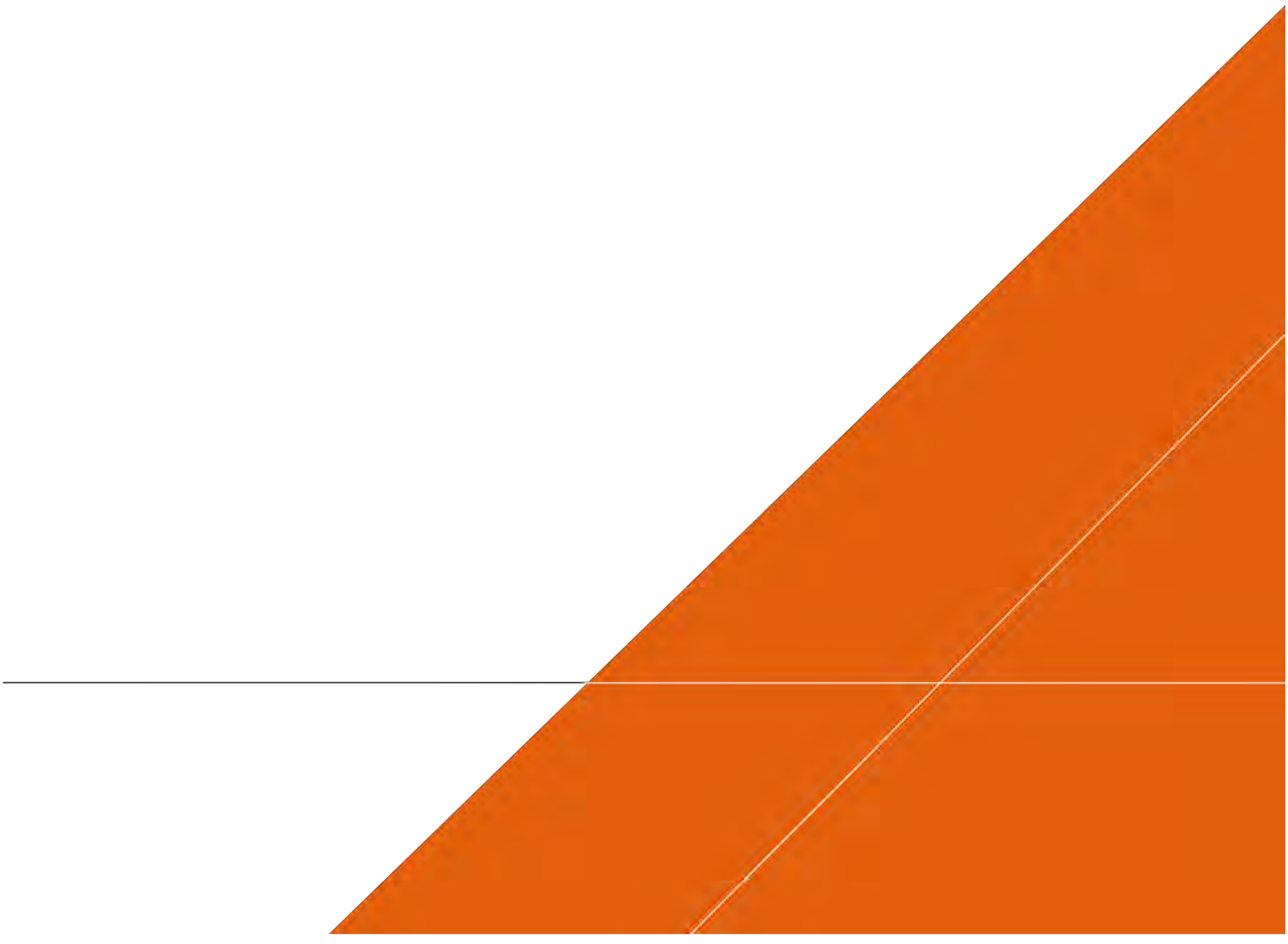
ARCADIS Design & Consultancy for natural and built assets

REMEDIATION ACTION PLAN

126 Kent Road, Marsfield NSW 2122

04 DECEMBER 2019



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Remediation Action Plan

126 Kent Road, Marsfield NSW 2122

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REVISIONS

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V0	19/11/2019	Draft for auditor review	PM	LM
V1	21/11/2019	Finalised for client – still waiting on Auditor comments	PM	LM
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V4	4/12/2019	Update after final Auditor comments	PM	LM
V5	4/12/2019	Update after final Auditor comments	PM	LM

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APPENDICES

ABBREVIATIONS

Acronym	Definition
ACM	Asbestos-Containing Materials
AF/FA	Asbestos fines / fibrous asbestos
AHD	Australian Height Datum
ANZECC & ARMCANZ	Australian and New Zealand Environment and Conservation Council & Agriculture and Resource Management Council of Australia and New Zealand
ANGZ	Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2018)
ADWG	Australian Drinking Water Guidelines
AEI	Areas of Environmental Interest
ASLP	Australian Standard Leaching Procedure
ASS	Acid sulfate soils
B(a)P	Benzo(a)pyrene
BGS	Below Ground Surface
BH	Borehole
BTEXN	Benzene, toluene, ethylbenzene, xylene and naphthalene
CEMP	Construction environmental management plan
CLM Act	Contaminated Land Management Act (1997)
CoPC	Contaminants of potential concern
CoC	Chain of Custody
CSM	Conceptual Site Model
DDSCA	Due Diligence Soil Contamination Assessment
DO	Dissolved Oxygen
DOE	Department of Education
DQI	Data Quality Indicator(s)
DQO	Data Quality Objective(s)
DSI	Detailed site investigation
EC	Electrical Conductivity
Eh	Redox Potential
EIL	Ecologically based Investigation Level
EMP	Environmental Management Plan
ENM	Excavated Natural Material
EP&A Act	Environmental Planning and Assessment Act 1979
EP&A Regulation	Environmental Planning and Assessment Regulation 2000
ESA	Environmental Site Assessment
FB	Field Blank (quality control sample)
FSSCA	Further Supplementary Soil Contamination Assessment
GIL	Groundwater Investigation Level(s)
GPR	Ground Penetrating Radar
GSW	General Solid Waste

GSW (Special Waste)	Asbestos Waste
Ha	Hectares
HASP	Health and safety plan
HIL	Health-based Investigation Level
HSE	Health Safety and Environment
HRA	Health Risk Assessment
HSL	Health-based Screening Level
HW	Hazardous Waste
IL	Investigation Level(s)
LCS	Laboratory Control Sample
LNAPL	Light Non-Aqueous Phase Liquid(s)
LOR	Limit of Reporting
LEP	Local Environmental Plan
LGA	Local Government Area
m	Metre
mbgs	Meters below ground surface
mg/kg	milligrams per kilogram
mg/L	milligrams per litre
MS	Matrix Spike or Mass Spectrometry or Mass Spectra
mS	milliSiemen
MSD	Matrix Spike Duplicate
MTBE	Methyl-tertiary Butyl Ether
mV	milli-Volts
MW	Monitoring Well
NATA	National Association of Testing Authorities
NEPM/NEPC	National Environment Protection Measure (2013) / National Environment Protection Council
NEMP	National Environmental Plan
NSW	New South Wales
NSW EPA	New South Wales Environment Protection Authority
ºC	Degrees Celsius
OCP & OPP	Organochlorine & organophosphorus pesticides
OEH	Office of Environment and Heritage
PAH	Polycyclic aromatic hydrocarbon
PFAS	Per- and poly- fluorinated alkyl substances
POEO Act	Protection of the Environment (Operations) Act 1997
PSI	Preliminary Site Investigation
PCBs	Polycyclic Chlorinated Biphenyl
PSH	Phase-Separated Hydrocarbons (same as LNAPL)
PID	Photo-Ionisation Detector
ppm	Parts Per Million
PQL	Practical Quantitation Limit

QA	Quality Assurance
QC	Quality Control
RAP	Remediation action plan
RB	Rinsate Blank (quality control sample)
RPD	Relative Percentage Difference
RSW	Restricted Solid Waste
SAS	Site Audit Statement
SB	Soil Bore
SDAC	Sediment Assessment Criteria
SEPP	State Environmental Planning Policy
SSD	State Significant Development
SWAC	Surface Water Assessment Criteria
SWL	Standing Water Level
SWMs	Safe Work Method Statement
TB	Trip Blank
TBA	To be advised
TCLP	Toxicity Characteristic Leaching Procedure
TDS	Total Dissolved Solids
TOC	Total Organic Carbon
TPH/TRH	Total petroleum hydrocarbons / total recoverable hydrocarbons
UCL	Upper Confidence Level
USCS	Unified Soil Classification System
UPSS	Underground Petroleum Storage Systems
ug/L	Micrograms per litre
UST	Underground Service Tank
VOCs/SVOCs	Volatile organic compounds / semi-volatile organic compounds
WHS	Work Health and Safety

EXECUTIVE SUMMARY

Arcadis Australia Pacific Pty Ltd (Arcadis) was commissioned by St Hilliers (NSW) Pty Ltd (St Hilliers) to complete a Remediation Action Plan (RAP) at 126 Kent Road, Marsfield NSW 2122 (herein known as 'the site').

