specific Assessment
SPR	Source, Pathway, Receptor
SCC	Specific Contamination Concentration
SPT	Standard Penetration Test

ABBREVIATIONS

SWL	Standing Water Level
TB	Trip Blank
TCLP	Toxicity Characteristic Leaching Procedure
TRH	Total Recoverable Hydrocarbons
TS	Trip Spike
UCL	Upper Confidence Limit
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
VENM	Virgin Excavated Natural Material
VOC	Volatile Organic Compounds
WHO	World Health Organisation
WHS	Work Health and Safety

Units

L	Litres
mBGL	Metres BGL
m	Metres
mV	Millivolts
ml or mL	Millilitres
meq	Milliequivalents
µS/cm	micro Siemens per Centimetre
µg/L	Micrograms per Litre
mg/kg	Milligrams per Kilogram
mg/L	Milligrams per Litre
ppm	Parts Per Million
%	Percentage

EXECUTIVE SUMMARY

This report presents the Remediation Action Plan (RAP) for the proposed additions to Canterbury South Public School, off High Street, Canterbury, NSW.

The RAP has been prepared to address development consent requirements with regards to State Environmental Planning Policy No.55 – Remediation of Land (1998). EIS has previously assessed the site (Stage 1 and Stage 2) in 2017 and 2018. Remediation is required to reduce human health and environmental risks associated with the site contamination, and to render the site suitable for the proposed development.

The proposed development includes extensive alterations and additions to the existing school. Concept development plans issued to EIS for the RAP are attached in the appendices. A review of the plans indicates the following: the majority of the existing site buildings and pavements in the north and central sections will be demolished; softscape surfaces and selected trees will be removed; new one and two storey buildings (Blocks A, B, C and D) are proposed; new landscaped areas are proposed surrounding the buildings; existing playground and car park located along the north boundary will be retained; the existing games court to the south-west will be resurfaced; and new play areas and amenities are proposed.

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

The goal of the remediation is to render the site suitable for the proposed development from a contamination viewpoint. The primary aim of the remediation at the site is to reduce the human health and environmental risks posed by the site contamination to an acceptable level.

The proposed remediation approach includes a combination of strategies to achieve the remedial goal. These include:

- Excavation and off-site disposal of surficial Asbestos Containing Material (ACM) in fill detected in the north, south and west sections of the site (see EIS Figure 3 attached in the appendices);
- Excavation and off-site disposal of contaminated fill that cannot be retained on site (the volume of fill to be assessed based on final cut and fill plans); and
- Capping and long-term management of contaminated fill remaining on-site by implementing an Environmental Management Plan (EMP). Consultation with the consent authority and other project stakeholders would be required prior to proceeding with an EMP.

The RAP includes a framework for the validation assessment and reporting required to demonstrate the successful remediation of the site.

EIS are of the opinion that the site can be made suitable for the proposed development provided this RAP is implemented. A site validation report and EMP should be prepared on completion of remediation activities and should be submitted to the consent authority.

The regulatory requirements for remediation work should be discussed with the consent authority prior to the commencement of remediation.

1 INTRODUCTION

Environmental Investigation Services (EIS)[1] was commissioned by NBRS Architecture (client) to prepare a Remediation Action Plan (RAP) for the proposed additions to Canterbury South Public School, off High Street, Canterbury, NSW (the 'site'). The site location is shown on Figure 1 attached in the appendices.

The RAP has been prepared to address development consent requirements with regards to State Environmental Planning Policy No.55 – Remediation of Land (1998)[2]. EIS has previously assessed the site (Stage 1 and Stage 2) in 2017 and 2018. Remediation is required to reduce human health and environmental risks associated with the site contamination, and to render the site suitable for the proposed development. A summary of the background information from the previous reports is presented in Section 3.

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

1.1 Proposed Development

The proposed development includes extensive alterations and additions to the existing school. Concept development plans issued to EIS for the RAP are attached in the appendices. A review of the plans indicates the following:

- The majority of the existing site buildings and pavements in the north and central sections will be demolished;
- Softscape surfaces and selected trees will be removed;
- New one and two storey buildings (Blocks A, B, C and D) are proposed with the majority of the buildings to the north and south;
- New landscaped areas are proposed surrounding the buildings;
- The existing playground and car park located along the north boundary will be retained;
- The existing games court to the south-west will be resurfaced; and
- New play areas and amenities are proposed at the site.

1.2 Background

EIS and JK Geotechnics have previously prepared the following reports for the site:

- EIS (2017a), *'Report to NBRS Architecture on Hazardous Building Materials Assessment for Proposed School Additions at Canterbury South Public School - High Street, Canterbury, NSW'*, Ref: E31040Krpt-HAZ, dated 18 November 2017;

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

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

- JK Geotechnics (2017), *'Report to NBRS Architecture on Geotechnical Investigation for Proposed Additions to Canterbury South Public School at High Street, Canterbury, NSW'*, Ref: 31040SBrpt, dated 12 December 2017;
- EIS (2017b), *'Report to NBRS Architecture on Preliminary Stage 1 Environmental Site Assessment for Proposed School Additions at Canterbury South Public School, High Street, Canterbury, NSW'*, Ref: E31040Krpt, dated 20 December 2017; and
- EIS (2018), *'Report to NBRS Architecture on Stage 2 Environmental Site Assessment for Proposed School Additions at Canterbury South Public School, High Street, Canterbury, NSW'*, Ref: E31040KBrpt2, dated 3 September 2018. Issued as Draft.

The above reports should be ready in conjunction with the RAP.

1.3 Objectives

The remediation goal is to render the site suitable for the proposed development from a contamination viewpoint. The primary aim of the remediation is to reduce the human health and environmental risks posed by the site contamination to an acceptable level.

The remediation objectives are to:

- Identify any data gaps to be addressed as part of the remediation;
- Provide a validation framework for addressing the additional investigation tasks;
- Provide a methodology to remediate and validate the site;
- 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 scope of work included consultation with the client, and other stakeholders regarding the remedial options, preparation of a draft RAP for review by the client, addressing of client comments, and issue of a final RAP.

The RAP has been prepared with reference to the Guidelines for Consultants Reporting on Contaminated Sites (2011)[3], the National Environmental Protection (Assessment of Site Contamination) Measure 1999 as amended (2013)[4], SEPP55 and other guidelines made under or with regards to the CLM Act 1997.

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

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

2 SITE DESCRIPTION

2.1 Site Identification

Table 2-1: Site Identification

Site Address:	High Street, Canterbury, NSW 2193
Lot & Deposited Plan:	Part of Lot 1 DP123147, Lot 2 DP194469, Lots A & B DP312359, Lots 4 to 8 DP8350
Current Land Use:	Canterbury South Public School
Proposed Land Use:	Ongoing use as a Public School
Local Government Authority:	Canterbury-Bankstown
Zoning:	R3 – Medium density residential R4 – High density residential
Wider Property Area (m^2):	17,920 (1.79 hectares)
Development Site Area (m^2):	13,240 (1.32 hectares)
RL (AHD in m) (approx.):	11-26
Geographical Location (decimal degrees) (approx.):	Latitude: -33.91785 Longitude: 151.116007
Site Location Plan:	Figure 1
Sample Location Plan:	Figure 2
Site Contamination Data:	Figure 3

2.2 Site Location and Regional Setting

The site is located in a predominantly residential area of Canterbury. The site is bounded by High Street to the north and north-west, Napier Street to the south-west and France Street to the north-east. The site is located to the immediate north of Pat O'Connor Reserve which forms part of Lot 1 DP123147. Cup and Saucer Creek is located approximately 100m to the south of the site. Cooks River is located approximately 400m to the north-east of the site.

2.3 Topography

The site is located within a region of gently undulating terrain. The site itself slopes down towards the north-west and south-east at a general gradient of approximately 3°. Further to the south-west of the existing school buildings, the slope gradient increases to between 8 and 10° and falls towards Cup and Saucer Creek.

2.4 Site Inspection

A walkover inspection of the site was undertaken by EIS on 11 July 2018. The inspection was limited to accessible areas of the site and immediate surrounds. Selected site photographs are attached in the appendices.

A summary of the other inspection findings are outlined in the following subsections:

2.4.1 Land Use Details

The site was occupied by a primary school with single storey buildings, demountable, playgrounds and undercover areas. The north section of the site included an asphaltic concrete paved car park. A paved basketball court was located near the west site boundary.

2.4.2 Buildings, Structures and Roads

The site consisted of twelve permanent brick and concrete buildings and one semi-permanent demountable classroom. The main administration building (Block J) was constructed in 1936 with the remaining buildings constructed between 1976 and 2010. Several of the older permanent buildings contained previously identified bonded asbestos materials in the form of fibre cement sheeting.

The site contained an asphaltic concrete car park located in the north-east corner with access onto France Street and several concrete pathways between the buildings. No visible staining or extensive damage was identified.

2.4.3 Boundary Conditions, Soil Stability and Erosion

The north boundary along High Street was marked by a small brick retaining wall approximately 0.9m high. The western, southern and eastern boundaries were marked by a tall metal fence approximately 2m high. The walls and fencing appeared to be in good condition. No areas of obvious erosion or soil instability were identified.

2.4.4 Visible or Olfactory Indicators of Contamination

Several fibre cement fragments (FCF) were identified in the southern corner of the site adjacent to the demountable classroom. Representative fragments were collected for analysis (see Section 6).

2.4.5 Presence of Drums/Chemicals, Waste and Fill Material

The northern boundary along High Street was approximately 0.5m to 0.9m above the road level and retained by a brick wall. This area may have been historically filled to achieve existing levels.

2.4.6 Drainage and Services

The surface runoff was assumed to follow the general gradient of the site towards to the south-east and north-west. Several drainage pits were located across the site and were presumed to be connected to local stormwater. No major underground services were identified at the site that could provide a potential pathway for contamination.

2.4.7 Sensitive Environments

The site is located to the immediate north of Pat O'Connor Reserve which forms part of Lot 1 DP123147. Cup and Saucer Creek is located approximately 100m to the south of the site. The park and creek are considered to be sensitive environments.

2.4.8 Landscaped Areas and Visible Signs of Plant Stress

Several brick lined garden beds were located throughout the site with native and exotic species of shrubs and flowering plants. Several medium to large native trees were scattered across the site. No visual signs of dieback or stress were noted during the site inspection.

2.5 Surrounding Land Use

During the site inspection, EIS observed the following land uses in the immediate surrounds:

- North – High Street, low density residences beyond;
- South – Napier Street, Pat O'Connor Reserve beyond;
- East – France Street, low to medium density residences beyond; and
- West – High Street, low density residences beyond.

EIS did not observe any land uses in the immediate surrounds that were identified as potential contamination sources for the site.

2.6 Underground Services

A 'Dial Before You Dig' (DBYD) search previously completed by EIS in 2018 did not indicate the presence of major services (such as water or sewer mains, substations or gas mains) that would be expected to act as preferential pathways for contamination migration.

2.7 Interview with Site Personnel

A discussion with the school Principal was undertaken during the inspection. No new information pertaining to contamination was noted.

2.8 Summary of Geology and Hydrogeology

2.8.1 Geology

A review of the regional geological information completed as part of the EIS 2017b ESA indicated that the site is underlain by Ashfield Shale of the Wianamatta Group, which typically consists of black to dark grey shale and laminite and by Quaternary aged deposits of peaty quartz sand, silt, and clay with ferruginous and humic cementation in places and common shell layers (eastern section of the site).

2.8.2 Acid Sulfate Soil (ASS) Risk and Planning

A review of the ASS risk map prepared by the Department of Land and Water Conservation (1997[5]) indicates that the site is not located in an ASS risk area.

The EIS 2017b ESA indicated that the site is located within a Class 5 ASS risk area. Works in Class 5 area that could pose an environmental risk in terms of ASS include works within 500m of adjacent Class 1,2,3,4 land which are likely to lower the water table below 1m AHD on the adjacent land.

We have assessed the risk posed to the environment by ASS to the development as relatively low for the following reasons:

- The ASS risk map prepared by the Department of Land and Water Conservation indicates that the site is located within an area of no known occurrence of ASS;
- The boreholes indicate the site is underlain by a residual soil profile over sandstone bedrock. ASS are not usually associated with residual soil profiles; and
- The site is located at approximately 11-26m AHD. ASS are not usually associated with soil horizons above 5m AHD.

2.8.3 Hydrogeology

A review of the hydrogeological information completed as part of the EIS 2017b ESA indicated eleven (11) registered groundwater bores within a buffer of 2,000m of the site. In summary:

- The nearest registered bore was located approximately 682m from the site. This was utilised for domestic purposes;
- The majority of the bores were registered for monitoring purposes; and
- The drillers log information from the closest registered bores typically identified fill and/or clay soil to depths of 1.0-6.0m, underlain by sandstone or shale bedrock. Standing water levels (SWLs) in the bores were between 6-7mBGL.

[5] Department of Land and Water Conservation, (1997). *1:25,000 Acid Sulfate Soil Risk Map (Series 9130S3, Ed 2).*

The information reviewed indicates that the subsurface conditions are likely to consist of residual soils overlying relatively shallow bedrock. The potential for viable groundwater abstraction and use of groundwater under these conditions is considered to be low. Use of groundwater is not proposed as part of the development.

Considering the local topography and surrounding land features, EIS would generally expect groundwater to flow towards Cup and Saucer Creek.

2.8.4 Receiving Water Bodies

The site location and regional topography indicates that excess surface water flows have the potential to enter the Cup and Saucer Creek located approximately 100m to the south of the site. This water body is a potential receptor.

3 PREVIOUS INVESTIGATIONS

A summary of previous investigations/ assessments relevant to this RAP is discussed below.

3.1 Hazardous Building Materials Assessment, EIS 2017a

3.1.1 Objectives and Scope of Works

EIS was commissioned to complete a Hazardous Building Materials Assessment of the existing buildings for the proposed school additions. The scope of work included: detailed inspection of the existing building and structures; sampling of representative materials; documentation of inspection finds including sample location, material type, condition, friability, photographic evidence and site location; laboratory analysis of selected representative materials; and preparation of a report presenting the results of the hazardous building materials assessment.

3.1.2 Results

3.1.2.1 Asbestos Materials

Asbestos fibre containing construction materials have been identified within the interior and the exterior of the existing building and structures at the site. All asbestos materials were considered to be non-friable. Any materials presumed to contain asbestos must be treated as such.

3.1.2.2 Lead Paint

Not identified within the scope and limitations of the report.

3.1.2.3 Lead in Accumulated Dust

Elevated levels of lead (significantly above the guideline level of 8 mg/m^2) were identified at the site. In consideration of the age and former use of the site, all dust within ceiling cavities and voids throughout the building is considered to contain potentially hazardous levels of lead.

3.1.2.4 PCB Containing Electrical Equipment

Light fittings potentially housing a PCB containing metal capacitor were identified throughout the site. PCBs are a scheduled waste with strict guidelines regarding transport and handling.

3.1.2.5 SMF Materials

Sources of SMF containing materials are present as insulation material within the roof void of the building. These SMF materials were in a stable condition at the time of the site inspection.

3.1.3 Conclusions and Recommendations

The report included procedures and guidelines to be followed for the safe removal of the hazardous materials detected in the buildings. Reference should be made to the report for additional information.

3.2 Geotechnical Investigation, JK 2017

3.2.1 Objectives and Scope of Works

JK Geotechnics was commissioned to complete a geotechnical investigation for the proposed school additions. The scope of work included: drilling ten boreholes (BH1 to BH10) in accessible areas of the site to depths ranging from approximately 1.3mBGL to 2.8mBGL; dynamic cone penetration (DCP) testing at the borehole locations; groundwater observations during drilling; laboratory testing of selected samples for geotechnical parameters; and preparation of a report presenting the results of the investigation.

3.2.2 Results

Reference should be made to the JK report for a summary of the results.

3.3 Stage 1 Environmental Site Assessment, EIS 2017b

3.3.1 Objectives and Scope of Works

EIS was commissioned to complete a preliminary Stage 1 ESA for the proposed development. The scope of work included: provide an appraisal of the past site use(s) based on a review of historical records; assess the current site conditions and use via a site walkover inspection; identify potential contamination sources/ AEC and CoPC; assess the soil contamination conditions via implementation of a preliminary sampling and analysis program; prepare a CSM; assess the potential risks posed by contamination to the receptors identified in the CSM (Tier 1 assessment); provide a preliminary waste classification for off-site disposal of soil; assess whether further intrusive investigation and/or remediation is required; and assess the potential for acid sulfate soil (ASS) at the site.

The ESA included a desktop site history assessment and soil sampling from ten geotechnical boreholes. The historical assessment identified the following potential sources of contamination/ AEC: fill; use of pesticides; hazardous building materials; and an off-site former mechanics.

3.3.2 Results

Contaminants encountered during the investigation included:

- One elevated concentration of TRH C_{10}-C_{16} (F2) was detected above the Health Screening Levels (HSL) in one soil sample;
- Elevated concentrations of zinc, TRH C_{10}-C_{16} (F2) and C_{16}-C_{34} (F3) were detected above the Ecological guidelines in one soil sample; and
- The site inspection identified several Fibre Cement Fragments (FCF) in the southern section. One representative sample was collected (HLF1) and analysed which contained asbestos.

3.3.3 Conclusions and Recommendations

The report concluded that it was technically feasible for the site to be made suitable for the proposed development provided that the following recommendations were implemented to address the data gaps and to manage the risks:

- Undertake a Stage 2 ESA to address the data gaps identified in the report. Including additional boreholes for soil sampling, groundwater monitoring and an asbestos quantification assessment to adequately characterise the risk;
- Update the Asbestos Management Plan to take into account the findings of this investigation and any future investigations;
- After the detailed Stage 2 ESA has been prepared, a RAP should be prepared to outline remedial measures for the site (when detailed proposed development plans become available); and
- Prepare a Validation Assessment (VA) report on completion of remediation.

3.4 Stage 2 Environmental Site Assessment, EIS 2018

3.4.1 Objectives and Scope of Works

EIS was commissioned by the client to complete a Stage 2 ESA for the proposed development at the site. The aim of the assessment was to characterise the contamination conditions previously identified at the site by EIS in 2017; assess the risk posed by contamination to the receptors; facilitate the preparation of a Remediation Action Plan (RAP); and provide a preliminary waste classification for the off-site disposal of soil.

The Stage 2 ESA included: soil sampling from additional boreholes drilled at the site; asbestos quantification from fifty (50) sampling locations; groundwater monitoring from three wells installed at the site; and laboratory analysis of selected soil, asbestos and groundwater samples obtained during the assessment.

Selected fill and natural soil samples and fibre cement fragments (FCF) were analysed for a range of contaminants including asbestos. The results of the testing were assessed against the site assessment criteria (SAC) outlined in NEPM 2013. The most sensitive land use criteria 'Residential with accessible soils' was adopted for the SAC.

3.4.2 Results

3.4.2.1 Subsurface Conditions

- Asphaltic concrete (AC) or concrete pavement was encountered at the surface;
- Fill was detected over the entire site and ranged in depth from approximately 0.2mBGL to a maximum of 2mBGL. Fill contained inclusions of igneous, sandstone, ironstone gravel; root fibres; plastic; ash; slag, wood; concrete; glass; clay nodules; brick, tile, ceramic and metal fragments;
- Natural soil was detected beneath the fill in thirty-four (34) locations, sandstone bedrock was detected in thirty-three (33) locations; and

- Standing water level (SWL) was measured in the monitoring wells installed at the site on 18 and 25 July 2018. The SWL in the wells ranged from approximately 3.2mBGL to 4.76mBGL.

3.4.2.2 Soil Contamination Results

Elevated concentrations of contaminants were encountered in the fill soil samples. The site contamination data that exceeded the health-based Site Assessment Criteria (SAC) are shown on Figure 3 in the appendices. A summary of the elevations is outlined below:

- Fill samples BH111 (0-0.2m) and BH149 (0-0.2m) detected lead concentrations of 420mg/kg and 350mg/kg respectively, above the HIL-A SAC. The results were below 250% of the SAC for lead;
- Fill samples BH142 (0-0.2m) and BH150 (0-0.1m) detected TRH F2 concentrations of 120mg/kg and 230mg/kg respectively, above the HSL-A SAC. The results were below 250% of the SAC for TRH F2;
- Fill sample BH142 (0-0.2m) detected TRH F3 concentration of 360mg/kg above the ESL-URPOS SAC. Fill sample BH150 (0-0.1m) detected TRH F2 and F3 concentrations of 230mg/kg and 1100mg/kg respectively, above the ESL-URPOS SAC;
- Fill sample BH118 (0-0.2m) detected carcinogenic PAHs concentrations of 8mg/kg above the HIL-A SAC. The result was greater than 250% of the SAC of 3mg/kg; and
- FCF sampled during the field work was tested for asbestos. Asbestos was detected in all of the FCF samples.

3.4.2.3 Statistical Analysis

Statistical calculations were undertaken on the results using ProUCL (Version 5.1). A summary of the results are as follows:

- Statistical calculations were computed on forty-two individual fill lead results. The standard deviation (SD) was 94.5 mg/kg, less than 50% of the lead SAC of 300 mg/kg. The 95% UCL on the mean lead result was 105.2 mg/kg, below the SAC of 300 mg/kg; and
- Statistical calculations were computed on forty-two individual fill carcinogenic PAHs results. The standard deviation (SD) was 1.2 mg/kg, less than 50% of the SAC of 3 mg/kg. The 95% UCL on the mean carcinogenic PAHs result was 1.03 mg/kg, below the SAC of 3 mg/kg.

3.4.2.4 Groundwater Contamination Results

Groundwater sample MW143 detected a copper result of 2µg/L above the ecological SAC. All groundwater samples MW101, MW142 and MW143 detected zinc values ranging from 22µg/L to 44µg/L above the ecological SAC. The source of lead and zinc in the groundwater could be associated with the leaching of metals from the fill or urban background sources. As groundwater will not be used as a resource at the site, it does not pose a risk to site receptors.

3.4.3 Conclusions to the Stage 2 ESA

The Stage 2 ESA concluded that the site contamination posed a risk to site receptors and needed remediation to make the site suitable for the proposed school development.

4 REVIEW OF CONCEPTUAL SITE MODEL

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

A review of the CSM in relation to source, pathway and receptor (SPR) linkages has been undertaken as part of the Tier 1 risk assessment process and summarised below.

4.1 Contaminant of Concern and SPR Linages

The Stage 2 ESA identified contaminants of concern (CoC) in the fill which pose a risk to site receptors. The main CoC identified include: asbestos, lead, carcinogenic PAHs, and TRH F2 and F3 fractions. The CoC and SPR linkages are presented in the following table:

Table 4-1: CoC and SPR Linkages – Soil Contamination

CoC	Receptor		Pathway	Potential Risk
Lead and Carcinogenic PAHs	Human	On-site workers	Inhalation of dust, dermal contact, ingestion	**There is a SPR linkage due to exposure during on-site works.** This will need to be managed by site remediation.
		Current Occupants		**There is a SPR linkage due to exposure by direct contact.** The CoC was detected at the surface increasing the risk of exposure by direct contact. This will need to be managed by site remediation.
		Future Occupants		The SPR linkage will be addressed by site remediation. Post remediation, the CoC is not considered to pose a risk.
	Ecology	Flora	Root zone contact	**There is a SPR linkage due to exposure by root contact.** This will need to be managed by site remediation.
		Fauna	Ingestion, dermal contact	**There is a SPR linkage due to exposure by direct contact.** The CoC was detected at the surface increasing the risk of exposure by direct contact. This will need to be managed by site remediation.

CoC	Receptor		Pathway	Potential Risk
Asbestos	Human	On-site workers	Inhalation of dust, dermal contact, ingestion	**There is a SPR linkage due to exposure during on-site works.** This will need to be managed by site remediation.
		Current Occupants		**There is a SPR linkage due to exposure by direct contact.** Asbestos was detected at the surface increasing the risk of exposure by direct contact. This will need to be managed by site remediation.
		Future Occupants		The SPR linkage will be addressed by site remediation. Post remediation, the CoC is not considered to pose a risk.
	Ecology	Flora	Root zone contact	Not applicable for this CoC.
		Fauna	Ingestion, dermal contact	Not applicable for this CoC.
TRH F2 and F3	Human	On-site workers	Inhalation of vapours, dermal contact, ingestion	**There is a SPR linkage due to exposure during on-site works.** This can be managed by site remediation and management.
		Current Occupants		**There is a SPR linkage due to direct contact.** This will need to be managed by site remediation. The potential for soil vapour generation is considered to be low as the contamination was confined to the surficial fill soil in the vicinity of BH8 and BH150. This area is currently grassed and open to the ambient atmospheric conditions. Considering the low detections of TRH, it is not considered to pose an on-site vapour risk.
		Future Occupants		The SPR linkage will be addressed by site remediation. Post remediation, the CoC is not considered to pose a risk.

CoC	Receptor		Pathway	Potential Risk
	Ecology	Flora	Root zone contact	**There is a SPR linkage due to exposure by root contact.** This will need to be managed by site remediation.
		Fauna	Ingestion, dermal contact	**There is a SPR linkage due to exposure by direct contact.** Lead was detected at the surface increasing the risk of exposure by direct contact. This will need to be managed by site remediation.

4.2 Contamination Source and Mechanism

4.2.1 Source of Contamination, Fate and Transport Mechanism

The source of the PAHs and lead contamination in the fill is considered to be the ash, slag and other inclusions detected in the fill matrix. The site history has not identified any on-site sources of these CoC other than fill. The site was developed prior to 1930. Historical filling of the site is likely to have occurred in the early 1900's, prior to construction of buildings. Slag and ash was frequently used as fill material during this period in Sydney. The slag and ash may have originated from various metal processing industries and from coal burning, respectively.

The elevated TRH (F2 and F3) concentrations are likely to be associated with a localised spill of petroleum containing compounds. The TRH was detected in the surface fill at BH142 and BH150. The deeper natural soil samples were not impacted by this CoC.

Asbestos in the form of FCF was detected at numerous locations as shown on Figure 3. The asbestos could have originated from the demolition of former buildings containing this CoC or imported along with the fill material.

The contamination is likely to be widespread throughout the fill soils. Taking into account the age of the fill and the topography it is likely that the majority of soluble contaminants could have leached out over the intervening years leaving the more insoluble component behind. The TRH F2/F3 fraction is likely to consist principally of the more hydrophobic degradation resistant hydrocarbons which will be strongly bound to soil particles.

The potential transport mechanisms for migration include:

- Fill material – top-down impacts e.g. placement of fill, leaching from surficial material and/or sub-surface release (e.g. impacts from buried material);
- Fuel – top-down, spills (e.g. during filling and usage of products from drums), or sub-surface release (e.g. from leaking drums);

- Hazardous building materials – top-down e.g. demolition resulting in surficial impacts in unpaved areas; and
- Vapour intrusion into the proposed basement and/or building (either from soil contamination or volatilisation of contaminants from groundwater).

4.2.2 Affected Media

At this stage, soil has been identified as potentially affected media requiring remediation.

4.2.3 Presence of Preferential Pathways for Migration

Soil vapour has the potential to migrate through services and enter buildings through service backfill. Vapour can also enter buildings through cracks, joins and other damaged areas.

4.2.4 Data Gaps

The EIS 2018 ESA was designed to gain full site coverage. Some areas beneath buildings were not accessible as the site was occupied by the school. Any unexpected finds will be addressed as outlined in this RAP.

5 REMEDIATION EXTENT

5.1 Remediation Requirement

The review of the CSM (see Section 4) has identified the following CoC that require remediation:

- Lead in soil - potential to impact current occupants, on-site workers and ecological receptors;
- Asbestos – potential to impact current occupants, and on-site workers;
- TRH F2 and F3 in soil - potential to impact current occupants, on-site workers and ecological receptors; and
- Carcinogenic PAHs in soil - potential to impact current occupants, on-site workers and ecological receptors.

The risk posed by the CoC (like asbestos) should be addressed as a priority considering the sensitive nature of the land use (primary school). As a duty of care, we recommend raking and picking of asbestos from the surface to be undertaken as soon as possible. This should be followed by a surface clearance from an Asbestos Assessor as outlined in Section 7.

At this stage, soil has been identified as potentially affected media. The potential for soil vapour generation is considered to be low as the contamination was confined to the surficial fill soil in the vicinity of BH8 and BH150. This area is currently grassed and open to the ambient atmospheric conditions. Considering the low detections of TRH, it is not considered to pose an on-site vapour risk.

Marginal elevations of lead and zinc were detected in the groundwater. The source of this contaminant could be associated with the leaching of metals from the fill or urban background sources. EIS understand that groundwater will not be used as a resource at the site and hence does not pose a SPR linkage.

5.2 Remediation Extent - Soil Contamination

The contamination is likely to be widespread through the fill soils across the site. The fill extends from the surface to depths of approximately 1.3mBGL in the north section to 2mBGL in the north-west section (see Figure 3 attached in the appendices). Fill contains inclusions of ash, slag, wood, metal, bricks and gravel. Asbestos Containing Material (ACM) was detected at the surface in many areas as shown on Figure 3.

5.3 Areas Excluded from this RAP

The school extends further to the south and south-east towards Cup and Saucer Creek. This section of the school has previously not been investigated and hence not included in this RAP.

6 REMEDIATION OPTIONS

6.1 Soil Remediation Options

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

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

Or if the above are not practicable:

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

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

In addition to the above, important considerations in assessing the acceptability of an asbestos remediation proposal (WA DoH 2009) includes:

1. Minimisation of public risk;
2. Minimisation of contaminated soil disturbance; and
3. Minimisation of contaminated material/soil moved to landfill.

6.2 Consideration of Remediation Options

Table 6-1: Consideration of Remediation Options

Option	Discussion	Applicability
Option 1 On-site treatment of contaminated material	The costs associated with on-site treatment of contaminants identified at the site is considered to be very expensive, time consuming and not viable for the development. Contaminants identified in the soil include lead; asbestos; PAHs; and TRH. Lead, PAHs and asbestos are difficult to treat on-site as they do not breakdown easily. Considering the costs associated with on-site treatment and the nature of the CoC, this option is not considered to be viable for the remediation. Bioremediation of soil impacted by TRH is not considered viable as the TRH is most likely associated with ash and slag in the fill. No on-site TRH source was identified. Bioremediation is viable for light fraction TRH compounds.	This approach is not applicable for the CoC.
Option 2 Off-site treatment of contaminated material	Contaminated soils are excavated, transported to an approved/ licensed treatment facility, treated to remove/stabilise the contaminants then returned to the subject site, transported to an alternative site or disposed to an approved landfill facility. This option provides for a relatively short program of on-site works, however there may be some delays if the material is to be returned to the site following treatment and regulatory requirements would need to be carefully considered. The cost per tonne for transport to and from the site and for treatment is considered to be relatively high. The material would also have to be assessed in terms of suitability for reuse as part of the proposed development works.	Not applicable for the site considering the regulatory requirements and the combination of contaminants that need to be remediated in soil (PAHs, asbestos and lead).

Option	Discussion	Applicability
Option 3 Consolidation and isolation of contaminated material 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 surface of the fill to isolate the contaminated material and thereby reduce the health risk to future site users. 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, including the Section 10.7 Council planning certificate (or other appropriate notification mechanism), would be modified to note the presence of the contamination/EMP. This may impact upon development approval conditions, place restrictions on the use of the land.	Cap and containment is a viable option for the site to address the CoC. This option will require approval from council for capping and managing contamination on-site via an EMP.
Option 4 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 an appropriately licensed facility. 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.	Excavation and off-site disposal is a viable option for the site to address the CoC. However, EIS understand that the client wishes to retain as much soil on-site if possible.