The site is occupied by Kent Road Public School, and Schools Infrastructure currently have a State Significant Development Approval (SSDA) to undertake development and upgrade works to the school, subject to a number of planning conditions (Conditions B8, B9, B10, D26, D27 and D28 relate specifically to Site Contamination).

The site has no history of industrial or commercial use and accordingly does not have a high potential risk for extensive contamination and was used primarily for residential or educational purposes since 1960s. Prior to the 1960s, the site was used for agricultural purposes (potentially market gardens and orchards)..

Following the observation and positive identification of asbestos containing material (ACM) at three (3) locations (TP-1, TP-3 and TP-4) on site, the sampling density required to effectively characterise the site needed to be reconsidered from the original fifteen (15) investigations that were undertaken. In these circumstances, the NSW guidelines default to the Western Australia (WA) 2009 guidelines which require double the density of sampling locations to characterise a site with potential asbestos containing material (PACM) impacts. Therefore, a minimum of twenty-eight (28) test locations are required to characterise and better assess the ACM impacts at this site.

Following the Further Supplementary Soil Contamination Assessment (Arcadis, November 2019), together with the preliminary SSDA conditions issued to Schools Infrastructure, the Department of Education (DoE) decided that a RAP would have to be prepared in order to ensure that the site could be made suitable for desired land use.

Objectives of the RAP

The objective of this RAP is to provide a plan of activities, procedures and objectives to ensure the effective and controlled remediation of the site for the proposed re-development. It describes the procedures and standards to be followed throughout the project to facilitate successful remediation / management of the site and ensure protection of human health and the environment.

Conclusions and Recommendations

With consideration to NSW EPA's endorsed guideline hierarchies for soil remediation options and clean-up objectives (NSW EPA 2017), and the site-specific contaminants, proposed development and environmental setting, the preferred remediation strategy will be a combination of 'excavation and removal of all impacted fill soil' and the use of a 'Containment Cell'. This is due to there being various classifications of waste present across the site which have varying costs associated with their disposal.

Soils that have been identified as being impacted by ACM will remain on-site but will be placed within a containment cell. Other fill soils identified on-site which have been given an indicative waste classification of GSW (possibly able to be recycled as GSW-CT1) ,will need to be disposed of off-site, subject to re-classification to Special Waste – GSW if any ACM is observed in the material during excavation and removal works.

As a part of the validation of the remediation works, a visual inspection should be conducted by a suitably qualified environmental consultant. An asbestos clearance certificate must also be issued by a Licensed Asbestos Assessor (LAA).

A long-term Environmental Management Plan (EMP) will need to be prepared for the management of impacted soils that will remain on site. The EMP must detail the monitoring and maintenance requirements for the containment cell cap. It must also outline the administrative controls on any future activity with the capacity to potentially expose the ACM impacted soil beneath.

1 INTRODUCTION

Arcadis Australia Pacific Pty Ltd (Arcadis) was commissioned by St Hilliers (NSW) Pty Ltd (St Hilliers) to complete a Remediation Action Plan (RAP) at 126 Kent Road, Marsfield NSW 2122 (herein known as 'the site') to address the conditions within the State Significant Development Approval (SSDA). The location of the subject site is shown on **Figure 1, Appendix A**.

1.1 Background

The site is currently occupied by Kent Road Public School, and Schools Infrastructure have a SSDA to undertake development and upgrade works to the school, subject to a number of planning conditions (Conditions B8, B9, B10, D26, D27 and D28 relate specifically to Site Contamination). Arcadis understands that building alterations and additions are currently proposed to be made on the area of interest on the site as part of ongoing school upgrades. The proposed upgrade design layout is presented in **Appendix C**.

The site has no history of industrial or commercial use and accordingly does not have a high potential risk for extensive contamination and was used primarily for residential or educational purposes since 1960s. Prior to the 1960s, the site was used for agricultural purposes (potentially market gardens and orchards).

a total of thirteen (13) soil sample locations was recommended to meet the required minimum number of sampling points to characterise a site in accordance with the relevant industry NSW EPA (1995) Sampling Design Guidelines. Eight (8) sampling locations were completed by hand auger during the Due Diligence Assessment to a depth of 0.3 m, and Arcadis completed a further seven (7) sampling locations to the natural soil profile providing a total of fifteen (15) investigation locations.

Following the observation and positive identification of asbestos containing material (ACM) at three (3) locations (TP-1, TP-3 and TP-4) on site, the sampling density required to effectively characterise the site needed to be reconsidered. In these circumstances, the NSW guidelines default to the Western Australia (WA) 2009 guidelines which require double the density of sampling locations to characterise a site with potential asbestos containing material (PACM) impacts. Therefore, a minimum of twenty-eight (28) test locations are required to characterise and better assess the ACM impacts at this site.

During the further works kick-off meeting on 19 September 2019, the EPA Accredited Auditor advised that the eight hand augured locations to 0.3 m below ground level are not acceptable for use as part of the dataset, but test pitting undertaken on 10 August 2019 as part of the Supplementary Assessment could be used as part of the data set. In order to meet the required density, an additional twenty-one (21) test pits were required across the site.

Following the Further Supplementary Soil Contamination Assessment (Arcadis, November 2019), together with the preliminary SSDA conditions issued to Schools Infrastructure, the Department of Education (DoE) decided that a RAP would have to be prepared in order to ensure that the site could be made suitable for desired land use.

1.2 Objective

The objective of this RAP is to provide a plan of activities, procedures and objectives to ensure the effective and controlled remediation of the site for the proposed re-development. It describes the procedures and standards to be followed throughout the project to facilitate successful remediation / management of the site and ensure protection of human health and the environment.

The RAP will address condition B8(b) of the Development Application.

1.3 Scope of Works

The following scope has been included as part of the RAP Stage:

- A Remediation Options Appraisal (ROA) was undertaken to provide the rationale, and justification for selection of the preferred remediation strategy. The options assessment

began with a screening of applicable remediation technologies based on site-specific data such as contaminated volumes and previous remediation experience with similar site conditions. Effectiveness, ease of implementation, protection of human health and the environment and cost were the primary criteria;

- A conceptual design drawing for the containment cell; and
- A detailed Sampling Analysis and Quality Plan for final validation works required after fill removal which also stipulates Quality Assurance and Quality Control measurements.

2 SITE DESCRIPTION AND ENVIRONMENTAL SETTING

2.1 Site Identification

The Site is located at 126 Kent Road, Marsfield NSW 2122, and the Site Location Investigation Area is shown in **Figure 1, Appendix A**. The site details are summarised in Table 2-1 below.

Table 2-1 Site Identification

Site Characteristic	Detail
Street Address	126 Kent Road, Marsfield NSW 2122
Lot and DP Number	Lot 1 – DP1250772 (consolidated from Lot 1 – DP 8612, Lot 1, 2, 3, 4 & 5 – DP 12030, Lot 1 – DP 34283 and Lot 1 – DP 782254)
Local Government Area	Ryde City Council
Land Zoning	'SP2 – Infrastructure – Educational Establishment', 'SP2 – Infrastructure – Classified Road' and 'R2 – Low Density Residential' under the Ryde Local Environmental Plan 2014
Current Site Use	Ryde Public School (Primary School)
Site Coordinates (UTM)	Latitude: -33.787917 Longitude: 151.109105
Site Area	Arcadis notes that during the reporting of the Supplementary Assessment it appeared that the site area is approximately 7,600 m^2**. Figure 4, Appendix A** and the design plans in **Appendix C** show the boundary of the Site to which the RAP, SSDA and Audit applies.

2.2 Site Use

2.2.1 Current Site Use

At the time Arcadis completed the Further Supplementary Soil Contamination Assessment (FSSCA) (Arcadis, 11 November 2019), the site was under redevelopment with a number of the school buildings having been demolished and the debris removed from site. These buildings were still present during the PSI and Due Diligence work.

The basketball court had been partially removed and all demountable classrooms had been relocated to the RMS paper road/easement north of the site. The surface appeared clean graded over the majority of the new building footprints and some new service trenches had been excavated. Most of the raised garden beds were still present in the north of the site along with the old trees. Vegetation did not appear to be stressed or dying.

2.2.2 Proposed Site Use

Arcadis understands that building alterations and additions are currently proposed to be made on the site, as part of ongoing school upgrades.

Refer to **Appendix C** for the proposed building footprints.

2.3 Surrounding Land Use

The land uses currently surrounding the site are as follows:

- North: There are residential properties on the northern side of the site, which are bordered by Kent Road and Herring Road;
- South: Residential properties;
- East: Residential properties and Kent Road; and
- West: Residential properties and Herring Road.