6.3 Preferred Remediation Options and Rationale

The preferred remediation options for the site are summarised in this section. The remediation options are based on the current available information.

Table 6-2: Preferred Remediation Options and Rationale

Remediation Area	Preferred Remediation Option	Rationale
Surface ACM – North and south sections (see Figure 3 in appendices)	Option 4 – excavation and off-site disposal	• ACM detected at the fill surface should be removed and disposed off-site; • The ACM removal will require appropriate handling and clearances in accordance with an Asbestos Management Plan (AMP); and • On-site treatment of the CoC is not economically viable.
Fill impacted by CoC – North and south sections (see Figure 3)	Option 4 – excavation and off-site disposal Or Option 3 – cap and contain	• On completion of the above, the impacted fill can either be excavated and disposed off-site or capped and contained on-site. The success of capping would depend on how much cut and fill earthworks is proposed for the development; • Capping will limit exposure to site receptors; and • Any remaining natural material should be sampled to assess the presence of cross contamination from overlying fill.

6.4 Preliminary Waste Classification of Fill

The fill impacted by CoC has been classed as General Solid Waste (non-putrescible) containing Special Waste (asbestos). The remaining fill is classed as General Solid Waste (non-putrescible). Additional testing for waste classification should be undertaken during remediation.

Fill should only be disposed of to a facility that is appropriately licensed to receive this waste stream. The facility should be contacted to obtain the required approvals prior to commencement of excavation.

7 REMEDIATION DETAILS

7.1 Roles and Responsibilities

The two primary roles under the RAP include the validation consultant and the remediation contractor. The validation consultant should be engaged to implement the validation plan outlined in this RAP. It would be prudent to select a consultant that is a Certified Environmental Practitioner (Site Contamination Specialist) under the Environment Institute of Australia and New Zealand scheme.

The remediation contractor should be engaged to carry out the remediation tasks required under this RAP. The role of the contractor is to remediate the site in accordance with the remediation methods and the validation consultant's advice, apply for any necessary permits/licenses required for remediation, retain all necessary documentation for waste disposal, imported materials etc, and to keep the validation consultant informed regarding the progress of the site works and any unexpected finds.

7.2 Sequence of Works

EIS anticipate the following sequence of work for the project (in the context of the remediation):

1. Preparation of an AMP for the remediation works;
2. Remediation of Surface ACM in the north and south sections;
3. Validation of remediated areas;
4. Remediation of remaining impacted fill by either excavation and off-site disposal or capping;
5. Validation of excavations and capping;
6. Reinstatement/backfilling of the remedial excavations (if required), including validation of imported materials; and
7. Preparation of a validation report.

7.3 Initial Site Preparation

Prior to commencement of remediation, appropriate steps should be taken to implement the *Site Management Plan for Remediation Works* (Section 10). All remediation is to be undertaken in accordance with the Safe Work Australia How to Safely Remove Asbestos Code of Practice (2016)[6].

7.4 Remediation of Surficial ACM

The remediation details are outlined in the following table:

[6] Safe Work Australia, (2016). *How to Safely Remove Asbestos Code of Practice* (referred to as Safe Work Australia 2016)

Table 7-1: Remediation Details – Surficial Fill impacted by ACM

Step	Procedure
1.	<u>Establish asbestos related controls and arrange licenses and tracking requirements</u> Prior to the commencement of remediation works: • The area should be inspected by an Asbestos Assessor to assess the extent of ACM; • Notification of bonded asbestos removal should be submitted to SafeWork NSW by the remediation contractor (who must have a Class B asbestos removal license); • Register with NSW EPA WasteLocate for the transport of asbestos waste. Other notifications may also be required depending on the waste classification of the fill; • An asbestos removal control plan should be prepared by the remediation contractor for the works required. This should include details for WHS and personal protective equipment (PPE), which as a minimum should include requirements for wearing safety helmets and steel capped boots, disposable coveralls rated type 5 category 3 (prEN ISO 13982–1) or equivalent, P2 masks conforming to the requirements of AS/NZS 1716:2009, and use of appropriate gloves; and • The existing in-grounds AMP should be reviewed and implemented as required. The asbestos removal control plan is to be reviewed by the validation consultant prior to commencement.
2.	<u>Removal of ACM from surficial fill:</u> Remediation will be undertaken as follows: • Peg out the horizontal extent of the remediation areas using a tape measures; • The ACM impacted fill could also extend beneath existing buildings. This should be checked on demolition of the buildings; • The impacted area should be divided into smaller grids (10m) marked with pegs and warning tape; • The surface fill should be racked by the asbestos contractor in passes to cover the entire grid. All visible ACM should be collected and bagged for off-site disposal; • Racking should be undertaken under the guidance of the asbestos assessor by the asbestos removal contractor, and in accordance with the asbestos removal control plan; • Load the ACM onto trucks (lined with plastic and leak-proof) and dispose off-site to a licensed facility in accordance with the assigned waste classification; and • Validate the grid in accordance with Section 8.
3.	<u>Capping of contaminated fill:</u> The contaminated fill will be capped as per the details outlined in Section 7.5. EIS understand that the surface in many sections of the site will be paved for the new development which will act as the capping layer. If reinstatement of the area is required, clean (validated) material can be used for reinstatement. Validation requirements for imported material are outlined in Section 8.

7.5 Remediation of Contaminated Fill

EIS understand that the client may wish to retain contaminated fill on site. Based on the final cut to fill levels, some amount of fill will require off-site disposal. The remaining fill will be capped onsite as detailed in this section.

The existing building and future buildings will form an integral part of the capping strategy. EIS recommend the client and other relevant stakeholders engage early with the consent authority to ensure the conditions of consent align with the RAP requirements (e.g. remediation under this RAP cannot be completed prior to the Construction Certificate, however the remediation and validation can be completed prior to the Occupation Certificate).

The specific remediation details are described in the table below:

Table 7-2: Remediation Details – Contaminated Fill

Step	Procedure
1.	Establish asbestos related controls and arrange licenses and tracking requirements The ACM visible at the surface of the fill will be removed as outlined in Step 1 of Table 7-1. Prior to the commencement of any excavation of contaminated fill, the following should be completed: • The area should be inspected by an Asbestos Assessor; • Notification of bonded asbestos removal should be submitted to SafeWork NSW by the remediation contractor (who must have a Class B asbestos removal license); • Register with NSW EPA WasteLocate for the transport of asbestos waste. Other notifications may also be required depending on the waste classification of the fill; • An asbestos removal control plan prepared in Step 1 of Table 7-1 should be reviewed and updated as required. This should include details for WHS and personal protective equipment (PPE), which as a minimum should include requirements for wearing safety helmets and steel capped boots, disposable coveralls rated type 5 category 3 (prEN ISO 13982–1) or equivalent, P2 masks conforming to the requirements of AS/NZS 1716:2009, and use of appropriate gloves; and • The existing in-grounds AMP should be reviewed and implemented as required. The asbestos removal control plan is to be reviewed by the validation consultant prior to commencement.
2.	Excavation and Off-site Disposal of Contaminated Fill: Excavation and off-site disposal of excess fill (that cannot be capped) will be undertaken as follows: • Peg out the horizontal extent of the remediation areas using a GPS unit with a horizontal accuracy of <1m; • Excavate the fill to the full extent of remediation under the guidance of the validation consultant and asbestos removal contractor, and in accordance with the asbestos removal control plan; • Load the fill onto trucks (lined with plastic and leak-proof) and dispose off-site to a licensed facility in accordance with the assigned waste classification; and • Validate the excavation in accordance with Section 8.
3.	Review of Proposed Capping Design and Adjustment of Site Levels: The contaminated fill remaining on site will require capping as outlined below. The contractor should undertake a review of the minimum acceptable capping standards outlined in Step 5. In the event that the site levels need to be reduced in order to achieve these standards, a waste classification should be undertaken for the material to be excavated.

Step	Procedure
	The material should subsequently be excavated and disposed off-site with additional waste classification as outlined in Step 3. The preliminary waste classification for the fill material is Special Waste General Solid Waste (GSW) (non-putrescible). Additional testing will be required to confirm this classification.
4.	Site Preparation and Surface Clearance: Once the initial site levels are achieved and the site has been prepared to facilitate the remediation and construction activities, the ground surface should be inspected and any visible fragments of fibre cement/ACM should be picked from the surface, double bagged and disposed of to a licensed facility. A surface clearance inspection for visible asbestos materials should subsequently be undertaken by a licensed asbestos assessor. A clearance certificate should be provided for inclusion in the validation report.
5.	Capping Procedures: The following are considered to be the minimum acceptable capping standards for the purpose of remediation: • Existing paved areas that will remain largely undisturbed – no action required; • Unpaved areas including landscaped or grassed areas with shallow plantings, turf and/or rubber soft fall – visual marker layer comprising geogrid (e.g. TriAx) and geofabric[7] over the contaminated fill, overlain by a minimum of 0.3m 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 a visual marker layer comprising geofabric over the contaminated fill. Areas where no trees are to be planted can include the marker layers and 0.5m of clean soil as noted above. The root ball of the tree should be approximately 0.5m above the marker layer; • New continuous hardstand areas, including areas beneath the building slab, paved walkways and new paved ramps – visual marker layer comprising geofabric over the contaminated fill, overlain by pavement materials; • New play areas – visual marker layer comprising geogrid (e.g. TriAx) and geofabric[8] over the contaminated fill, overlain by a minimum of 0.3m of clean (validated) soil. Synthetic play surfaces can form the capping layer; • New raised/suspended walkways or areas beneath raised/suspended balconies (assuming there is no accessible crawlspace beneath the walkways/balconies) – visual marker layer comprising geogrid and geofabric over the contaminated fill. If the marker layer is not visible and does not pose an aesthetic issue, no further capping other than construction of the walkway/balcony is required. Mulch or other suitable material could otherwise be placed over the marker layer (prior to construction of the overlying raised/suspended walkway/balcony) to a depth of approximately 0.1m. In the event that there is an accessible crawl space or the area beneath the

[7] Reference to 'geofabric' in the context of this RAP includes a high visibility, orange, non-woven product that is also suitable from an engineering and geotechnical point of view. A product such as Bidim A14 or similar would be acceptable to achieve its objective under this RAP.

[8] Reference to 'geofabric' in the context of this RAP includes a high visibility, orange, non-woven product that is also suitable from an engineering and geotechnical point of view. A product such as Bidim A14 or similar would be acceptable to achieve its objective under this RAP.

Step	Procedure
	suspended walkway/balcony is easily accessible, a more robust cap should be constructed, similar to that required for new paved or unpaved areas; and • Underground services – all services to be placed above the marker layer. If service installation extends below the contaminated fill, the base and walls of service trenches are to be lined with a visual marker layer of geofabric. Service trenches are to be backfilled with clean (validated) materials. Overlying capping requirements to meet the specification for paved or unpaved areas etc. as noted above. A general capping specification plan for the above is provided in the appendices. The integration of the different capping requirements across the site and between the various areas should be appropriately considered prior to commencement. Considering the minimum acceptable capping standards, remediation of capped areas will be undertaken as follows: • The marker layer placement should be inspected by the validation consultant prior to the placement of the overlying clean capping materials/pavement. This should be documented photographically; • In any unpaved areas, a levels survey should be completed 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 8; • The capping layers should be constructed 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 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.

Considering that the capping requirements will be largely dependent on the volume of soil and the extent of the area to be remediated, a detailed specification for capping has not been provided in this RAP. An addendum RAP or RWP should be prepared to outline the capping approach.

7.6 Remediation Documentation

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

- Waste/ soil disposal dockets;
- Imported materials information;
- Photographs of remediation works, including photographs of marker layers prior to placement of the overlying capping materials;
- Asbestos removal documentation, including licences, removal control plans and air monitoring results;
- Waste tracking documentation (where relevant); and
- Site surveys of any capped areas after the marker layers are installed, and again after the capping layers are constructed.

Copies of the above documentation must be forwarded to the validation consultant for evaluation and inclusion in the final validation report.

8 VALIDATION PLAN

Validation is necessary to demonstrate that the remedial measures described in this RAP have been successful and that the site is suitable for the intended land use. The sampling program for the validation is outlined in Section 8.1. 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 and documentation requirements for the validation are outlined in this section. These are the minimum requirements 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.

8.1 Validation Sampling and Documentation

The table below outlines the validation requirements for the site.

Table 8-1: Validation Requirements

Aspect	Sampling	Analysis	Observations and Documentation
Contaminated Fill – Requiring Disposal			
Base of excavation after fill removal is complete Walls of excavation after fill removal is complete Contaminated fill requiring off-site disposal.	One sample per 100m^2 (10m by 10m grid) across the excavation base. One sample per 10m lineal of excavation wall, collected over a depth interval of 0-0.1m down the side of the wall. Stockpile sampling to meet NEPM 2013 requirements. As a minimum, 1 sample per 25m^2 of material.	Lead, PAHs, TRH and asbestos. Above CoC and TCLP metals, TCLP PAHs.	Samples to be screened using a PID. Observations and soil type to be recorded at validation locations. Photographs to be taken. Disposal dockets to be retained.
Contaminated Fill – Capped on Site			
Capping	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 following placement of marker layers and following placement of capping material (unpaved areas). Documentation of capping materials

Aspect	Sampling	Analysis	Observations and Documentation
			and thickness of capping layers above the marker layers. Validation of imported materials used as capping (as later in this table). Disposal dockets to be retained for any fill requiring off-site disposal.
Imported Materials – relevant to all site works			
Imported VENM backfill (if required)	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. Additional analysis may be required depending on site history.	VENM documentation/ report required (should include source site history to demonstrate analytes are appropriate). 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.
Imported engineering materials comprising only	At the validation consultant's discretion based on supplier documentation.	At the validation consultant's discretion based	Documentation to be provided from the supplier confirming the material is a product comprising only VENM (i.e. quarried product).

Aspect	Sampling	Analysis	Observations and Documentation
natural quarried products such as blue metal etc.		on supplier documentation.	Review of quarry 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.

8.2 Validation Assessment Criteria

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

Table 8-2: VAC

Validation Aspect	Criteria
Waste classification (soil disposal)	In accordance with the procedures and criteria outlined in the Waste Classification Guidelines 2014 and any associated exemptions/approvals.
Soil validation	The soil validation criteria will be the Health Investigation Level A (HIL-A) and Health Screening Level A (HSL-A) criteria based on NEPM (2013). NEPM (2013) Ecological Investigation Levels (EILs) and Ecological Screening Levels (ESLs) will be considered for validation samples collected in proposed landscaped areas.

Validation Aspect	Criteria
Imported materials	Heavy metal concentrations to be consistent with background range, organic compounds to be less than the laboratory practical quantitation limits (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).

8.3 Validation Reporting and EMP

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

The validation 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.

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. EIS recommend that early engagement be undertaken with the consent authority and any other relevant stakeholders so that the EMP can be publically notified and enforceable.

8.4 Data Quality

Appropriate QA/QC samples should be obtained during the validation (where applicable) 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 2006 and with reference to USEPA documents Data Quality Objectives Processes for Hazardous Waste Site Investigations (2000) and Guidance on Systematic Planning Using the Data Quality Objectives Process (2006). The seven steps include the following:

- State the problem;
- Identify the decisions/goal of the study;

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

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

9 CONTINGENCY PLAN

A review of the proposed remediation works has indicated that the greatest risks that may affect the success of the remediation include an unexpected find or continual validation failure. A contingency plan is outlined below, in conjunction with a selection of other contingencies that may apply to this project.

9.1 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: friable asbestos in soil, large amounts of ash and slag, or odorous/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 validation consultant should be contacted;
- Temporary barricades should be erected to isolate the area from access to workers;
- In the event suspected friable asbestos material is encountered, a qualified occupational hygienist and/or asbestos consultant should be contacted (preferably the validation consultant will have an in-house hygienist or asbestos assessor);
- An additional sampling and analytical rationale should be established by the consultant and should be implemented with reference to the relevant guideline documents;
- The validation consultant should then assess the extent of remediation that may be required and consultation between the consultant and other stakeholders should occur;
- In the event remediation is required outside the purview of the RAP an addendum Remediation Work Plan (RWP) should be prepared and submitted to the consent authority for approval; and
- Appropriate validation sampling should be undertaken and the results should be included in the validation report.

9.2 Validation Failure

In the event of a validation failure, assess the extent of the failure in the context of the CSM. Consideration could be given to implementing a cap and contain approach, and management of the contamination via an EMP.

9.3 Failure of Imported Material

Where material to be imported onto the site does not meet the importation acceptance criteria detailed in Section 8, the material should not be accepted unless it can be demonstrated that the material poses a negligible risk to human health and the environment, and the use of the material on-site is not contrary to relevant legislation and guidance regarding waste and resource recovery.

9.4 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 licensed landfill facility. The presence of Hazardous Waste may result in significant delays and additional cost to the project.

10 SITE MANAGEMENT PLAN FOR REMEDIATION WORKS

The information outlined in this section of the RAP is for the remediation work only and should be implemented concurrently with any other requirements outlined in the development consent/ approval.

10.1 Asbestos Controls and Licensing Requirements

The following requirements should be met for the asbestos remediation works at the site:

- A Class A licensed asbestos removalist should be engaged to undertake any asbestos-related remediation works. The licenced contractor is to prepare an Asbestos Removal Control Plan for the site works;
- The contractor should review this RAP and the proposed development requirements to establish whether SafeWork NSW are to be notified;
- All personnel and contractors must be informed of site conditions, asbestos work areas and any exclusion zones;
- Air fibre monitoring should be undertaken on a daily basis during remedial works in the southern remediation area and all readings are to be below the detection limit of 0.01 fibres per millilitre; and
- The site should be managed in accordance with this plan and the general requirements of SafeWork NSW and strategies outlined in the relevant regulations, guidelines, codes and standards.

10.2 Interim Site Management

An Asbestos Management Plan (AMP) will be required for the remediation works. The AMP will be prepared by the asbestos removal contractor.

10.3 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 in the following table:

Table 10-1: Project Contacts

Role	Company	Contact Details
Project Manager	To be appointed	-
Remediation Contractor	To be appointed	-
Environmental Consultant	EIS (at the time of the RAP preparation)	9888 5000
Certifier	To be appointed	-

Role	Company	Contact Details
NSW EPA	Pollution Line	131 555
Emergency Services	Ambulance, Police, Fire	000

10.4 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 and secured to reduce the risk to site personnel from injury by falling into open excavations.

10.5 Timing and Sequencing of Remediation Works

The remediation and validation is to occur sequentially as outlined in Section 7.2. In the event of unexpected delays, geo-fabric (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.

10.6 Site Soil and Water Management Plan

The contractor should prepare a detailed soil and water management plan prior to the commencement of site works. Silt fences should be used to control the surface water runoff at all appropriate locations of the site.

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.

10.7 Noise and Vibration Control Plan

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

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

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

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.

10.8 Dust Control Plan

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

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

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

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

Dust monitoring should be undertaken at the site for the duration of the remediation works. If unacceptable concentrations of dust are 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. Additional controls may also be specified in the asbestos removal control plans for decontamination of asbestos.

10.9 Air Monitoring

Asbestos air fibre monitoring should be undertaken for the duration of remediation works in accordance with the AMP.

10.10 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 Protection of the Environment Operations Act;
- Demolition materials and other combustible waste should not be burnt on site;
- Use of protective covers (e.g. geo-fabric or builders plastic).

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

The following odour management plan should be implemented to limit the exposure of site personnel and surrounding land users to unpleasant odours:

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

If continued complaints are received, alternative odour management strategies should be considered and implemented.

10.11 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 and Safe Work Australia 2016.

As a minimum requirement, personnel must wear appropriate protective clothing, including long sleeve shirts, long trousers and steel cap boots. Asbestos-related PPE is also required as outlined in

Section 6 (and to be formally documented in the asbestos removal control plan). 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.

10.12 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 natural excavated material wherever possible.

10.13 Incident Management Contingency

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

10.14 Hours of Operation

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

11 CONCLUSIONS

EIS are of the opinion that the site can be made suitable for the proposed development described in Section 1.1 provided this RAP is implemented accordingly. A site validation report and EMP should be prepared on completion of remediation activities and issued to the consent authority.

11.1 Remediation Category

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

Table 11-1: 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 state or regional environmental planning policy 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 development application or as a new and separate development application. Category 1 remediation work is identified as advertised development work unless the remediation work is a designated development or a state significant development.
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 are of the opinion that the remediation work is Category 2 remediation. It is noted that the RAP is likely to be assessed by Council as part of the development application/ consent process.

11.2 Regulatory Requirements

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

Table 11-2: Regulatory Requirement

Guideline	Applicability
Duty to Report Contamination (2015)	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.
Protection of the Environment Operations Act 1997	Section 143 of the Protection of the Environment Operations 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 relevant waste that is disposed off-site. Asbestos waste must be tracked using WasteLocate.
WHS Code of Practice (2016)	Sites with asbestos become a 'workplace' when work is carried out there and require a register and asbestos management plan. Appropriate SafeWork NSW notification will be required for asbestos removal works or handling. Contractors are also required to be appropriately licensed for the asbestos works undertaken (i.e. bonded or friable asbestos works). Notification of bonded and friable asbestos removal is required under this RAP.

12 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.

13 REFERENCES

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

Australian and New Zealand Environment Conservation Council (ANZECC), (2000). Australian and New Zealand Guidelines for Fresh and Marine Water Quality

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

CRC Care, (2017). Technical Report No. 39 – Risk-based management and guidance for benzo(a)pyrene

Contaminated Land Management Act 1997 (NSW)

Department of Land and Water Conservation, (1997). 1:25,000 Acid Sulfate Soil Risk Map (Series 9130N3, Ed 2)

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

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

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

NSW EPA, (1995). Contaminated Sites Sampling Design Guidelines

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

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

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

National Environmental Protection (Assessment of Site Contamination) Measure 1999 as amended (2013)

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

Protection of the Environment Operations Act 1997 (NSW)

State Environmental Planning Policy No.55 – Remediation of Land 1998 (NSW)

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

Western Australia Department of Health, (2009). Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia

14 IMPORTANT INFORMATION ABOUT 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 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.

Appendix A: 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: CANTERBURY SOUTH PUBLIC SCHOOL
HIGH STREET, CANTERBURY, NSW

Report No: E31040KB

Figure No: 1

ENVIRONMENTAL INVESTIGATION SERVICES

EIS

PLOT DATE: 27/08/2018 4:14:52 PM DWG FILE: S:\5 EIS\5C- EIS JOBS\31000'S\E31040K CANTERBURY\CAD\E31040KB.DWG

AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM, 17 JUL 2018.

HIGH STREET

FRANCE STREET

NAPIER STREET

BH2(0.3)
BH105(0.8)
BH104(0.6)
BH106(0.4)
BH116(0.7)
BH103(0.4)
BH107(0.5)
BH117(0.4)
BH115(0.6)
BH102(0.6)
BH108(0.6)
BH118(0.3)
BH1(0.8)
BH132(1.1)
BH114(0.75)
MW101(1.3)
BH109(0.55)
BH119(0.5)
BH3(0.4)
BH113(0.95)
BH110(0.5)
BH131(2.0)
BH133(2.0)
BH120(0.2)
BH112(0.6)
BH10(>0.2)
BH130(0.3)
BH7(1.4)
BH134(0.6)
BH121(0.6)
MW143(1.7)
BH129(0.3)
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BH9(0.7)
BH8(0.3)
BH128(0.5)
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BH146(0.2)
BH149(0.55)
BH127(0.6)
BH124(0.9)
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BH140(1.1)
BH145(0.4)
BH148(0.4)
BH126(0.5)
BH125(0.85)
BH4(0.5)
BH138(0.4)
BH139(1.2)
MW142(0.6)
BH5(0.4)

LEGEND

- APPROXIMATE SITE BOUNDARY
- BH (Fill Depth) — BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m), 2018
- BH (Fill Depth) — BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m), 2017
- BH/MW(Fill Depth) — BOREHOLE AND GROUND WATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m)

0 6 12 18 24 30
SCALE 1:600 @A3 METRES

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

Title: **SAMPLE LOCATION PLAN**

Location: CANTERBURY SOUTH PUBLIC SCHOOL
HIGH STREET, CANTERBURY, NSW

Report No: E31040KB

Figure No: 2

ENVIRONMENTAL INVESTIGATION SERVICES

EIS

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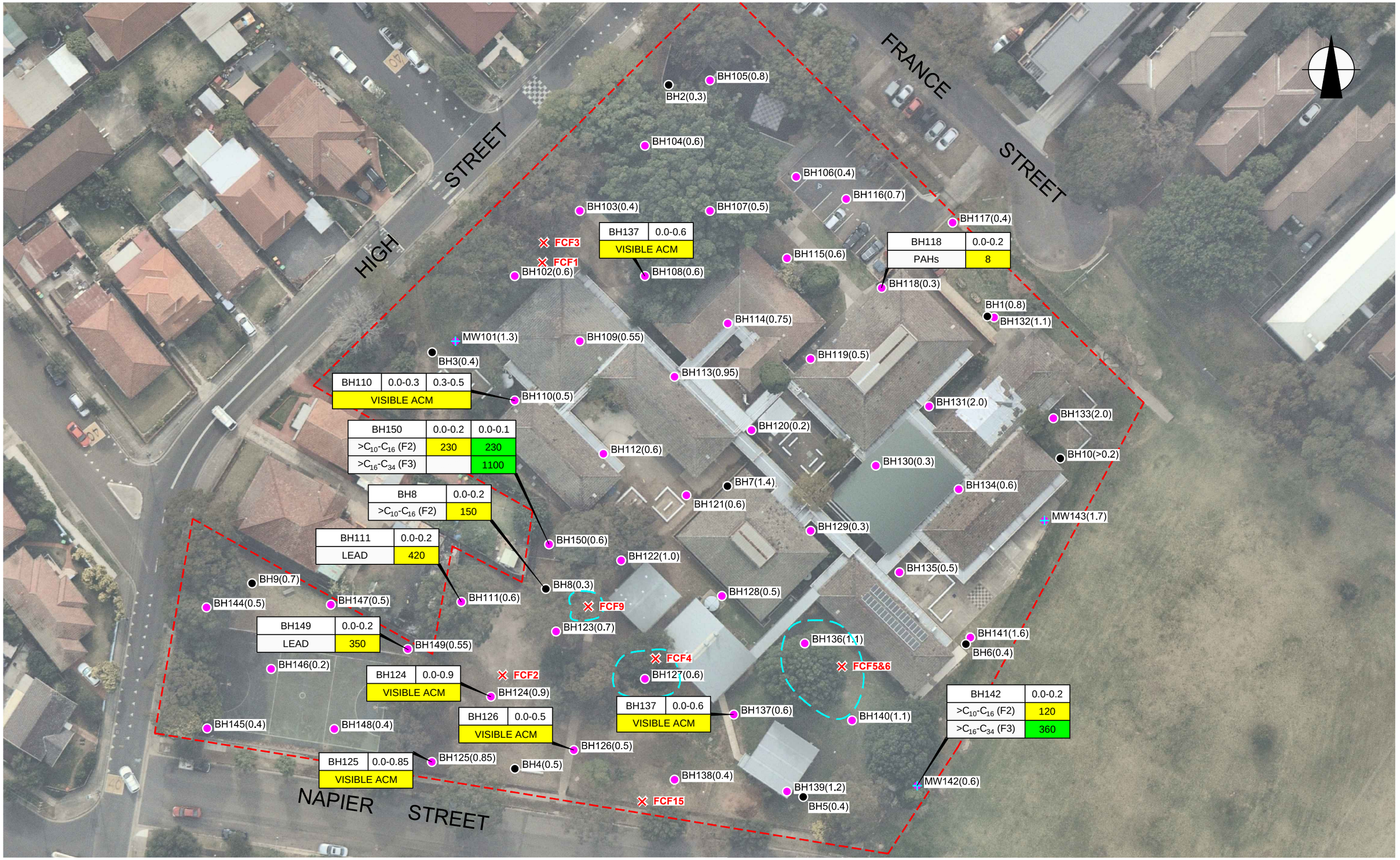

LEGEND

- APPROXIMATE SITE BOUNDARY
- BH (Fill Depth) — BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m), 2018
- BH (Fill Depth) — BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m), 2017
- BH/MW(Fill Depth) — BOREHOLE AND GROUND WATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m)

SAMPLE ID	DEPTH (metres)
CHEMICAL	CONCENTRATION

- SOIL CONTAMINATION ABOVE SAC FOR HUMAN HEALTH RISK (mg/kg)
- FCF — FIBRE CEMENT FRAGMENTS (FCF) 2018
- FCF SCATTERED AT SURFACE

0 6 12 18 24 30
SCALE 1:600 @A3 METRES

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

Title: **SITE CONTAMINATION DATA PLAN**

Location: CANTERBURY SOUTH PUBLIC SCHOOL
HIGH STREET, CANTERBURY, NSW

Report No: E31040KB

Figure No: 3

ENVIRONMENTAL INVESTIGATION SERVICES

EIS

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Appendix B: Proposed Concept Plans

NBRSARCHITECTURE.
LANDSCAPE

Landscape Documentation - Drawing Schedule			
DWG. No.	**TITLE**	**SCALE**	**ISSUE**
L-000	COVER PAGE	1:1000	B
L-001	SITE SURVEY	1:1000	B
L-002	LANDSCAPE DEMOLITION PLAN	1:500	B
L-003	LANDSCAPE SITE KEY PLAN	1:500	B
L-004	PROPOSED LANDSCAPE SITE PLAN	1:1000	B
L-100	PLANTING SCHEDULE, HARDSCAPE & SOFTSCAPE PALETTE	N/A	B
L-101	LANDSCAPE PLAN - SHEET ONE	1:200	B
L-102	LANDSCAPE PLAN - SHEET TWO	1:200	B
L-103	LANDSCAPE PLAN - SHEET THREE	1:200	B
L-104	LANDSCAPE PLAN - SHEET FOUR	1:200	B
L-105	LANDSCAPE PLAN - SHEET FIVE	1:200	B
L-106	LANDSCAPE PLAN - SHEET SIX	1:200	B
L-107	LANDSCAPE PLAN - SHEET SEVEN	1:200	B
L-200	LANDSCAPE SECTIONS/ELEVATIONS	1:100	B
L-300	LANDSCAPE DETAILS 01	AS SHOWN	B
L-301	LANDSCAPE DETAILS 02	AS SHOWN	B
L-302	LANDSCAPE DETAILS 03	AS SHOWN	B

DRAWING COLOUR CODED - PRINT ALL COPIES IN COLOUR

LEGEND

GENERAL

- SITE BOUNDARY
- EXTENT OF LANDSCAPE WORKS
- NEW BUILDING FOOTPRINT
- 0:0 FALL — GRADIENT AND DIRECTION OF SLOPE
- EL 0.00 — EXISTING LEVEL
- RL 0.00 — PROPOSED LEVEL
- FFL 0.00 — FINISHED FLOOR LEVEL
- TOW 0.00 — TOP OF WALL

SOFTSCAPE

- TREES TO BE REMOVED
- TREES TO BE RETAINED AND PROTECTED AS PER AS4970-2009
- PROPOSED TREE PLANTING
- PROPOSED MASS PLANTING
- PROPOSED NATURAL TURF (TYPE TR 01) 'SIR WALTER BUFFALO'