2.4 Site History

The following site history was summarised in the Preliminary Site Investigation (PSI) prepared by Arcadis (Arcadis, 27 April 2018).

- The site and immediate surrounding area have no history of industrial or commercial use and therefore does not have a high potential risk for extensive contamination.
- The site has historically been used for residential or educational purposes since 1960s. Since that time, the site configuration has changed from four small buildings on the north west portion of the site to its current configuration of several buildings scattered across the north west, centre and west of the site, along with a basketball and tennis court.
- The surrounding land was observed to be agriculture in nature or undeveloped before residential development began to the south and west of the site in 1961. A large cylindrical tower existed north west of the site from 1961 to 1982 and appears to be a water tower.
- Prior to the 1960s, historical agricultural use of the site (potentially including market gardens and orchards) may have involved use of OCPs, OPPs and herbicides.

2.5 Environmental Setting

2.5.1 Topography

The site slopes slightly south/south east toward Shrimptons Creek and has an elevation of approximately 60 m Australian Height Datum (AHD). Additional information regarding the elevation contours around the site can be found in the PSI prepared by Arcadis (Arcadis, 27 April 2018).

2.5.2 Geology

Arcadis PSI (Arcadis, 27 April 2018) reported the site geology as follows:

The 1:100,000 Geological Survey of NSW map of Sydney indicates that the site is underlain by the following geological unit;

- Triassic aged Ashfield Shale from the Wianamatta Group described as black to dark grey shale and laminate.

The 1:100,000 Geological Survey of NSW map of Sydney indicates that directly south east of the site, the following geological unit underlays the site;

- Triassic aged medium to coarse grained quartz sandstone, very minor shale and laminate lenses.

The Soil Conservation Service of NSW Sydney 1:100,000 Soil Landscapes Series Sheet 9310 (2nd Edition) indicates that the landscape of the region of the site comprises of Glenorie Soil Landscapes.

2.5.3 Hydrogeology

A review of NSW Department of Primary Industries Office of Water records for groundwater bores within a 2000 m radius of the site indicated the presence of twenty-six (26) water monitoring bores. A list of registered groundwater bores within 1500 m from the site are provided in Table 2-2 below. For the full list of registered groundwater bores within the 2000 m dataset buffer, refer to the Lotsearch report provided within the PSI (Arcadis, 27 April 2018).

Table 2-2 Registered Groundwater Bore Details within a 1500 m Buffer Zone

Bore ID	Use	SWL	Distance from the Site (m)	Direction
GW108110	Recreation	7.30	849	North West
GW112640	Monitoring	-	867	North
GW112641	Monitoring	-	883	North
GW112642	Monitoring	-	891	North
GW011296	Irrigation	-	934	North
GW016863	Irrigation	-	935	North
GW109694	Monitoring	-	1357	North East

Based on the above, the inferred groundwater flow direction is towards the west / southwest following the natural topography.

2.5.4 Hydrology

The nearest surface water receptor is an unnamed water course that branches off Shrimptons creek and is located approximately 73 m south east of the site.

2.5.5 Acid Sulfate Soil Risk

Review of the 'Standard Local Environmental Plan Acid Sulfate Soils' indicated that there is no known occurrence of acid sulfate soils (ASS) at the site.

Review of the 'Atlas of Australian Acid Sulfate Soils' indicated that the site was in a Class B category with a low probability of occurrence (6 – 70 % chance of occurrence). ASS is not known or expected to occur in these environments, and land management activities are not likely to be affected by acid sulfate materials.

3 CONTAMINATION STATUS

A summary of the previous environmental investigation work conducted at the site is presented in the following sections. The sampling locations discussed in this section are presented in **Figures 2 and 3, Appendix A**.

3.1 Preliminary Site Investigation (Arcadis, 27 April 2018)

Based on the scope of work conducted for the PSI at Kent Road Public School within the proposed development area located at 126 Kent Road, Marsfield NSW 2122, the following conclusions and recommendations were provided:

- The site and immediate surrounding area have no history of industrial or commercial use and therefore does not have a high potential risk for extensive contamination.
- The site has historically been used for residential or educational purposes since 1960s.
- Prior to the 1960s, historical agricultural use of the site (potentially including market gardens and orchards) may have involved use of OCPs, OPPs and herbicides.
- Within the proposed development area of interest, potential indicators of contamination observed at the site included the presence of fill material and building materials containing asbestos and/or lead paint.

Based on the observations made during the site walkover and following analysis of site history, Arcadis is of the opinion that there is a low risk of gross contamination present onsite within the proposed development area.

Whilst there is a low risk of gross contamination, given that several potential sources of contamination have been identified (i.e. former market gardens, fill, asbestos materials and lead paint) and minor disturbance works are proposed during development, Arcadis recommended conducting a targeted assessment of the site soils to confirm that there is no risk to human health or the environmental within the proposed development.

3.2 Due Diligence Soil Contamination Assessment (Arcadis, 30 July 2018)

Arcadis conducted a Due Diligence Soil Contamination Assessment (DDSCA) on the site in July 2018, where eight (8) soil bores were excavated by hand auger to 0.3 m bgl. These locations are presented in **Figure 2, Appendix A**. This work was commissioned to provide an indicative soil quality report and in-situ indicative waste classification of soils within the proposed development footprint, and the likelihood of potential risk to human health (both workers and occupants/students) and ecological receptors. The locations were selected to provide general coverage of the site, although were targeted to include the indicative area for proposed buildings.

The targeted soil assessment included the collection of surface soils and natural soils to a maximum depth of 0.3 m below ground level. The reported total recoverable hydrocarbons (TRH) F2 (>C_{10}-C_{16} minus naphthalene) Tier 1 NEPC (2013) NEPM HSL A&B exceedances in soil samples SB03-0.2 and SB07-0.2 indicated that there could be a potential risk to human health via the vapour intrusion pathway if buildings were located over these locations. No ACM was reported from the 2018 sampling.

Arcadis recommended that a supplementary soil contamination assessment was required to close out the data gaps identified during the Due Diligence Soil Assessment, and to characterise the nature and depth of the fill in the proposed development area to determine whether the soils meet the required land use criteria of Low Density Residential based on the use as a primary school in accordance with NEPM.

3.3 Further Supplementary Soil Contamination Assessment (Arcadis, 11 November 2019)

Based on the development site area of 0.55 ha, a total of thirteen (13) soil sample locations was recommended to meet the required minimum number of sampling points to characterise a site in accordance with the relevant industry NSW EPA (1995) Sampling Design Guidelines. Eight (8) sampling locations were completed by hand auger during the Due Diligence Assessment to a depth of 0.3 m, and Arcadis completed a further seven (7) sampling locations as a part of the Supplementary Assessment to the natural soil profile providing a total of fifteen (15) investigation locations. These locations are presented in **Figure 2, Appendix A**.

Following the observation and positive identification of asbestos containing material (ACM) at three (3) locations (TP-1, TP-3 and TP-4) on site, the sampling density required to effectively characterise the site needed to be reconsidered. In these circumstances, the NSW guidelines default to the Western Australia (WA) 2009 guidelines which require double the density of sampling locations to characterise a site with potential asbestos containing material (PACM) impacts. Therefore, a minimum of twenty-eight (28) test locations are required to characterise and better assess the ACM impacts at this site. These new locations are presented in **Figure 3, Appendix A**.

During the further works kick-off meeting on 19 September 2019, the EPA Accredited Auditor advised that the eight hand augured locations to 0.3 m below ground level are not acceptable for use as part of the dataset, but test pitting undertaken on 10 August 2019 as part of the Supplementary Assessment could be used as part of the data set. In order to meet the required density, an additional twenty-one (21) test pits were required across the site.

Based on the findings of the assessments and the objectives of the supplementary assessment, the following conclusions were made by Arcadis:

- Gross contamination in soils at the site was not identified during both investigations, with the exception of bonded ACM observed on the surface and top 100 mm at two test pit locations (TP3 and TP12), scattered surface locations near the garden beds and also other locations observed Arcadis, and within the uncontrolled fill at three (3) test pit locations (TP1, TP4, and GB2).
- The presence of bonded ACM at the surface and in the top 10 cm of soil profile (TP3 and TP12) exceeds the land use criteria of ‘no visible asbestos’ within the top 10 cm and therefore needs to be removed and validated. Arcadis believe that that asbestos fragment reported at TP12 is likely to have been worked into the surface soil as a result of vehicle movements on site as the natural was observed at 0.1 m bgl and the fill material was primarily road base gravels with no suspicious anthropogenic materials.
- ACM was identified and confirmed by laboratory analysis within the fill profile below 10 cm at three (3) of the thirty two (32) locations (TP1, TP4, and GB2) , and exceeded the land use criteria of 0.01% (Residential with access to soils) with the results showing TP1 (0.054%) and TP4 (0.019%). ACM concentration in GB2 is 0.008 w/w%.
- Arcadis understands that approximately 2,500 m^3 of materials require offsite disposal to reach required building levels. Based on the test pit descriptions, Arcadis estimated the total volume of fill across the site to be approximately 2,275 m^3 +/- 10% (7,600 m^2 x 0.30 m) not allowing for an ex-situ bulking factor.
- Arcadis have assessed the available data in detail and note that:

– the asbestos fragments reported in the fill material are primarily located in the west of the site and localised to the raised garden beds. Arcadis have taken a conservative buffer around the asbestos impacted test pits and consider these materials to be preliminary classified as Special Waste with a General Solid Waste (GSW) matrix. This area is outlined in red in **Appendix A, Figure 4**, and the estimated volume requiring disposal as Special Waste with GSW is 1,050 m^3.

– anthropogenic materials (with no apparent ACM) were observed in the fill material in the southern portion of the site. This area is outlined in blue in **Figure 4, Appendix A**. The chemical analysis for the fill material from test pits in this section returned concentrations below

the GSW CT1 criteria Arcadis suggest a preliminary waste classification for this material as GSW(consider recycling as GSW-CT1) assuming no ACM and minimal building rubble (to be guided by an experienced contaminated land consultant or hygienist during the excavation work).

- the remaining fill material observed on site, to the centre, east and north of the site can be preliminary classified as a combination of GSW (consider recycling as GSW-CT1)and the material beneath the fill can be pre-classified as virgin excavated natural material (VENM), with the exception of the total recoverable hydrocarbons (TRH) hotspot outlined in yellow in **Figure 4, Appendix A** which would need to be disposed of as GSW (or included with the general solid waste with asbestos fragments). This 'hotspot' represents SB03.
- Arcadis estimate the volume of GSW (consider recycling as GSW-CT1) and VENM to be approximately 1,400 m^3 and the "hotspot" volume to be approximately 50 m^3.

Based on the findings of the assessments and the objectives of the supplementary assessment, the following recommendations were made by Arcadis:

- An Asbestos Management Plan (AMP) needs to be prepared for the site.
- The ACM impacted fill material could be capped on site or disposed offsite as part of the required bulk excavation works. A Remediation Action Plan will need to be prepared if onsite management of the asbestos contaminated fill is a viable option. An Environmental Management Plan (EMP), which will go on title, will have to be prepared.
- If disposal of asbestos contaminated materials will be the preferred option, the following items should then be included in the AMP negating the requirement for a RAP:
- An Unexpected Find Protocol (UFP) should be included in the Construction Environmental Management Plan (CEMP) to address any additional contamination not identified during assessment (the UFP and AMP could form an Appendix to the CEMP).

Upon completion of the supplementary assessment it was decided by the DoE that some of the asbestos impacted fill material would be retained onsite by a 'cap and contain' strategy.

4 CONCEPTUAL SITE MODEL

Schedule B(2) of the NEPM (NEPC, 2013) describes a conceptual site model as

"A conceptual site model (CSM) is a representation of site-related information regarding contamination sources, receptors and exposure pathways between those sources and receptors. The development of a CSM is an essential part of all site assessments and provides the framework for identifying how the site became contaminated and how potential receptors may be exposed to contamination either in the present or the future".

Based on the site history, site setting, and contamination identified above, the following CSM has been developed.

4.1 Source

Potential sources of contamination at the site (specifically within the proposed development area) and the associated contaminants of potential concern (CoPC) are listed in Table 4-1 below.

Table 4-1 - Potential Contaminant Sources

Source	Associated Chemicals	CoPC
Potential Onsite Sources		
Fill materials of unknown origin	Asbestos, ash, slag, foundry waste	Asbestos, PAH, heavy metals, TRH, OCPs/OPPs, PCBs
Market Garden/Orchards	Pesticides & Herbicides	Organochlorine Pesticides (OCPs) and Organophosphate Pesticides (OPPs)

In addition to the above, pesticides and herbicides may have been used at the site for vermin and weed control in more recent times.

In the Supplementary Assessment, the collected samples were analysed for OCPs and OPPs and no exceedances were observed. Pesticides and herbicides are no longer considered to be a CoPC.

4.2 Potentially Affected Media

Potentially affected media at the site include:

- Soil
- Groundwater

4.3 Pathways

Pathways or transport mechanisms by which receptors may be exposed to contamination on and offsite include:

- Direct contact with contaminated soil/groundwater
- Vertical migration of spills/leaks to groundwater
- Ingestion of dust/abstracted groundwater
- Inhalation of asbestos fibres

4.4 Receptors

Potential receptors to contamination include:

- School attendants
- Site workers
- Intrusive maintenance workers
- Demolition/construction workers
- Surrounding residents
- Groundwater users (off-site)

4.5 Exposure Assessment

Based on the preliminary CSM discussed in Section 4.1 to Section 4.4, the potential for contamination to be present at the site is considered to be Low.

5 DATA QUALITY OBJECTIVES

According to NSW Environment Protection Agency (NSW EPA) 2017 Guidelines for the NSW Site Auditor Scheme (3rd edition), Data Quality Objectives (DQOs) are qualitative and quantitative criteria that clarify the objectives of an investigation, define the amount and type of data to be collected, and specify the tolerable levels of decision making errors. DQOs ensure that the data collected is of the appropriate quantity (sampling frequency) and quality to allow for sound decisions to be made about the nature and extent of subsurface impacts.

It is recognised as the most efficient way to accomplish these goals is to establish criteria for defensible decision making before data collection begins and develop a data collection design based on these criteria. The DQO process consists of seven steps, which are designed to clarify the study objectives, define the appropriate type of data and specify tolerable levels of potential decision errors. DQO process, was established by the United States Environmental Protection Agency (US EPA) and is endorsed in AS4482.1-2005, will ensure that appropriate DQOs are established for the Site.

The DQOs derived for this RAP have been developed in general accordance with:

- National Environment Protection (Assessment of Site Contamination) Measure 1999 as amended in 2013 (NEPM 2013);
- Sampling Design Guidelines (NSW EPA, 1995); and
- Guidelines for Consultants Reporting on Contaminated Sites (OEH, 2011).

The seven steps are outlined as follows:

- **Step 1:** State the Problem – concisely describe the problem to be studied. Review prior studies and existing information to gain a sufficient understanding to define the problem;
- **Step 2:** Identify the Decision – identify what questions the study will attempt to resolve, and what actions may result;
- **Step 3:** Identify the Inputs to the Decision – identify the information that needs to be obtained and the measurements that need to be taken to resolve the decision statement;
- **Step 4:** Define the Study Boundaries – specify the time periods and spatial area to which decisions will apply. Determine when and where data should be collected;
- **Step 5:** Develop a Decision Rule – define the statistical parameter of interest, specify the action level, and integrate the previous DQO outputs into a single statement that describes the logical basis for choosing among alternative actions;
- **Step 6:** Specify Tolerable Limits on Decision Errors – define the decision maker's tolerable decision error rates1 based on a consideration of the consequences of making an incorrect decision; and
- **Step 7:** Optimise the Design –evaluate information from the previous steps and generate alternative data collection designs. Choose the most resource-effective design that meets all DQOs.

The DQOs for the site are provided in Table 5-1 below.

Table 5-1 Project DQOs

Step	Detail
State the Problem	Arcadis understands that the site is currently occupied by Kent Road Public School, and Schools Infrastructure currently have a SSDA to undertake development and upgrade works to the school, subject to a number of planning conditions (Conditions B8, B9, B10, D26, D27 and D28 relate specifically to Site Contamination). Gross contamination in soils was not identified in the investigations undertaken at the site, with the exception of bonded ACM observed on top 100 mm at two test pits locations (TP3 and TP12), scattered surface locations near the garden