HARDSCAPE

- WALL TYPE 1 (W1) GABION WALL
- EXISTING FENCE TO BE PROTECTED & RETAINED
- NEW STEEL TUBULAR DIPLOMAT SECURITY FENCE H 2100mm (FENCE TYPE 1 - F1)
- COLOURED CONCRETE PAVING TYPE 1 (PV 01) COLOUR TBC - BROOM FINISH
- COLOURED CONCRETE PAVING TYPE 2 (PV 02) COLOUR TBC - BROOM FINISH
- COLOURED CONCRETE PAVING TYPE 3 (PV 03) COLOUR TBC - BROOM FINISH
- PLEXIPAVE PAVING TYPE 4 (PV 04) COLOUR TBC
- COLOURED CONCRETE PAVING WITH ENGRAVING TYPE 5 (PV 05)
- COMPOSITE TIMBER DECKING (PV 06) TO MATCH EXISTING ON SITE
- MULCH (PV 07) 'PLAYGROUND MULCH'
- SOFTFALL (PV 08) POLYSOFT PLAY COLOUR TBC
- CONCRETE KERB (CK 01)
- ALUMINIUM EDGING (AE 01)
- TACTILE GROUND SURFACE INDICATORS (TG 01)

1 LANDSCAPE SITE PLAN
1:500

CANTERBURY SOUTH PUBLIC SCHOOL - HIGH STREET, CANTERBURY NSW

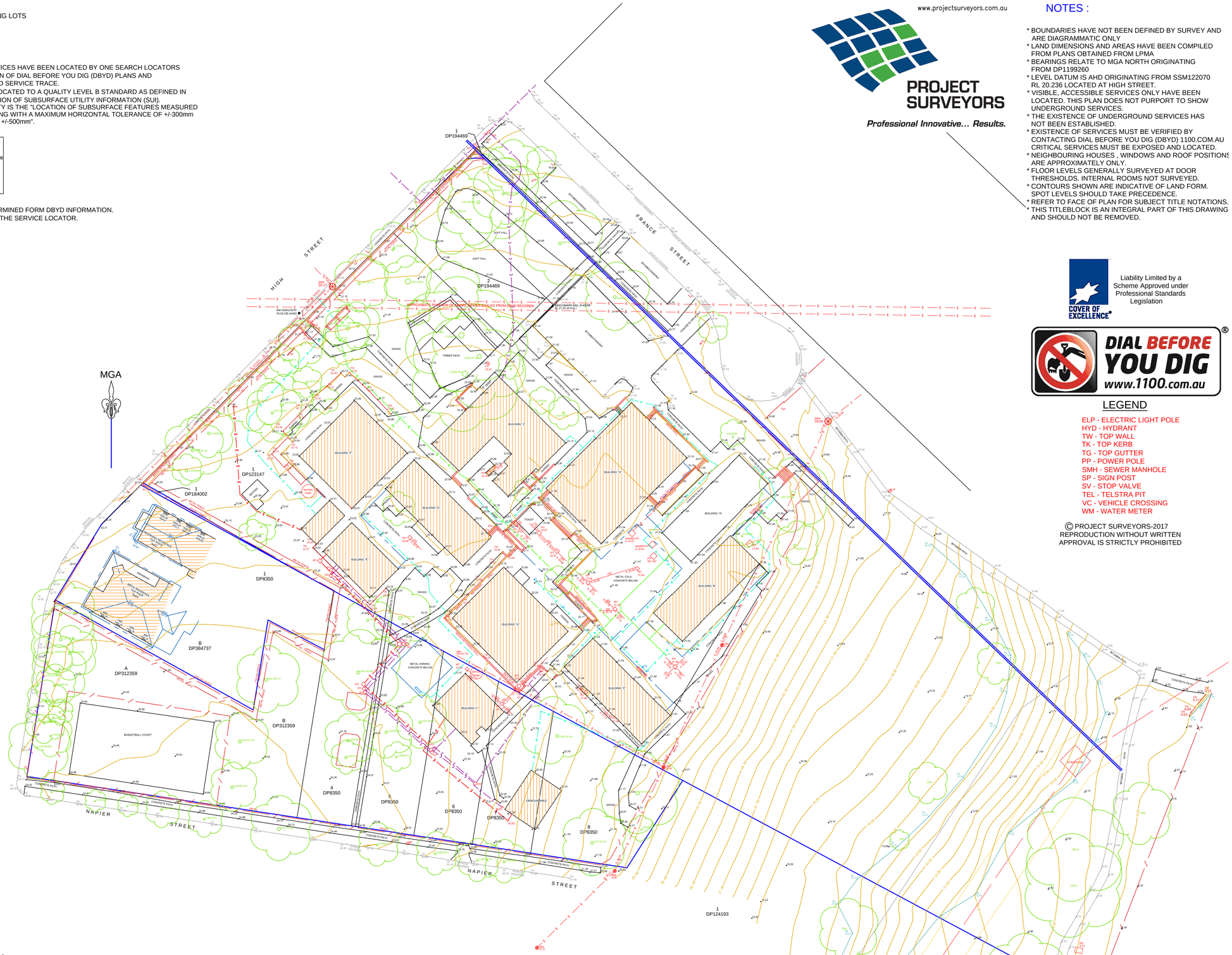
LANDSCAPE SCHEMATIC ISSUE - DRAFT

* CANTERBURY SOUTH PUBLIC SCHOOL BEING LOTS
LOTS 4-8 IN DP8350,
LOTS A & B IN DP312359,
LOT 1 IN DP123147,
LOTS 1 & 2 IN DP194469

* THE EXISTENCE OF UNDERGROUND SERVICES HAVE BEEN LOCATED BY ONE SEARCH LOCATORS IN NOVEMBER 2017 USING A COMBINATION OF DIAL BEFORE YOU DIG (DBYD) PLANS AND GROUND PENETRATION RADAR (GPR) AND SERVICE TRACE.
* THE SERVICES HAVE GENERALLY BEEN LOCATED TO A QUALITY LEVEL B STANDARD AS DEFINED IN SECTION 2.6 OF AS 5488-2013, CLASSIFICATION OF SUBSURFACE UTILITY INFORMATION (SUI). AS 5488-2013 STATES THAT LEVEL B QUALITY IS THE "LOCATION OF SUBSURFACE FEATURES MEASURED IN TERMS OF RELATIVE SPATIAL POSITIONING WITH A MAXIMUM HORIZONTAL TOLERANCE OF +/-300mm AND A MAXIMUM VERTICAL TOLERANCE OF +/-500mm".

- E — DENOTES UNDERGROUND ELECTRICITY
- W — DENOTES UNDERGROUND WATER
- C — DENOTES UNDERGROUND COMMUNICATIONS
- SW — DENOTES STORM WATER DIRECTION
- S — DENOTES SEWER DIRECTION
- G — DENOTES UNDERGROUND GAS

* SEWER INVERT LEVES HAVE BEEN DETERMINED FORM DBYD INFORMATION. THESE ARE STILL TO BE CONFIRMED BY THE SERVICE LOCATOR.



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NOTES :

* BOUNDARIES HAVE NOT BEEN DEFINED BY SURVEY AND ARE DIAGRAMMATIC ONLY
* LAND DIMENSIONS AND AREAS HAVE BEEN COMPILED FROM PLANS OBTAINED FROM LPMA
* BEARINGS RELATE TO MGA NORTH ORIGINATING FROM DP1199260
* LEVEL DATUM IS AHD ORIGINATING FROM SSM122070 RL 20.236 LOCATED AT HIGH STREET.
* VISIBLE, ACCESSIBLE SERVICES ONLY HAVE BEEN LOCATED. THIS PLAN DOES NOT PURPORT TO SHOW UNDERGROUND SERVICES.
* THE EXISTENCE OF UNDERGROUND SERVICES HAS NOT BEEN ESTABLISHED.
* EXISTENCE OF SERVICES MUST BE VERIFIED BY CONTACTING DIAL BEFORE YOU DIG (DBYD) 1100.COM.AU CRITICAL SERVICES MUST BE EXPOSED AND LOCATED.
* NEIGHBOURING HOUSES , WINDOWS AND ROOF POSITIONS ARE APPROXIMATELY ONLY.
* FLOOR LEVELS GENERALLY SURVEYED AT DOOR THRESHOLDS. INTERNAL ROOMS NOT SURVEYED.
* CONTOURS SHOWN ARE INDICATIVE OF LAND FORM. SPOT LEVELS SHOULD TAKE PRECEDENCE.
* REFER TO FACE OF PLAN FOR SUBJECT TITLE NOTATIONS.
* THIS TITLEBLOCK IS AN INTEGRAL PART OF THIS DRAWING AND SHOULD NOT BE REMOVED.

NBRSARCHITECTURE. LANDSCAPE

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LEGEND

ELP - ELECTRIC LIGHT POLE
HYD - HYDRANT
TW - TOP WALL
TK - TOP KERB
TG - TOP GUTTER
PP - POWER POLE
SMH - SEWER MANHOLE
SP - SIGN POST
SV - STOP VALVE
TEL - TELSTRA PIT
VC - VEHICLE CROSSING
WM - WATER METER

THE TITLE FOR LOT 1 IN DP194469 NOTES:
1. RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
2. QUALIFIED TITLE. CAUTION PURSUANT TO SECTION 28J(1) AND 28J(1A) OF THE REAL PROPERTY ACT, 1900. ENTERED 5.12.1990 BK 1833 NO 300
3. LIMITED TITLE. LIMITATION PURSUANT TO SECTION 28T(4) OF THE REAL PROPERTY ACT, 1900. THE BOUNDARIES OF THE LAND COMPRISED HEREIN HAVE NOT BEEN INVESTIGATED BY THE REGISTRAR GENERAL.

THE TITLE FOR LOT 2 IN DP194469 NOTES:
1. LIMITED TITLE. LIMITATION PURSUANT TO SECTION 28T(4) OF THE REAL PROPERTY ACT, 1900. THE BOUNDARIES OF THE LAND COMPRISED HEREIN HAVE NOT BEEN INVESTIGATED BY THE REGISTRAR GENERAL

THE TITLE FOR LOT 1 IN DP123147 NOTES:
1. RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
2. H968961 EASEMENT FOR TRANSMISSION LINE AFFECTING PART OF THE LAND ABOVE DESCRIBED SHOWN 30.48 IN THE TITLE DIAGRAM. Z944756 TRANSFER OF EASEMENT TO SYDNEY ELECTRICITY

THE TITLES FOR LOTS 4 - 8 IN DP8350 NOTE:
1. RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)

THE TITLES FOR LOT A AND B IN DP312359 NOTE:
1. RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)

THIS DRAWING MUST BE PRINTED IN COLOUR

Issue

No.	Date	Description	Chkd
A	12/07/2018	ISSUE FOR COORDINATION	AS
B	03/08/2018	ISSUE FOR COORDINATION	AS

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E: architects@nbrsarchitecture.com W: nbrsarchitecture.com

Project
CANTERBURY SOUTH PUBLIC SCHOOL
at
20 HIGH STREET, CANTERBURY, NSW 2193
for
NSW Department of Education

Drawing Title
Site Survey

Date 03/08/2018
Scale 1:400 @ A1 1:800 @ A3
0 4 8 12 16 20 24m

Drawing Reference Rev
17352-NBRS-L-001 B

RETAIN & RELOCATE EXISTING 1 x BUDDY BENCH. REFER L-104 FOR LOCATION

RETAIN EXISTING 3 x PENCIL SCULPTURES. SCHOOL TO STORE.

RETAIN & RELOCATE EXISTING 1 x BIKE & 1 x SCOOTER RACK. REFER L-106 FOR LOCATION

RETAIN & RELOCATE EXISTING 1 x COW SCULPTURE. REFER L-104 FOR LOCATION

REMOVE CERAMIC ART GROUND TILES & BOTTLECAP WALL ART MURAL

RETAIN & PROTECT EXISTING SIGN

2 x EXISTING MEMORIAL TREES TO BE TRANSPLANTED. MEMORIAL PLAQUES TO BE RELOCATED

REMOVE EXISTING PAVED AREA

RETAIN & RELOCATE EXISTING 2 x VEGETABLE GARDEN BEDS. REFER L-105 FOR LOCATION

RETAIN & RELOCATE EXISTING 6 x VEGETABLE GARDEN BEDS. REFER L-105 FOR LOCATION

EXISTING 2 x CAR TYRES & GARDENS WITHIN TO BE REMOVED

RETAIN & RELOCATE EXISTING MULCH & COMPOST BINS. REFER L-105 FOR LOCATION

EXISTING SHED TO BE REMOVED

RETAIN & RELOCATE EXISTING BOTTLE REFILL STATION. REFER L-105 FOR LOCATION

RETAIN & RELOCATE EXISTING 1 x BUDDY BENCH. REFER L-104 FOR LOCATION

RETAIN & RELOCATE EXISTING 1 x WALL MOUNTED NOTICE BOARD. REFER L-104 FOR LOCATION

RETAIN & RELOCATE EXISTING 6 x ALUMINIUM BENCHES & TABLES. REFER L-104 FOR LOCATION

RETAIN & RELOCATE EXISTING 1 x BBQ UNIT. REFER L-104 FOR LOCATION

NBRSARCHITECTURE.
LANDSCAPE

SOFTSCAPE

- TREES TO BE REMOVED
- TREES TO BE RETAINED AND PROTECTED AS PER AS4970-2009
- STRUCTURE TO BE DEMOLISHED
- HARDSCAPE SURFACE TO BE DEMOLISHED
- SOFTSCAPE SURFACE TO BE DEMOLISHED

NOTE:
1. REFER TO ARCHITECT FOR BUILDING DEMOLITION
2. RETAIN ALL MOVEABLE WHEELIE BINS ON SITE

THIS DRAWING MUST BE PRINTED IN COLOUR

Issue

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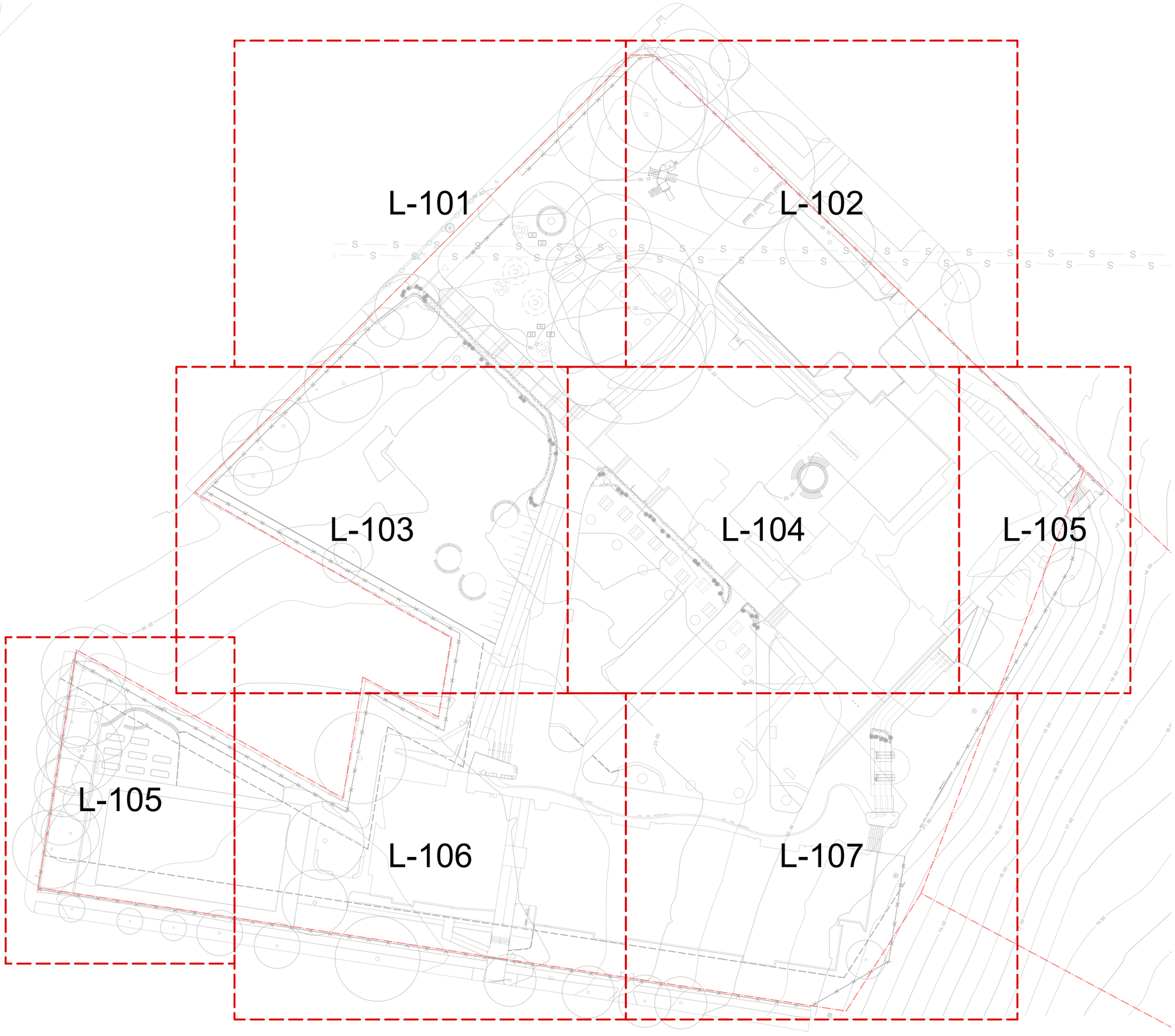
ABN 16 002 247 565