	bed and also other locations, and within the uncontrolled fill at three test pit locations (TP1, TP4 and GB2). Following laboratory analysis, where ACM was identified and confirmed at three of the thirty-two total locations (TP1, TP4 and GB2), an exceedance of the land use criteria of 0.01% (residential with access to soils). TRH C_{10}-C_{16} less naphthalene were detected in excess of the Health Screening Level (HSL) A/B at a depth range of 0-1 m bgl at SB03 and SB07 during the 2018 sampling. However, these exceedances of TRH were unable to be repeated in the 2019 sampling, prompting the use of a 95% UCL statistical calculation which brought the concentration below the HSL criteria. The impacted soil must be remediated appropriately and validated in order to reduce the exposure risk and allow the development and upgrade works to be undertaken at the site.
Identify the Decision	Site contamination arising from bonded ACM in the fill soils on the site could potentially be resolved through remediation via a combined 'cap and contain' and excavation method, which would limit exposure risk. Arcadis have assessed the available data and provided preliminary waste classifications for the soil on various sections of the site. These indicative classifications are linked with the spread of ACM impacted material across the site and therefore have been used to guide the remediation options. These are presented in **Figure 4, Appendix A**. The impacted soil within the area pre-classified as 'Special Waste - General Solid Waste (GSW)' (outlined in red in **Figure 4, Appendix A)** will be appropriately 'capped and contained' on-site. A long-term Environmental Management Plan (EMP) will need to be prepared and be notified with Ryde City Council. The fill soil containing anthropogenic materials within the area pre-classified as 'GSW (Recyclable)' (outlined in blue in **Figure 4, Appendix A)** will be excavated, immediately placed in a truck, re-sampled/visually observed from the truckload to confirm the indicative classification, and then taken off-site to an appropriately licensed facility. If ACM is observed within this material, the waste classification should be reclassified to 'Special Waste – GSW'. The TRH hotspot (outlined in yellow in **Figure 4, Appendix A)** may be disposed of with the 'GSW (recyclable)' soils. The remaining soil observed on-site was pre-classified as a combination of 'GSW' (fill) and 'VENM' (underlying the fill) and should be appropriately dealt with if being moved off-site. All materials to be disposed off-site will need to be properly classified in accordance with the NSW EPA (2014) Waste Classification Guidelines. The site will be declared validated and suitable for the proposed land use once fill is removed or contained onsite and natural material is visually observed. An asbestos clearance certificate will also need to be issued by a LAA post- cap installation and after excavation works have been completed. More detail on the validation requirements are provided in Section 7.
Identify the Inputs to the Decision	The inputs to the decisions include: • Site history; • Available analytical data; • Physical observations, including visual, olfactory and PID screening results during site activities; • Delineation and validation data;

	• Waste classification data; and • NSW EPA endorsed guidelines.
Define the Study Boundaries	This RAP applies to the site boundary as shown in **Figure 4, Appendix A**. The temporal boundaries of the study include the previous environmental site assessments and future remediation and validation works.
Develop a Decision Rule	The following decision rule for residual contamination present following excavation of fill soils: • If the fill is still visible or further ACM is uncovered, then further excavation and removal or cap and contain is required; • If fill is removed/contained and natural soils exposed, and an asbestos clearance certificate is issued by a LAA, then the site will be considered to be suitable for the proposed land use. Impacted soil classified and disposed off-site to a facility licensed to accept the classified waste. • Soil analytical data will be compared against EPA endorsed criteria for waste classification and the available landfill/recycling facility acceptance criteria. Statistical analyses of the data in accordance with relevant guidance documents will be undertaken, if appropriate, to facilitate the decisions (as detailed above). • The waste will be classified based on either the total concentrations of CoPC or a combination of total and leachable concentrations. Import of fill suitable for use at the site. • Fill will be considered to be suitable for use on site only if it is accompanied by documentation certifying it as clean fill e.g. virgin excavated natural material (VENM) and excavated natural material (ENM). Onsite encapsulation of waste where there are potential unacceptable risks to human health or the environment from residual contamination. • Where soil encapsulation is proposed, the containment must be appropriately designed / engineered to eliminate, as far as practicable, ongoing risks to human health and/or the environment. Monitoring and management of encapsulated material must be specified in the EMP prepared for the site. Long term management of residual contamination underneath the cap. • A site EMP may be required to inform the long-term maintenance, monitoring, reporting, roles & responsibilities, operational constraints, etc.
Specify Tolerable Limits on Decision Errors	**Capping Design and Implementation Errors** For errors relating to the capping design and implementation, relevant suitably qualified personnel are to ensure that: • A suitably constructed capping layer is installed, to industry standard; and • That the capping layer constructed, to industry standard, results in a long-term stable barrier. **Soil Waste Classification Sample Analytical Errors** The acceptable limits for field and laboratory QA/QA results are as follows: • Relative percent difference (%RPD) for field duplicates is less than 50% for all analytes.

	• Recovery of matrix spikes and surrogate spikes between 70 and 130% or 50% RPD for matrix spike duplicate RPDs for organics only; and • 70 to 130% recovery on trip spike samples. Where acceptable limits for field duplicates are not met, a discussion on low biased error will be provided.
Optimise the Design	The remediation design has been optimised by using the methodologies described in the following industry best practice guidelines: • Sampling Design Guidelines (EPA 1995); • Guidelines for the NSW Site Auditor Scheme 3rd Edition, October 2017; • National Environment Protection (Assessment of Site Contamination) Measure, National Environment Protection Council, revised 2013 (NEPM 2013); • Waste Classification Guidelines. Part 1: Classifying Waste, NSW Environment Protection Authority (EPA) 2014; • Addendum to the Part 1 Waste Classification Guidelines (EPA 2016); and • Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia, WA Department of Health (DOH) 2009.

6 REMEDIATION OPTIONS

6.1 Remediation Objectives

The objective of the RAP is to provide a detailed plan of activities, procedures, contingency measures and objectives to ensure the effective and controlled remediation of the site for the proposed upgrades and development. It describes the procedures and standards to be followed throughout the project to facilitate successful remediation / management of the site and ensure protection of human health and the environment.

The remediation objectives are outlined as follows:

- Remediate the site to a level enabling the proposed upgrades and development suitable for continued land use as a primary school;
- Prevent or minimise to the extent practicable further migration of contaminants from source areas that pose an unacceptable risk to either future site occupants or environmental receptors;
- Validate the soil remedial/assessment works by demonstrating:
  - The ACM impacted soils have been capped and contained within a suitable cap/containment cell;
  - A long-term Environmental Management Plan (EMP) has been implemented for the ongoing monitoring and maintenance of the cap;
  - That fill is removed/contained, and natural soils exposed; and
  - An asbestos clearance certificate can be issued by a LAA.
- Validate the remedial works in accordance with the relevant NSW EPA guidelines;
- Document the validation/assessment process; and
- Prepare a long-term Environmental Management Plan for ongoing monitoring and maintenance purposes of the cap.

6.2 Extent of Remediation Required

The extent of remediation required on-site is presented within **Figure 4, Appendix A**.

The areas requiring remediation have been summarised in the following table. Arcadis notes that remediation is based on the suitability of the material to remain on-site under the proposed land use, however, the indicative waste classification of materials on-site is used for guidance as it defines the areas on the site that are impacted by ACM.

Table 6-1 Description of Remediation Areas

Identifier	Soil (Colour Code in Figure 4, Appendix A)	Location	Indicative Waste Classification	Estimated Area (m^2)	Estimated Volume of Soil (m^3)	Comments
A	Fill material containing ACM (Shown as red)	To the west of the site, localised to the raised garden beds	Special Waste - GSW	~1981	~1,150 (based on an average depth of 0.58m)	This material requires remediation under the NEPM guidelines.
B	Fill material containing	Towards the southern	GSW (consider	~1917	~1,917 (based on an average	This material does not

Identifier	Soil (Colour Code in Figure 4, Appendix A)	Location	Indicative Waste Classification	Estimated Area (m^2)	Estimated Volume of Soil (m^3)	Comments
	anthropogenic materials, no apparent ACM (Shown as blue)	portion of the site	recycling as GSW-CT1)		depth of 0.29m)	require remediation under the NEPM guidelines, unless ACM is discovered.
C	Hotspot location, TRH exceedance of HSL A/B (shown as yellow)	To the north of the site	GSW (consider recycling as GSW-CT1)	~3689	~738 (based on an average depth of 0.2m)	This material requires remediation under the NEPM guidelines.
D	Remainder of fill on-site	To the centre, east and north of the site	GSW (consider recycling as GSW-CT1) and VENM			This material does not require remediation under the NEPM guidelines, unless ACM is discovered.

6.3 Possible Remediation Options

The Contaminated Sites Guidelines for the NSW Auditor Scheme 3rd Edition (NSW EPA 2017) states that a site Auditor must be satisfied that any proposed or completed remediation is technically feasible, environmentally justifiable and consistent with relevant laws, policies and guidelines. The Auditor Guideline (NSW EPA 2017) state the Auditors must have regards to:

- National and NSW remediation policies.
- The Protection of the Environment Operations Act 1997 (POEO Act) and Regulations.
- Other legislation such as the Environmentally Hazardous Chemicals Act 1985 (EHC Act) and the Environmental Planning and Assessment Act.
- Relevant technical guidance documents issued by the EPA.

In addition, the guidelines state the preferred hierarchy of options for site remediation and/or management is set out in s.6(16) Assessment of Site Contamination Policy Framework of Schedules A and B of the NEPM, which is followed in NSW.

This means that soil remediation and management is implemented in the following preferred order:

- *On-site treatment of the soil so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level; and*
- *Off-site treatment of excavated soil 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 applicable*
- *Consolidation and isolation of the soil on-site by containment within a properly designed barrier; and*

- *Removal of contaminated soil to an approved site or facility, followed, where necessary, by replacement with clean fill; and*

A summary of the viable remediation options that may be practically implemented at the site are listed in Table 6-2 below.

Table 6-2 Soil Remediation Options Screening Matrix

Options	Discussion	Conclusion
Option 1 Excavation and removal of all impacted fill soil.	Offsite disposal off all impacted fill material is one of the fastest ways of remediating soils impacted at the site and will eliminate all exposure risks. Additionally, if all impacted material is exported off-site, there will be no requirement for an EMP to be prepared and implemented. There are currently suitably licensed waste facilities in the Sydney region capable of receiving ACM impacted wastes (following waste classification). However, to remove this volume of fill material offsite and to a waste facility would involve a significant volume of truck movement to and from the site. This option would also generate the highest quantity of waste, since materials are disposed to landfill rather than treated and/or reused. The various soils requiring remediation (as specified in Table 6-1) have different pre-classifications and so will be required to be disposed of or recycled accordingly. The cost of disposing Special Wastes – GSW (ACM impacted soils) to a landfill is greatly steeper than the cost of recycling soils with a "GSW-CT1" (all criteria <CT1) classification.	Due to the lack of efficiency and cost of excavating and removing all impacted fill soil on the site, solely using this option is not viable. However, this option, used in conjunction with another option (Option 3) is the **preferred option**.
Option 2 Do nothing.	To leave the site as it is currently would not be feasible due to the risk of harm to occupants of the site from the ACM impacted fill soils.	**Not a suitable option.**
Option 3 Placing the ACM impacted soils within a 'containment cell'.	Containment of impacted soils is a viable option where ACM impacted soils will be removed and placed in a 'containment cell' underneath one of the new buildings to be constructed on-site, effectively 'capping' the impacted soils. This option produces less waste than Option 1, as no or minimal amounts of impacted soil will be sent as waste to a landfill. This option is also the most favourable under the NSW EPA Waste minimisation hierarchy. Option 3 removes the exposure pathway for human health risks, rendering the site soil suitable for the proposed development.	A lack of containment cell space underneath the proposed building structures means that solely using this option is not viable. However, this option used in conjunction with another option (Option 1) is the **preferred option.**

6.3.1 Preferred Remediation Option

With consideration to NSW EPA's endorsed guideline hierarchies for soil remediation options and clean-up objectives (NSW EPA 2017), and the site-specific contaminants, proposed development and environmental setting, the preferred remediation strategy will be a combination of 'Option 1 – excavation and removal of all impacted fill soil' and 'Option 3 – Containment Cell'. This is due to there being various classifications of waste present across the site which have varying costs associated

with their disposal. Additionally, a lack of containment cell space underneath the proposed building structures prevent Option 3 being the sole remediation option used.

Soils that have been identified as being impacted by ACM (identified as 'A' in Table 6-1) will remain on-site and will be placed within a containment cell. Other fill soils identified on-site (identified as 'B', 'C' and 'D' in Table 6-1) will need to be disposed of off-site, subject to re-classification to Special Waste – GSW if any ACM is observed in the material during excavation/validation works.

The details of this remediation option are provided in Section 6.4.

6.4 On-site Soil Remediation Plan

A summary of the remediation schedule for soil is provided as follows:

- Remove the ACM impacted material (Emu bob) from the surface and if possible, the top 10 cm across the site and document the subsequent clearance certificate.
- Air monitoring is advised during the removal of all fill material as a conservative measure, and to ensure that if further ACM is identified, the appropriate management and monitoring controls are in place. See Section 9.11 for more detail on air monitoring requirements.
- Fill soils that have been identified as being impacted by ACM (identified as 'A' in Table 6-1) will be retained on-site within a containment cell. It has been proposed that the containment cell will be located underneath the proposed Block R structure, which will be located on the north-east portion of the site. A conceptual design of the containment cell is provided in **Appendix B**. Refer to the proposed upgrade design layout in **Appendix C** for the location of Block R.
  - In order to account for the containment cell, the existing soil beneath Block R will be excavated down to natural rock which is present at a maximum depth of 3.2 m bgl. The existing soil underneath Block R has been pre-classified to be a combination of GSW (Fill, however, consider recycling as all criteria are <CT1) and VENM (soil underneath the fill).
  - The foundation for Block R has been proposed to comprise 425mm of concrete slab, 100mm of sand, and several bored pile footings that will extend below the slab to the natural rock surface. These details are provided in **Appendix C** and **Appendix D**.
  - The containment cell will be 'capped' by a visual marker layer, an aggregate/sand layer and the concrete foundation slab of Block R.
  - A visual 'marker' layer should be installed around the bored pile caps once they have been installed, prior to the placement of sand and the concrete slab being poured. The visual marker layer, if encountered during any future intrusive works through the slab, will act as a warning marker that works should cease. A permeable geomembrane can be used as the marker layer.
  - As the containment cell will be placed on top of natural rock, a base marker layer is not required.
- Due to the presence of several bored piles that will extend below Block R's slab to the natural rock surface, going through the containment cell, three options were provided regarding the methodology of constructing the containment cell (and piling). From a constructability perspective, the civil contractor engaged to carry out works at the site has chosen the method specified in Table 6-3.

Table 6-3 Methodology of Piling/ Constructing the Containment Cell

Option	Description of Methodology
Drilling through the containment cell to construct the piles	The methodology that will be used to install the piles underneath Block R are as follows: 1. Conduct excavation of the existing soil beneath Block R down to natural rock. 2. Backfill this excavation with the ACM impacted material. 3. Install the bored piles through the ACM impacted material down to natural rock. Drill spoil from the installation of the bored piles must be disposed of off-site as 'Special Waste – GSW' to an appropriately licenced landfill*.

	4. Install the marker layer on top of the contained impacted material between the pile caps 5. Place the sand layer and pour the concrete slab. * Additional health and safety management measures must be implemented (See Section 10.9 for further details).

- Soils that have been identified as fill soils containing anthropogenic material (identified as 'B' in Table 6-1) have been given a GSW pre-classification (consider recycling as all criteria are <CT1). The soils in this area must be appropriately managed during excavation with a suitably qualified environmental consultant present during the works to observe the material and provide expert opinion, and possibly conduct additional sampling to confirm the preliminary classification of the material. If ACM will be observed within this material, the waste classification should be reclassified to Special Waste – GSW and will be disposed offsite as Special Waste in a GSW soil matrix. This can only be decided during the excavation works. Communications with the Auditor will be undertaken if this problem arises.
  - This material will be visually assessed by an experienced environmental scientist during excavation works,
  - It is intended for this material to be immediately removed from the site via truck to landfill, and not stored in temporary stockpiles.
  - During filling of the trucks, a total of three 10L samples will be collected per truck load for additional screening over a 7 mm sieve (as per the WA DOH Guidelines). If ACM is visually observed within a truck or within any of the three (or more) 7 mm screening tests, then that particular truckload will be disposed of as Special Waste – GSW. It is the presence or absence of ACM in this material that will dictate if the material leaves the site as GSW or Special Waste – GSW.
- Soils that have been identified within the hotspot location (TRH exceedance of HSL A/B) (identified as 'C' in Table 6-1) have been given a GSW pre-classification (consider recycling as all criteria are <CT1), and may be disposed of along with the GSW (consider recycling as all criteria are <CT1) waste. Additional sampling of this material may be required in order to confirm the preliminary classification of this material.
- The remainder of the soils on the site have been given a combination of GSW (consider recycling as all criteria are <CT1) and VENM (below the fill material in area's 'A', 'B', 'C' and 'D') pre-classification and should be disposed of off-site appropriately. Additional sampling of this material may be required in order to confirm the preliminary classification of this material.

6.4.1 Notification to Site Auditor

The site Auditor has requested to be notified at the following stages over the course of the remediation.

St Hilliers must provide notification to the Auditor at the stages detailed in Table 6-4 as the Auditor intends to attend the site to complete an inspection. In addition to the schedule listed below, the Auditor must also be notified of which piling/construction methodology is selected from Table 6-3.

Table 6-4 Schedule of Notification to Site Auditor

Stage of Remediation	Time of Notification
Completion of the excavation of the containment cell.	The Auditor should be notified at a maximum of 48 hours after completion of the excavation of the cell.
ACM impacted material has been placed in the containment cell.	The Auditor should be notified at a maximum of 48 hours after all ACM impacted material has been placed within the containment cell.

Installation of concrete piles	The preferred installation methodology (refer to Table 6.3) shall be communicated with the Auditor at least 48 hours before the piles will be installed.
Installation of the visual marker layer.	The Auditor must be notified at a minimum of 48 hours prior to the installation of the visual marker layer. This must be completed prior to placement of sand and pouring of the concrete slab.
Cap (marker layer, sand and concrete slab) has been installed.	The Auditor should be notified at a maximum of 48 hours after the cap of the containment cell has been installed.