Project
CANTERBURY SOUTH PUBLIC SCHOOL
at
20 HIGH STREET, CANTERBURY, NSW 2193
for
NSW Department of Education

Drawing Title
Site Demolition Plan

Date 03/08/2018
Scale 1:300 @ A1 1:600 @ A3
0 3 6 9 12 15 18m

Drawing Reference 17352-NBRS-L-002
Rev B



THIS DRAWING MUST BE PRINTED IN COLOUR

Issue

No.	Date	Description	Chkd
A	12/07/2018	ISSUE FOR COORDINATION	AS
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Project
CANTERBURY SOUTH PUBLIC SCHOOL
at
20 HIGH STREET, CANTERBURY, NSW 2193
for
NSW Department of Education

Drawing Title
Landscape Site Key Plan

Date 03/08/2018
Scale 1:400 @ A1 1:800 @ A3
0 4 8 12 16 20 24m

Drawing Reference Rev
17352-NBRS-L-003 B

NBRSARCHITECTURE. LANDSCAPE

LEGEND

GENERAL

- SITE BOUNDARY
- EXTENT OF LANDSCAPE WORKS
- NEW BUILDING FOOTPRINT
- 0:0 FALL — GRADIENT AND DIRECTION OF SLOPE
- TREES TO BE RETAINED AND PROTECTED AS PER AS4970-2009
- PROPOSED TREE PLANTING
- PROPOSED MASS PLANTING
- PROPOSED NATURAL TURF (TYPE TR 01) 'SIR WALTER BUFFALO'
- WALL TYPE 1 (W1) BLOCK WALL
- EXISTING FENCE TO BE PROTECTED & RETAINED
- NEW STEEL TUBULAR DIPLOMAT SECURITY FENCE H 2100mm (FENCE TYPE 1 - F1)
- COLOURED CONCRETE PAVING TYPE 1 (PV 01) COLOUR TBC - BROOM FINISH
- COLOURED CONCRETE PAVING TYPE 2 (PV 02) COLOUR TBC - BROOM FINISH
- COLOURED CONCRETE PAVING TYPE 3 (PV 03) COLOUR TBC - BROOM FINISH
- PLEXIPAVE PAVING TYPE 4 (PV 04) COLOUR TBC
- COLOURED CONCRETE PAVING WITH ENGRAVING TYPE 5 (PV 05)
- DECORATIVE PEBBLE (PV 06) 'NEPEAN RIVER PEBBLE' (20MM)
- MULCH (PV 07) 'PLAYGROUND MULCH'
- SOFTFALL (PV 08) POLYSOFT PLAY
- CONCRETE KERB (CK 01)
- ALUMINIUM EDGING (AE 01)
- TACTILE GROUND SURFACE INDICATORS (TG 01)

THIS DRAWING MUST BE PRINTED IN COLOUR

Issue

No.	Date	Description	Chkd
A	12/07/2018	ISSUE FOR COORDINATION	AS
B	31/07/2018	ISSUE FOR INFORMATION	AS

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CANTERBURY SOUTH PUBLIC SCHOOL
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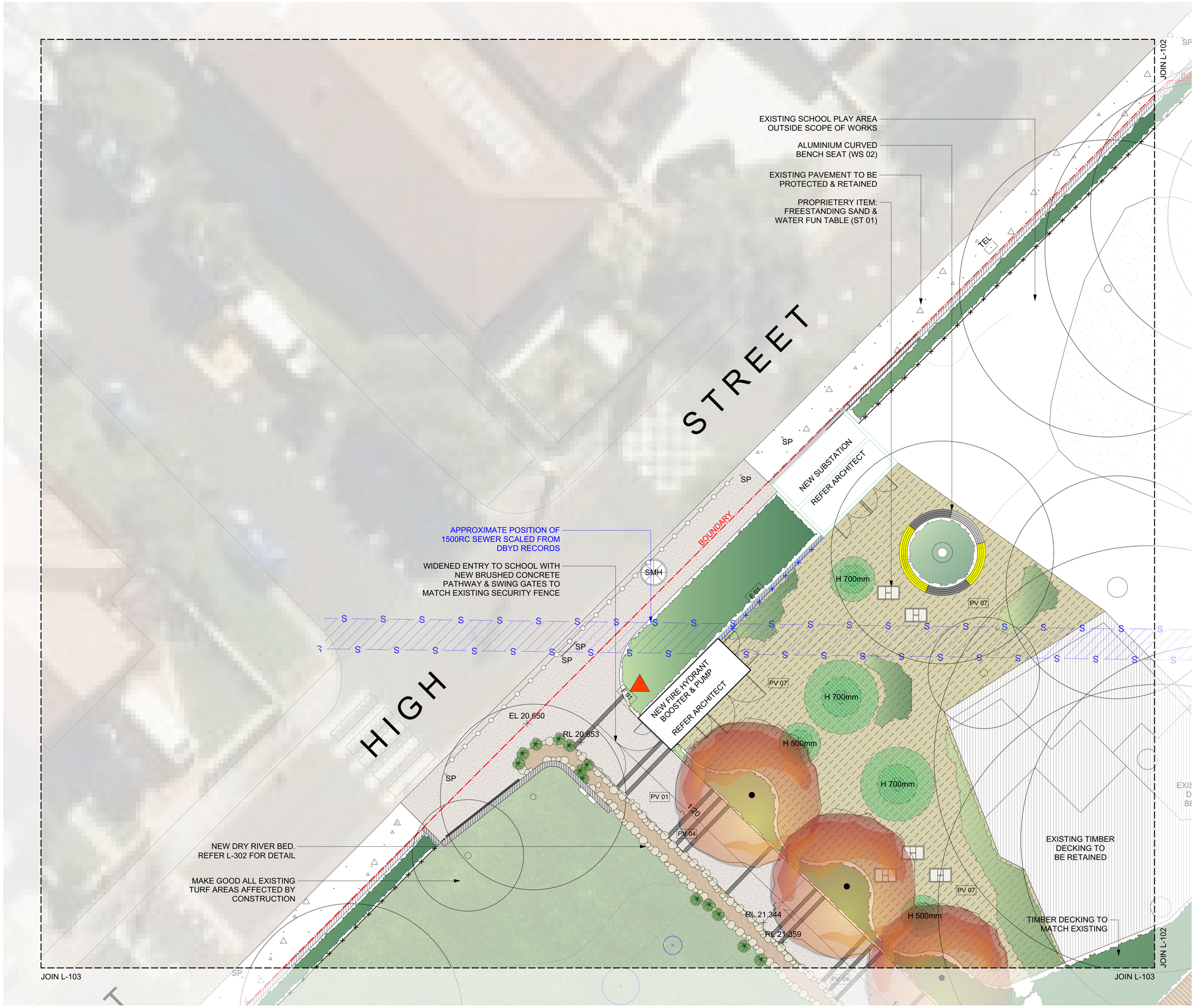
for
NSW Department of Education

Drawing Title
Landscape Site Plan

Date 03/08/2018
Scale 1:300 @ A1 1:600 @ A3
0 3 6 9 12 15 18m

Drawing Reference 17352-NBRS-L-004
Rev B



NBRSARCHITECTURE. LANDSCAPE

LEGEND

- SITE BOUNDARY
- EXTENT OF LANDSCAPE WORKS
- NEW BUILDING FOOTPRINT
- 0.0 FALL — GRADIENT AND DIRECTION OF SLOPE
- EL 0.00 — EXISTING LEVEL
- RL 0.00 — PROPOSED LEVEL
- FFL 0.00 — FINISHED FLOOR LEVEL
- TOW 0.00 — TOP OF WALL
- TREES TO BE RETAINED AND PROTECTED AS PER AS4970-2009
- PROPOSED TREE PLANTING
- PROPOSED MASS PLANTING
- PROPOSED NATURAL TURF (TYPE TR 01) 'SIR WALTER BUFFALO'
- EXISTING FENCE TO BE PROTECTED & RETAINED
- NEW STEEL TUBULAR DIPLOMAT SECURITY FENCE H 2100mm (FENCE TYPE 1 - F1)
- COLOURED CONCRETE PAVING TYPE 1 (PV 01) COLOUR TBC - BROOM FINISH
- COLOURED CONCRETE PAVING TYPE 4 (PV 04) COLOUR TBC - BROOM FINISH
- DECORATIVE PEBBLE (PV 06) 'NEPEAN RIVER PEBBLE' (20MM)
- MULCH (PV 07) 'PLAYGROUND MULCH'
- SYNTHETIC TURF MOUNDS

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Issue

No.	Date	Description	Chkd
A	12/07/2018	ISSUE FOR COORDINATION	AS
B	31/07/2018	ISSUE FOR INFORMATION	AS

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Project
CANTERBURY SOUTH PUBLIC SCHOOL
at
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for
NSW Department of Education

Drawing Title
Materials & Finishes Plan 01

Date 03/08/2018
Scale 1:100 @ A1 1:200 @ A3
0 1 2 3 4 5 6m

Drawing Reference 17352-NBRS-L-101 Rev B

LEGEND

- SITE BOUNDARY
- EXTENT OF LANDSCAPE WORKS
- NEW BUILDING FOOTPRINT
- 0.0 FALL — GRADIENT AND DIRECTION OF SLOPE
- EL 0.00 — EXISTING LEVEL
- RL 0.00 — PROPOSED LEVEL
- FFL 0.00 — FINISHED FLOOR LEVEL
- TOW 0.00 — TOP OF WALL
- TREES TO BE RETAINED AND PROTECTED AS PER AS4970-2009
- PROPOSED TREE PLANTING
- PROPOSED MASS PLANTING
- PROPOSED NATURAL TURF (TYPE TR 01) 'SIR WALTER BUFFALO'
- COLOURED CONCRETE PAVING TYPE 1 (PV 01) COLOUR TBC - BROOM FINISH
- TACTILE GROUND SURFACE INDICATORS (TG 01)
- ALUMINIUM EDGING (AE 01)

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Issue

No.	Date	Description	Chkd
A	12/07/2018	ISSUE FOR COORDINATION	AS
B	31/07/2018	ISSUE FOR INFORMATION	AS

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CANTERBURY SOUTH PUBLIC SCHOOL
at
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for
NSW Department of Education

Drawing Title
Materials & Finishes Plan 02

Date 03/08/2018
Scale 1:100 @ A1 1:200 @ A3
0 1 2 3 4 5 6m

Drawing Reference 17352-NBRS-L-102 Rev B

NBRSARCHITECTURE. LANDSCAPE

LEGEND

- SITE BOUNDARY
- EXTENT OF LANDSCAPE WORKS
- NEW BUILDING FOOTPRINT
- 0.0 FALL — GRADIENT AND DIRECTION OF SLOPE
- EL 0.00 — EXISTING LEVEL
- RL 0.00 — PROPOSED LEVEL
- FFL 0.00 — FINISHED FLOOR LEVEL
- TOW 0.00 — TOP OF WALL
- TREES TO BE RETAINED AND PROTECTED AS PER AS4970-2009
- PROPOSED TREE PLANTING
- PROPOSED MASS PLANTING
- PROPOSED NATURAL TURF (TYPE TR 01) 'SIR WALTER BUFFALO'
- EXISTING FENCE TO BE PROTECTED & RETAINED
- COLOURED CONCRETE PAVING TYPE 1 (PV 01) COLOUR TBC - BROOM FINISH
- COLOURED CONCRETE PAVING TYPE 4 (PV 04) COLOUR TBC - BROOM FINISH
- DECORATIVE PEBBLE (PV 06) 'NEPEAN RIVER PEBBLE' (20MM)
- MULCH (PV 07) 'PLAYGROUND MULCH'
- ALUMINIUM EDGING (AE 01)

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Issue

No.	Date	Description	Chkd
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CANTERBURY SOUTH PUBLIC SCHOOL
at
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for
NSW Department of Education

Drawing Title
Materials & Finishes Plan 03

Date 03/08/2018
Scale 1:100 @ A1 1:200 @ A3
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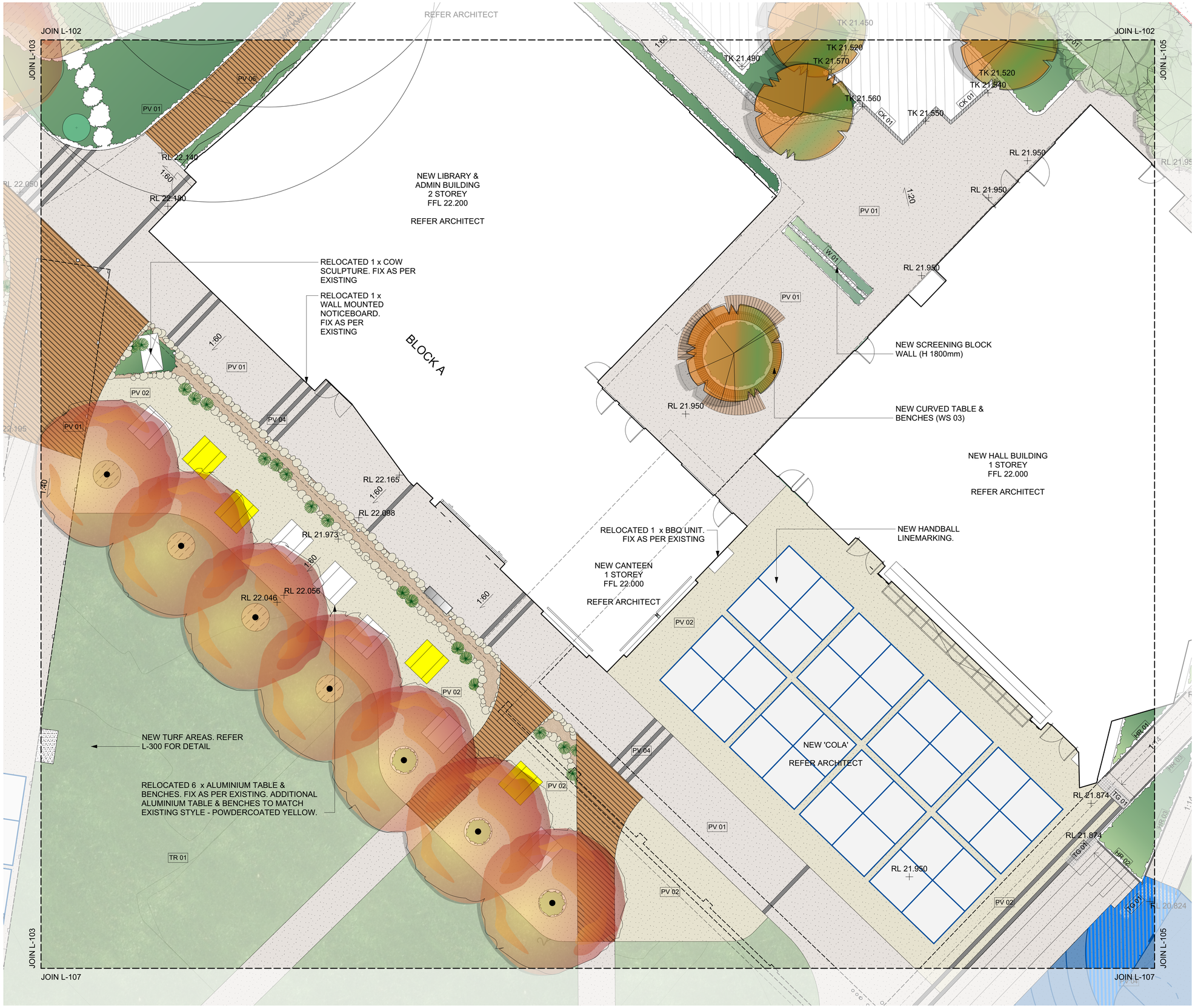
Drawing Reference 17352-NBRS-L-103 Rev B