6.5 Expected Volume Available in the Containment Cell

Arcadis has roughly estimated the volume expected to be available in the containment cell beneath Block R.

St Hilliers has provided the following information, and Arcadis' volume calculations are based on these:

- The surface area of Block R is 387m^2
- The maximum depth to rock from surface level is 3.2 m bgl (metres below ground level). Arcadis notes that this is an assumption.
- The thickness of the concrete slab for Block R is 0.425 m.
- The thickness of the sand layer underlying the concrete slab for Block R is 0.1 m.

Arcadis has assumed/allowed for the following:

- The depth to rock from surface level is 3.2 m bgl across the entirety of Block R.
- The diameter of each bored pile is assumed to be 0.6 m, therefore the volume of all 20 piles is 18 m^3.
- The containment cell will be excavated 0.25 m inward from the perimeter, to account for any lateral movement during compaction of the backfill. This means that the containment cell surface area is 369 m^2.
- The volume that the capping layer (concrete slab and sand layer) will take up is approximately 194 m^3, based on the thickness of the capping layers and the reduced containment cell surface area, as specified above.

From the above information, the expected volume available within the containment cell underneath Block R is approximately 1,000 m^3. In case the containment cell is too small, additional disposal of special waste will be required.

6.6 Validation

Validation of the remedial works is an integral part of the remediation process. Validation inspections will be used to demonstrate that the remediation objectives have been achieved. Details of the validation program are provided in Section 7 below.

6.7 Environmental Management Plan (EMP)

As the remedial strategy to be adopted at the site will involve the placement and containment of the impacted fill material within a containment cell on-site, a long-term Environmental Management Plan (EMP) will need to be prepared for the management of impacted soils that will remain on site. A conceptual design of the containment cell that will be located underneath Block R, has been provided in **Appendix B**.

The EMP must detail the monitoring and maintenance requirements for the containment cell cap. It must outline the administrative controls on any future activity with the capacity to potentially expose the ACM impacted soil beneath. In addition to this, the EMP must also include a surveyed drawing to present where the impacted material has been placed.

The requirement for the development of the EMP will occur once validation of the site has been completed and any engineering controls are installed. The engineering controls are the components of the containment cell. The administrative controls to ensure the integrity of the cell include:

- Regular visual inspections of the slab under Block R; and
- The presence of the impacted material, including the containment cell details, should be noted on the site-specific asbestos register kept by Kent Road Public School administration and the Asset Management Unit of the Department of Education.

The EMP should be notified on the Section 10.7 Certificate.

Before approval of the EMP, the auditor should seek views of the relevant authority (Department of Planning and City of Ryde) as required per the NSW EPA Site Auditor Guidelines.

6.8 Residual Exposure Risk

The residual exposure risk to contaminants within the soils will be low through the capping and containment of the ACM impacted soils, and the excavation and offsite disposal of hotspots and fill material.

7 VALIDATION PLAN

7.1 Visual Inspection and Clearance Certificate

Visual inspections should be performed during excavation to identify any inconsistencies and evidence of contamination and unexpected finds.

Visual inspection during excavation of soils that have been identified as 'B' in Table 6-2 must especially be observed by a suitably qualified environmental consultant to note if any ACM will be observed within this material. If ACM is observed, the waste classification of this material should be reclassified from GSW (consider recycling as all results are <CT1 criteria) to Special Waste – GSW, alternatively an additional containment cell can be created underneath one of the other new school buildings.

Post-excavation and remediation work, another visual inspection must be undertaken by a suitably qualified environmental consultant to assess if all fill materials have been removed, and that natural materials are exposed. From previous investigations it was concluded by Arcadis that the natural materials on-site meet Residential A criteria, therefore, exposed natural material will indicate that the site is suitable for the proposed upgrades and redevelopment.

A clearance certificate should be provided by a LAA after all excavation works are completed.

At locations where not all fill material will be removed, soil validation sampling and testing will be required. Soil samples should be collected on a 10m grid and tested for heavy metals, TRH, BTEX, PAH, OP/OC and Asbestos. If soil sampling will be undertaken, a sampling and analysis methodology will have to be agreed upon between the Consultant and the Auditor prior to the sampling being undertaken. Such a Sampling and Analysis Quality Plan (SAQP) will then be prepared by the consultant for the Auditor to approve.

7.2 Validation Reporting

At the completion of the remediation works a Validation Report must be prepared in general accordance with the NSW OEH Guidelines for Consultants Reporting on Contaminated Sites (OEH 2011), documenting the works as completed. This report will contain information including:

- Details of the remediation works conducted;
- Details of the landfill and recycling sites where material has been disposed of (i.e. weighbridge dockets, EPL licence number)
- Details of the air monitoring program implemented during the removal and excavation of fill material across the site;
- Information demonstrating that the objectives of the RAP have been achieved, in particular the sample results of any waste classification, along with assessment of the data against both the pre-defined DQOs and to the remediation acceptance criteria;
- Information demonstrating compliance with appropriate regulations and guidelines;
- Any variations to the strategy undertaken during the implementation of the remedial works;
- Details of any environmental incidents occurring during the course of the remedial works and the actions undertaken in response to these incidents; and
- Other information as appropriate, including requirements (if any) for ongoing monitoring / management.

The report will serve to document the remediation works for future reference.

The following records will be maintained by the civil contractor during remediation work and will be made available for inclusion into the Validation Report:

- Any complaints made towards the remedial works, the date and time that the complaint was made, and corrective actions taken;

- Records of approvals to remove or dispose soil from the site;
- Suspicious soil material encountered in the materials brought onto site;
- Source of material being brought onto site for the sub-grade layer or for backfilling; and
- Dockets for the quantities of material being brought onto site as well as the EPA approvals.
- Any amendments to works which negate from this RAP, Auditor comments to these amendments, as well as any comments and/or endorsements;
- Site visits and activities performed; and
- Photographic records of the stockpiled materials (if any) as well as stockpile management, and site establishment.

The validation report must assess the results of the post-remediation testing against the clean-up criteria stated in the RAP. Where targets have not been achieved, reasons must be stated, and additional site work proposed to achieve the original RAP objectives.

8 CONTINGENCY PLAN

A review of remediation works has been undertaken to identify potential risks to meeting the specified site validation criteria. A number of potential risks have been identified. These are listed following with contingencies that will be implemented to ensure that validation criteria are met.

8.1 Unexpected Finds

An Unexpected Finds Protocol (UFP) will be prepared to address any undiscovered hazards that may be present at the site. The strategy for dealing with any potentially hazardous unexpected sources is discussed in detail within the UFP and has only been briefly discussed in this section.

The UFP will apply to the following activities:

- Earthworks completed to remove, remediate and/or dispose of known ACM impacted soils;
- Earthworks completed during construction activities for the proposed upgrade works;
- Importation of any fill to support earthworks undertaken as part of the site development works;
- Installation of site infrastructure including stormwater, service connections, utilities, roads and access infrastructure; and
- Any other activities that have the potential to uncover or encounter contaminated materials, waste or asbestos.

Contractors should make allowance for the briefing of all site workers on the unexpected findings protocol as well as allow time for undertaking continuous and daily inspections and recording daily events.

Should material be encountered (outside the area identified as 'A' in Table 6-2 (marked red on **Figure 4, Appendix A**) that is suspected of containing ACM, the following actions are to be undertaken:

- Material that is suspected of containing asbestos must be isolated and the area barricaded to prevent the possible exposure of workers to asbestos. Signs notifying site workers of the presence of asbestos must be placed on the barricades;
- All suspicious material must be assumed to contain asbestos until it has been proven otherwise by laboratory analysis; and
- All suspicious material and other unexpected finds are to be logged on the Unexpected Finds Register.
- If, after confirmation that ACM is present within the material, the material pre-classification will need to be changed to Special Waste – GSW and should be disposed of appropriately off-site. This can only be decided during the excavation and removal works.

The sampling strategy for each "unexpected find" shall be designed by a suitably qualified and experienced environmental professional. The strategy will, however, be aimed at determining the nature of the substance – that is, is it hazardous and, if so, at concentrations which pose an unacceptable risk to human health or the environment.

The sampling frequency of the identified substance / materials shall meet the minimum requirements the NSW EPA Sampling Design Guidelines (1995).

8.2 Excessive Odours from Works

Based on the nature of the identified contaminants, off-site odour complaints will not be likely. Where complaints do occur, the following will be undertaken:

- Transport and handling of soils during favourable weather conditions only;
- Covering of impacted soils; and/or
- Consider installing an odour screening / masking system at the site boundaries.

8.3 Remediation Strategy Unsuccessful

Should validation be deemed not suitable for the sites intended land uses, the RAP will be required to be revised to manage exposure pathways and potential risks to site users. In this case, other remediation options may need to be considered (see options listed in Section 6).