NBRS ARCHITECTURE. LANDSCAPE

LEGEND

- SITE BOUNDARY
- EXTENT OF LANDSCAPE WORKS
- NEW BUILDING FOOTPRINT
- 0.0 FALL — GRADIENT AND DIRECTION OF SLOPE
- EL 0.00 — EXISTING LEVEL
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- COLOURED CONCRETE PAVING TYPE 1 (PV 01) COLOUR TBC - BROOM FINISH
- COLOURED CONCRETE PAVING TYPE 2 (PV 02) COLOUR TBC - BROOM FINISH
- COLOURED CONCRETE PAVING TYPE 3 (PV 03) COLOUR TBC - BROOM FINISH
- PLEXIPAVE PAVING TYPE 4 (PV 04) COLOUR TBC - BROOM FINISH
- SOFTFALL (PV 08) POLYSOFT PLAY
- CONCRETE KERB (CK 01)
- ALUMINIUM EDGING (AE 01)
- TACTILE GROUND SURFACE INDICATORS (TG 01)

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Project
CANTERBURY SOUTH PUBLIC SCHOOL

at
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for
NSW Department of Education

Drawing Title
Materials & Finishes Plan 04

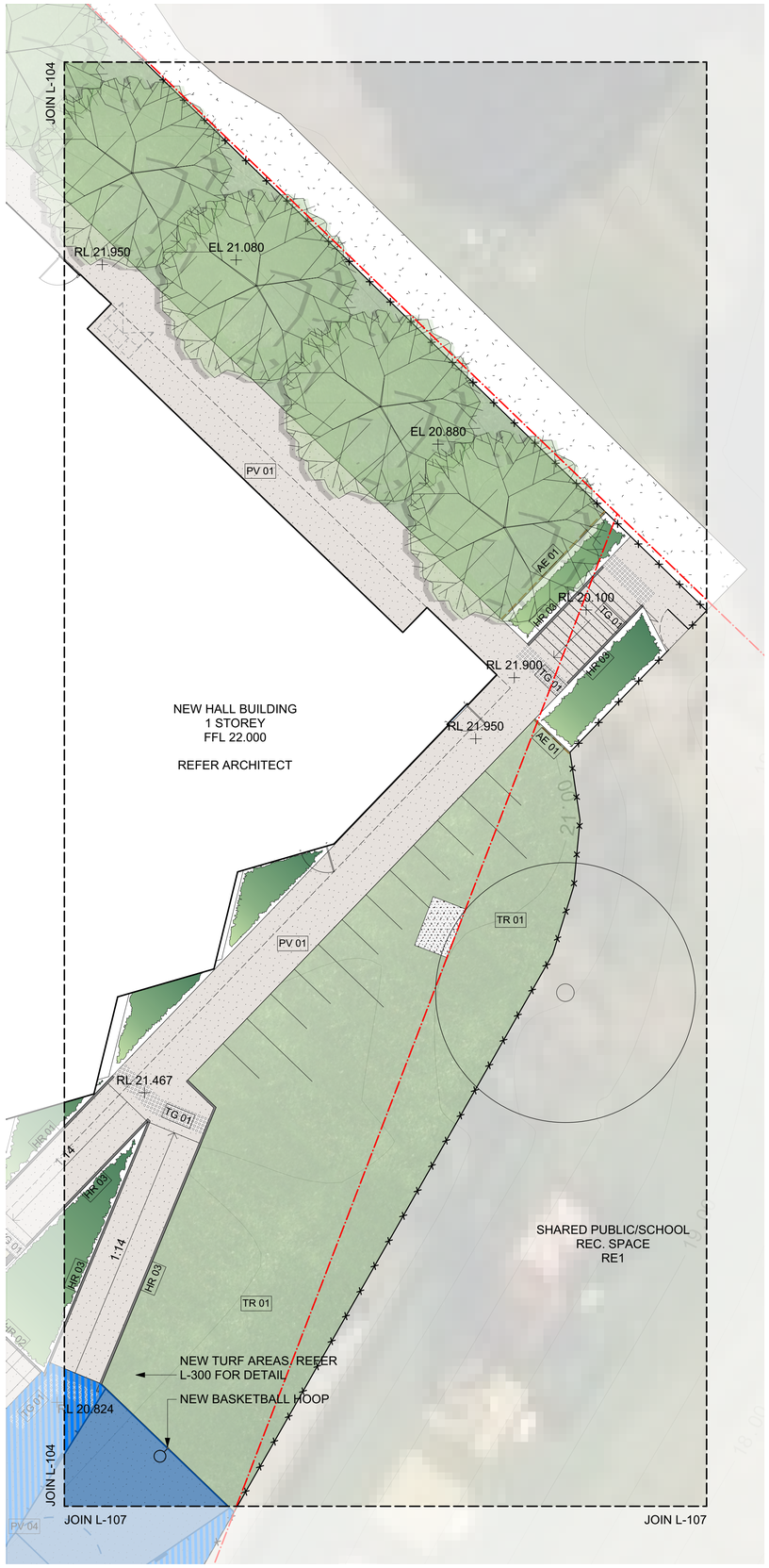
Date 03/08/2018

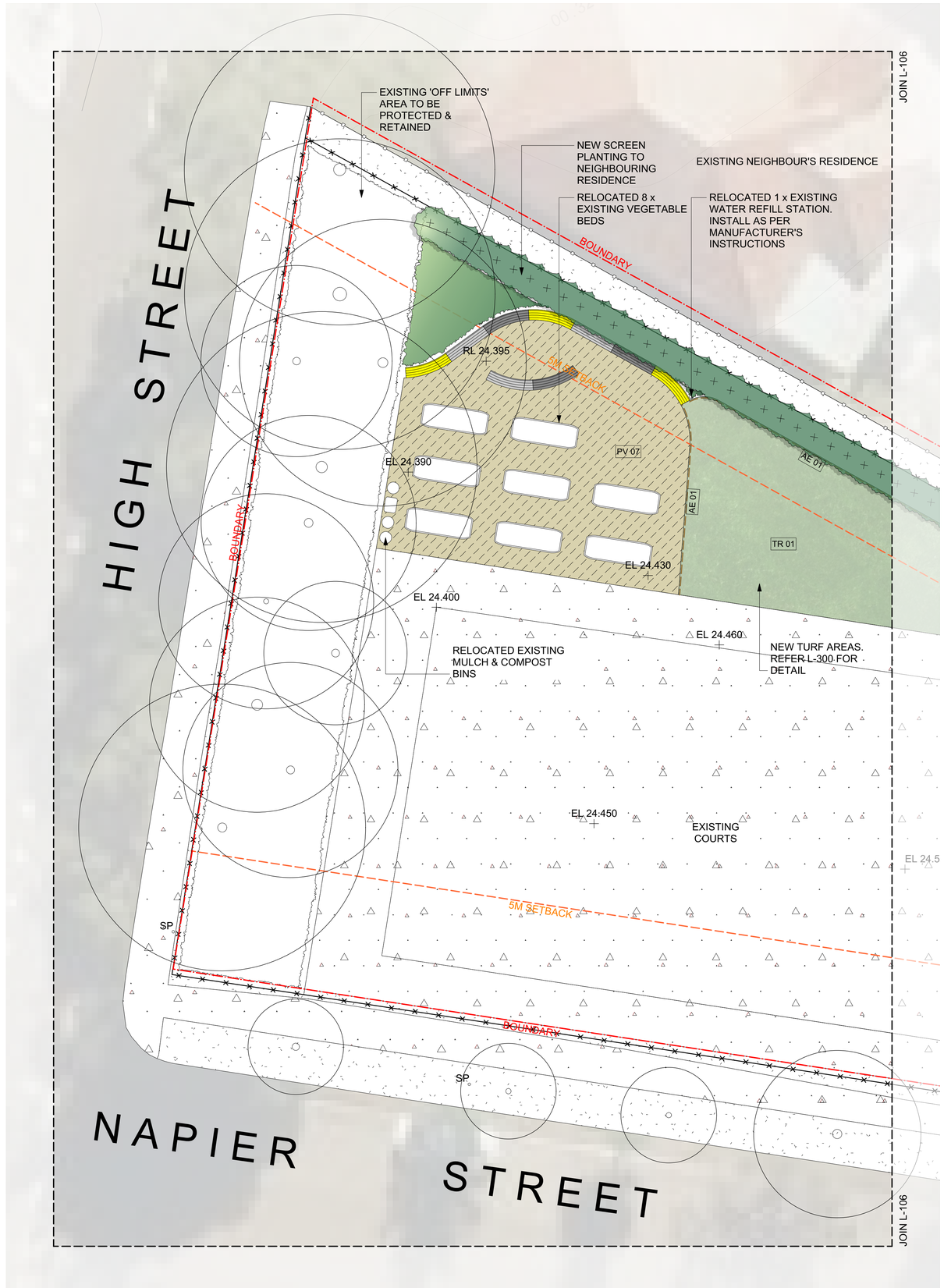
Scale 1:100 @ A1 1:200 @ A3

0 1 2 3 4 5 6m

Drawing Reference
17352-NBRS-L-104

Rev
B





NBRSARCHITECTURE. LANDSCAPE

LEGEND

- SITE BOUNDARY
- EXTENT OF LANDSCAPE WORKS
- NEW BUILDING FOOTPRINT
- 0.0 FALL — GRADIENT AND DIRECTION OF SLOPE
- EL 0.00 — EXISTING LEVEL
- RL 0.00 — PROPOSED LEVEL
- FFL 0.00 — FINISHED FLOOR LEVEL
- TOW 0.00 — TOP OF WALL
- TREES TO BE RETAINED AND PROTECTED AS PER AS4970-2009
- PROPOSED TREE PLANTING
- PROPOSED MASS PLANTING
- PROPOSED NATURAL TURF (TYPE TR 01) 'SIR WALTER BUFFALO'
- EXISTING FENCE TO BE PROTECTED & RETAINED
- COLOURED CONCRETE PAVING TYPE 1 (PV 01) COLOUR TBC - BROOM FINISH
- DECORATIVE PEBBLE (PV 06) 'NEPEAN RIVER PEBBLE' (20MM)
- ALUMINIUM EDGING (AE 01)
- TACTILE GROUND SURFACE INDICATORS (TG 01)

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for
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Drawing Title
Materials & Finishes Plan 05

Date 03/08/2018
Scale 1:100 @ A1 1:200 @ A3
0 1 2 3 4 5 6m

Drawing Reference
17352-NBRS-L-105
Rev
B

SCREEN PLANTING TO NEIGHBOURING RESIDENCE

1:20 RAMP WITH TIERED AMPHITHEATRE SEATING

JOIN L-103

JOIN L-105

JOIN L-107

EXISTING NEIGHBOUR'S RESIDENCE

BOUNDARY

5M SETBACK

AE 01

TR 01

PV 02

EL 24.550

EL 24.520

EL 24.470

RL 24.480

EXISTING COURTS

EL 24.520

EL 24.680

RL 24.576

1:20

TG 01

TOS 23.530

TOS 23.830

RL 23.950

RL 23.980

RL 22.630

1:40

PV 01

PV 04

RL 22.650

RL 22.700

PV 05

BLOCK C SUBFLOOR

NEW GLA/BLD 3 STOREY

REFER ARCHITECT

BLOCK C

RL 23.077

NEW GLA/BLD 3 STOREY

REFER ARCHITECT

RL 23.826

RL 23.526

RELOCATED EXISTING BIKE & SCOOTER RACK. FIX AS PER EXISTING

1 x RELOCATED MEMORIAL TREE & PLACQUE

RL 24.126

TK 24.100

NEW KERB RAMP

TEL

NAPIER STREET

LEGEND

- SITE BOUNDARY
- EXTENT OF LANDSCAPE WORKS
- NEW BUILDING FOOTPRINT
- 0.0 FALL — GRADIENT AND DIRECTION OF SLOPE
- EL 0.00 — EXISTING LEVEL
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- PROPOSED NATURAL TURF (TYPE TR 01) 'SIR WALTER BUFFALO'
- EXISTING FENCE TO BE PROTECTED & RETAINED
- COLOURED CONCRETE PAVING TYPE 1 (PV 01) COLOUR TBC - BROOM FINISH
- COLOURED CONCRETE PAVING TYPE 2 (PV 02) COLOUR TBC - BROOM FINISH
- COLOURED CONCRETE PAVING WITH ENGRAVING TYPE 5 (PV 05)
- ALUMINIUM EDGING (AE 01)
- TACTILE GROUND SURFACE INDICATORS (TG 01)

THIS DRAWING MUST BE PRINTED IN COLOUR

Issue

No.	Date	Description	Chkd
A	12/07/2018	ISSUE FOR COORDINATION	AS
B	31/07/2018	ISSUE FOR INFORMATION	AS

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E: architects@nbrsarchitecture.com W: nbrsarchitecture.com

Project
CANTERBURY SOUTH PUBLIC SCHOOL
at
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for
NSW Department of Education

Drawing Title
Materials & Finishes Plan 06

Date 03/08/2018
Scale 1:100 @ A1 1:200 @ A3
0 1 2 3 4 5 6m

Drawing Reference
17352-NBRS-L-106
Rev
B

LEGEND

- SITE BOUNDARY
- EXTENT OF LANDSCAPE WORKS
- NEW BUILDING FOOTPRINT
- 0.0 FALL — GRADIENT AND DIRECTION OF SLOPE
- EL 0.00 — EXISTING LEVEL
- RL 0.00 — PROPOSED LEVEL
- FFL 0.00 — FINISHED FLOOR LEVEL
- TOW 0.00 — TOP OF WALL
- TREES TO BE RETAINED AND PROTECTED AS PER AS4970-2009
- PROPOSED TREE PLANTING
- PROPOSED MASS PLANTING
- PROPOSED NATURAL TURF (TYPE TR 01) 'SIR WALTER BUFFALO'
- COLOURED CONCRETE PAVING TYPE 1 (PV 01) COLOUR TBC - BROOM FINISH
- COLOURED CONCRETE PAVING TYPE 2 (PV 02) COLOUR TBC - BROOM FINISH
- COLOURED CONCRETE PAVING TYPE 3 (PV 03) COLOUR TBC - BROOM FINISH
- PLEXIPAVE PAVING TYPE 4 (PV 04) COLOUR TBC
- COLOURED CONCRETE PAVING WITH ENGRAVING TYPE 5 (PV 05)
- MULCH (PV 07) 'PLAYGROUND MULCH'
- SOFTFALL (PV 08) POLYSOFT PLAY
- TACTILE GROUND SURFACE INDICATORS (TG 01)

THIS DRAWING MUST BE PRINTED IN COLOUR

Issue

No.	Date	Description	Chkd
A	12/07/2018	ISSUE FOR COORDINATION	AS
B	31/07/2018	ISSUE FOR INFORMATION	AS

Disclaimer

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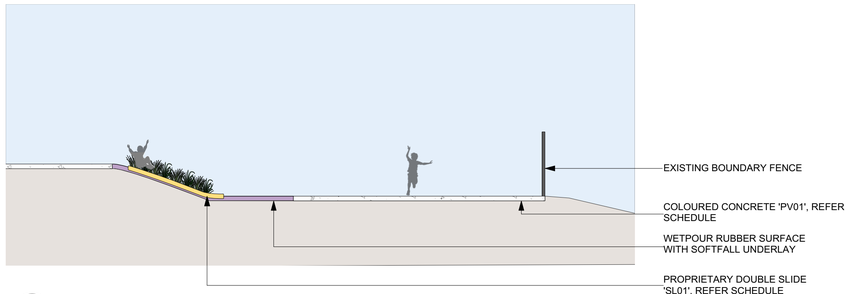
Project
CANTERBURY SOUTH PUBLIC SCHOOL
at
20 HIGH STREET, CANTERBURY, NSW 2193
for
NSW Department of Education

Drawing Title
Materials & Finishes Plan 07

Date 03/08/2018
Scale 1:100 @ A1 1:200 @ A3
0 1 2 3 4 5 6m

Drawing Reference 17352-NBRS-L-107
Rev B



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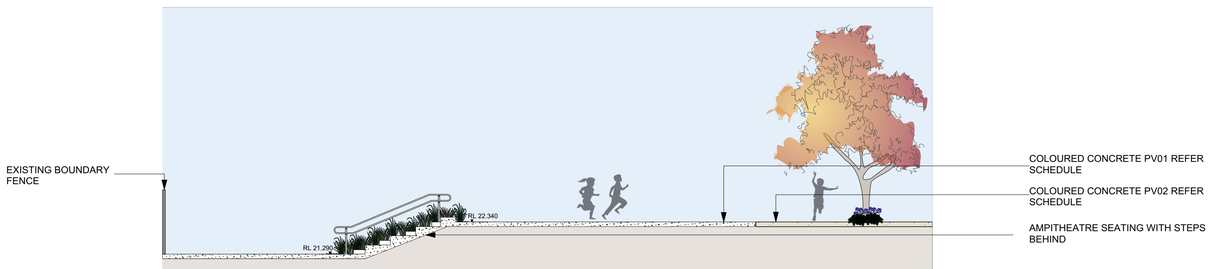

2 SECTION B
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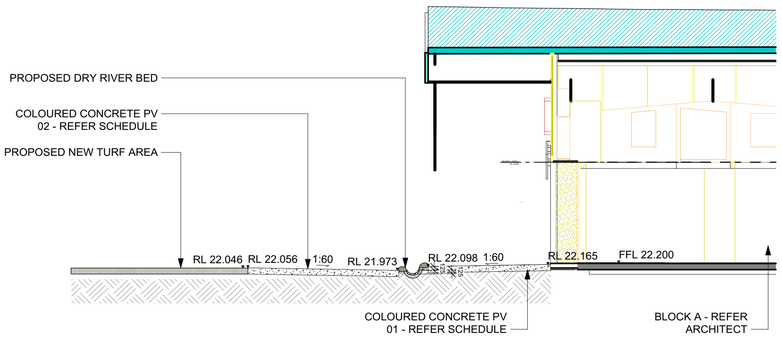

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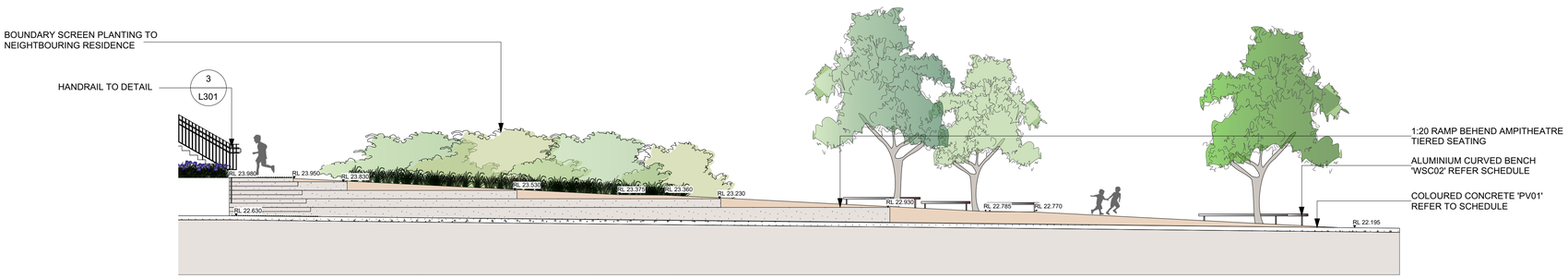

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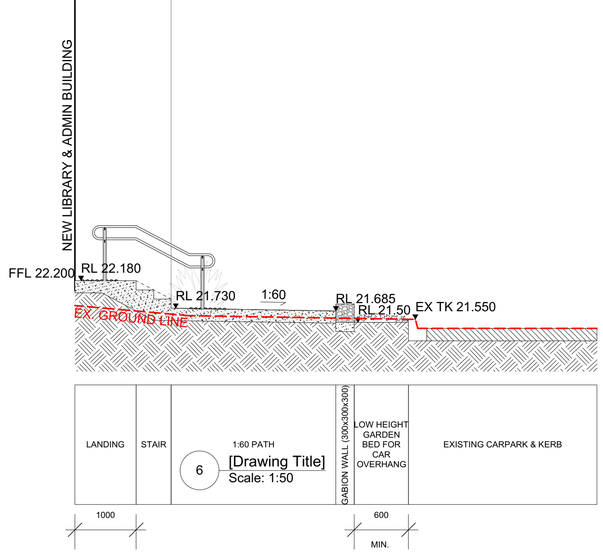

6 [Drawing Title]
Scale: 1:50

7 SECTION D
1:50

NBRSARCHITECTURE. LANDSCAPE

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Issue

No.	Date	Description	Chkd
A	12/07/2018	ISSUE FOR COORDINATION	AS
B	31/07/2018	ISSUE FOR INFORMATION	AS

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Project
CANTERBURY SOUTH PUBLIC SCHOOL
at
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for
NSW Department of Education

Drawing Title
Landscape Sections/Elevations 01

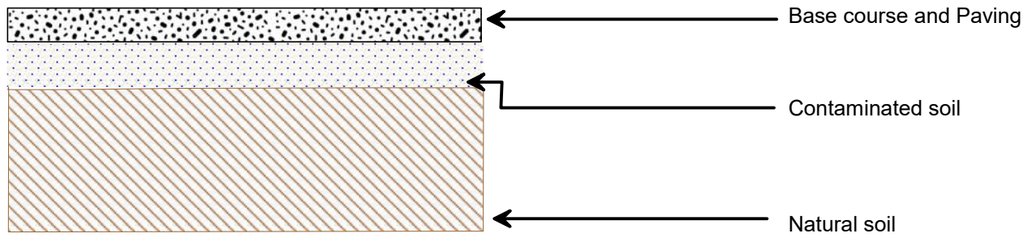
Date 03/08/2018
Scale 1:100 @ A1 1:200 @ A3
0 1 2 3 4 5 6m

Drawing Reference
17352-NBRS-L-200
Rev
B

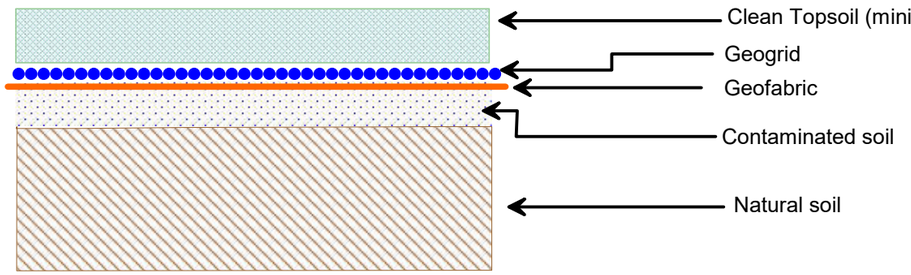
Appendix C: General Capping Specifications

General Capping Specifications (as described in Table 7-2 of the RAP)

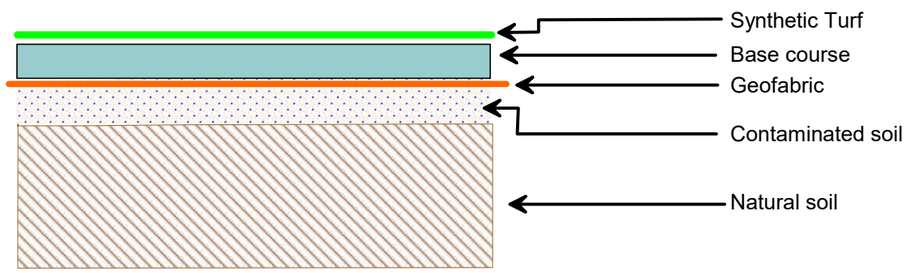
Schematic cross section of capping of existing contiuous paved areas



Schematic cross section of capping unpaved areas, turf and/or rubber soft fall



Schematic cross section of capping of play areas

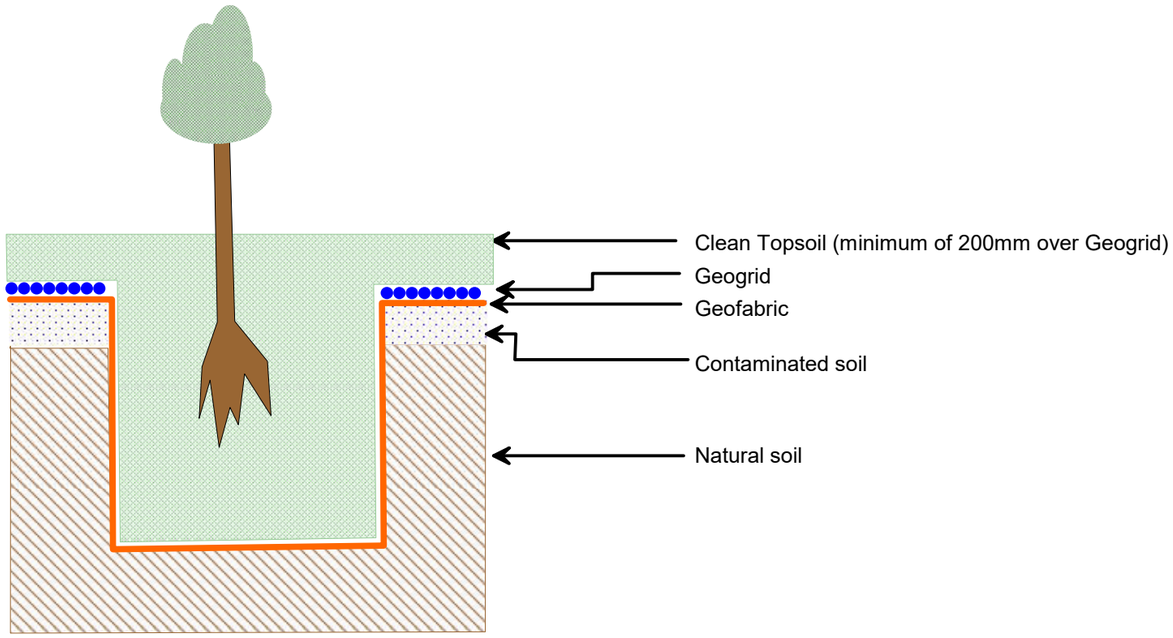


NOTES:
Sketch is indicative only. Not to scale.

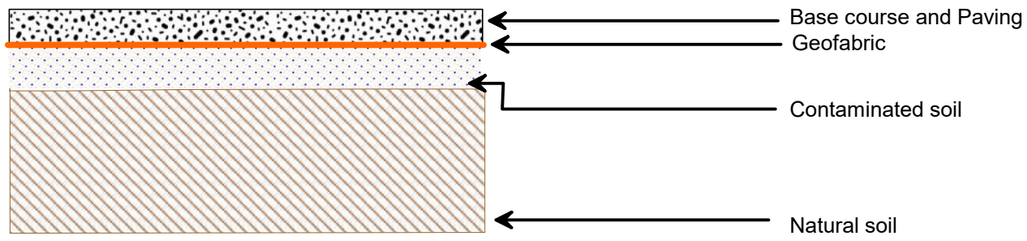
Reference should be made to the report text for a full understanding of this plan.

ENVIRONMENTAL INVESTIGATION SERVICES	Project Number: E31040KBrpt RAP	Title: SCHEMATIC CROSS SECTIONS OF CAPPING (PAGE 1 of 3)
	Attachment: A1	Address: Canterbury South Public School, Canterbury, NSW

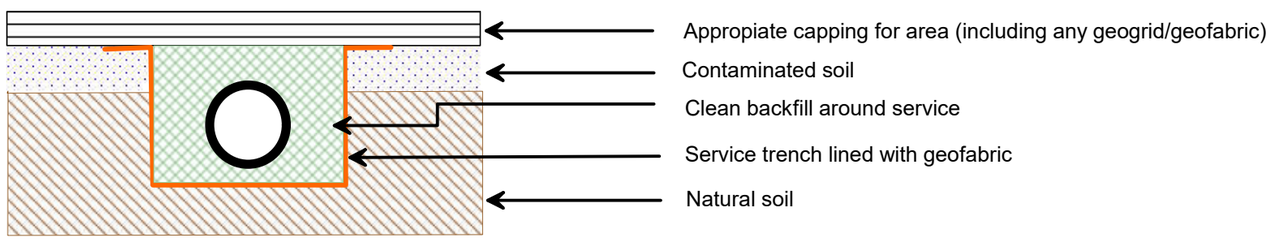
Schematic cross section for landscaping with deeper plantings



Schematic cross section of capping of new continuous hardstand areas



General schematic cross section for Services



NOTES:
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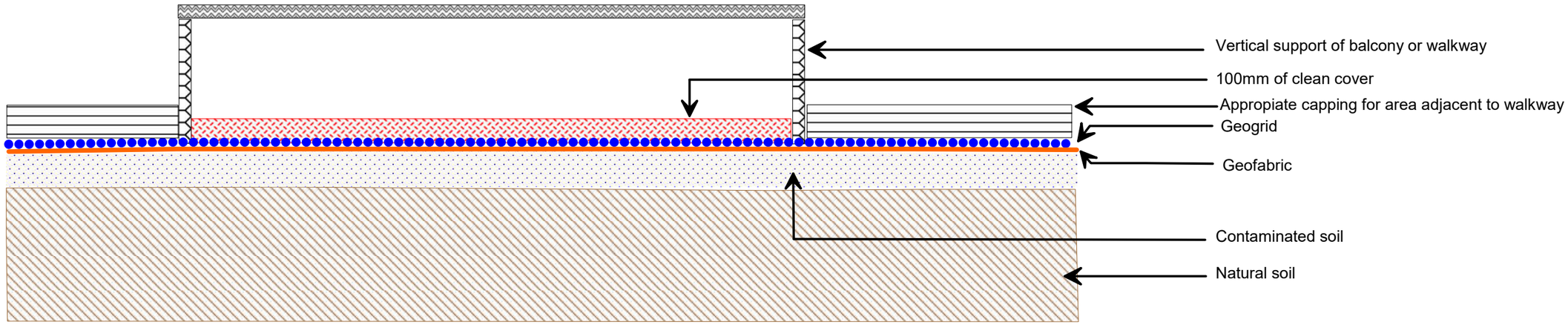
ENVIRONMENTAL INVESTIGATION SERVICES	Project Number: E31040KBrpt RAP	Title: SCHEMATIC CROSS SECTIONS OF CAPPING (PAGE 2 of 3)
	Attachment: A2	Address: Canterbury South Public School, Canterbury, NSW

Schematic cross section of capping beneath suspended walkways/balconies



NOTES:
Sketch is indicative only. Not to scale.

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

ENVIRONMENTAL INVESTIGATION SERVICES	Project Number: **E31040KBrpt RAP**	Title: **SCHEMATIC CROSS SECTIONS OF CAPPING (PAGE 3 of 3)**
	Attachment: **A3**	Address: **Canterbury South Public School, Canterbury, NSW**