9 SITE MANAGEMENT PLAN

The following section contains appropriate details to eliminate / manage potential environmental emissions which may be generated by or during the site remediation works.

9.1 Hours of Operation

Remediation works shall only be permitted during the following hours:

- Monday to Friday: 7:00 am to 6:00 pm;
- Saturdays: 8:00 am to 1:00 pm;
- Sundays and Public Holidays: No work permitted.

9.2 Site Establishment

All safety and environmental controls are to be implemented as the first stage of remediation works. These controls will include:

- Locate and isolate all required utilities in proximity of the works;
- Install work area security fencing;
- Site signage and contact numbers with the contact details of the remediation contractor and project manager;
- Assess the requirements of dust and odour control measures;
- Sediment erosion controls; and
- Stormwater runoff sediment controls.

9.3 Site Access

During remediation works, perimeter fencing will be maintained to restrict access to the works area. Only authorised persons will be able to enter the works area.

Vehicle access to the site shall be stabilised to prevent the tracking of soil around the site and the adjoining driveway/access point to the road will be swept or cleaned on an as-needed basis. Any collected materials shall be treated as potentially contaminated and will be suitably managed.

9.4 Material Tracking

A Stockpile and Waste Tracking Register should be used to record all soil material sent offsite for disposal and other materials brought onto site as part of the remediation work.

An accredited surveyor may be required to monitor earthworks and validate of each phase of the remediation works regarding material removed and / or reinstated.

9.5 Material Transport

Trucks will be loaded in a designated area away from the contaminated material excavations. The transporting contractor shall ensure that there is no material tracked out onto the street and that the load is securely covered. In addition, all site vehicles must leave the site in a forward direction.

All appropriate road rules shall be observed, and state roads will be selected as far as practicable over local roads when deciding on the transport route to the off-site material disposal location.

Under the NSW EPA Asbestos and Waste Tyre Guidelines 2015 the legal requirements that consignors, transporters and occupiers of premises must meet in addition to the Waste Regulations for ACM transportation the following requirements are noted:

- A transporter of Asbestos Waste must be registered as a transporter of Asbestos Waste on WasteLocate before any transport of Asbestos Waste is to occur.

https://wastelocate.epa.nsw.gov.au/

The transporter of Asbestos Waste must provide the following information to the NSW EPA upon registration on WasteLocate no later than on delivery of its first load of Asbestos Waste to the receiving facility:

- Name and address of the transporter;
- Mobile telephone number of the transporter's registered driver;
- Email address of the transporter;
- Trading name or agency name of the transporter;
- Drivers licence number of the transporter's registered driver;
- Postal address of the transporter, if different from address;
- Primary telephone number of transporters;
- The Australian Business Number (ABN) for the transporting company (if the entity has an ABN); and
- WorkCover licence number of the transporter, if held.

The transporter of a load of Asbestos Waste must provide the following information to the NSW EPA by using WasteLocate before the transportation of any load of Asbestos Waste:

- Type of Asbestos Waste in the load;
- Vehicle registration; and
- Number of the vehicle driven by the transporter's registered driver for the specific consignment.

A transporter of a load of Asbestos Waste to any premises must scan the EPA Fixed Plate at the premises through their mobile device for each load. Scanning of the EPA Fixed Plate by the transporter for a load enables the occupier to meet its obligations under clause 76(7) or 79(6) (as applicable) of the Waste Regulation for that load.

If the EPA Fixed Plate at an occupier's premises is not scanned by the transporter, the occupier must provide the EPA in writing the date and time of delivery of the load of Asbestos Waste, the vehicle registration number of the vehicle driven by or on behalf of the transporter for the specific consignment.

Where material is to be imported, controls are to be implemented to maintain separation between contaminated and non-contaminated materials.

It is noted that WasteLocate may not be required to be used for transport of asbestos impacted soils depending on the status of a temporary directive issued by NSW EPA. The status of WasteLocate requirements in relation to asbestos impacted soil is to be confirmed at the time of disposal.

9.6 Backfilling Excavations

If any imported fill is required to be brought on-site for back-filling purposes, it is required to be certified as ENM or VENM and accompanied by a waste classification certificate or be sampled in accordance with the ENM Order (NSW EPA 2014).

9.7 Soil and Water Management

All works shall be conducted in strict accordance with the soil and water management measures outlined in this section.

To prevent the migration of impacted soil / sediment off site, silt fences shall be constructed at the down-gradient works area boundaries, as per the specifications contained in Managing Urban Stormwater – Soil and Construction Volume 1, 4th Edition, NSW Government, March 2004. Any material which is collected behind the sediment controls shall be treated as potentially contaminated and will be suitably managed.

In a storm event, the sediment controls located on-site will need to be monitored and replaced or altered if necessary. Collected material will need to be suitably managed in accordance with remediation works.

Prior to exposing and/or disturbing the known or potential ACM impacted soils by intrusive earthworks or excavation works, the following activities should be carried out and implemented by the party responsible for the disturbance to soil in the affected areas:

- Notification to the responsible party (Owner, Principal Contractor etc.) to discuss the scope of works to be undertaken, the likelihood of generating dust, excess spoil or waste and the management of this material;
- Ensure contractors / workers are aware of the potential for asbestos contaminated materials to be encountered;
- Setup of work area, and exclusion zone including appropriate signage and barriers;
- Assess proposed scope of works to minimise the requirement to expose and / or excavate asbestos contaminated materials;
- Ensure contractors / workers, where any works involving asbestos contaminated materials is expected or identified, are supervised by an appropriately qualified person as required by the relevant legislation (i.e. Class-A or Class-B licensed contractor);
- Preparation of a specific occupational health and safety plan that caters for the proposed activities / works including the provision of PPE (refer to Section 7.1);
- Consideration and / or preparation of a Dust Management Plan / Procedure to mitigate / minimise dust generation and identify controls;
- Consideration of the equipment used to minimise potential soil exposure and dust generation;
- Preparation of a specific environmental protection plan including soil, water and air management protocols;
- Preparation of a methodology for managing excavated soil; and
- Contingency planning to include encountering other suspected asbestos impacted material other than that expected.
- Additional information pertaining to the transportation of ACM (Section 9.12) should also be consulted.

9.8 Stockpiles

Although stockpiling is not intended to be undertaken for any of the excavated material, the following procedures have been provided, in case there is requirement to stockpile any material that does NOT contain any ACM:

- Contaminated soil stockpiles should be placed on an impermeable or sealed surface with controls for dust, runoff and seepage to minimise further impact to surrounding areas;
- No stockpiles or other materials shall be placed on footpaths or roadways and will be away from all stormwater infrastructure (including drainage lines, stormwater pits, gutters, etc.) where possible. Where this is not possible, sediment controls will be placed over stormwater grates to prevent ingress of sediment to stormwater drainage lines;
- Stockpiles shall be formed with sediment control structures placed immediately down slope to protect other lands and waters from sediment pollution;

- Placement of material on a sealed or plastic lined surface;
- Covering of all excavated / stockpiled contaminated material; and
- Fill material sourced onsite or imported (ENM or VENM) should segregated and placed in an area where there is no risk of the material becoming contaminated during remediation works.

9.9 Noise

The remediation works shall comply with the NSW EPA's Environmental Noise Control Manual for the control of noise from construction sites.

All machinery and equipment used on site will be in good working order and with the fitted with appropriate silencers when necessary.

9.10 Vibration

The use of plant and machinery shall not cause vibrations to be felt or capable to be measured at the neighbouring premises.

9.11 Air Quality

Health and air monitoring must be undertaken when a worker is at risk of exposure to asbestos while performing work that is not licensed asbestos removal work. The need for health and air monitoring of these workers should be determined on the basis of the potential for exposure, frequency of potential exposure and duration of the work being undertaken.

Consideration must be given to the worker's demographic, medical and occupational history and records of the worker's personal exposure. The health and air monitoring must include a physical examination of the worker with emphasis on the respiratory system, including standardised respiratory function tests, unless another form of health and air monitoring is recommended by a registered medical practitioner.

Workers must be informed of any health and air monitoring requirements before the worker carries out work that may expose them to asbestos.

Air monitoring for asbestos exposure may be required as result of the assessment and should be conducted by a competent person in accordance with the following;

- Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Edition [NOHSC:3003(2005)].

Exposure standards set out the airborne concentrations of asbestos, which should not damage the health of workers. The exposure standards for asbestos are:

- Amosite (brown asbestos) 0.1 f/mL (Fibres per millilitre of air);
- Crocidolite (blue asbestos) 0.1 f/mL; and
- Chrysotile (white asbestos) 0.1 f/mL.

All areas or equipment with asbestos or ACM in situ should be assessed by a competent person to determine the appropriate inspection periods to ensure risk controls are effective. Inspection periods are to be identified by the person responsible for the area.

9.12 Dust Control

During the remediation of the ACM impacted areas, dust levels will be monitored and minimised by using mist sprays as necessary on all excavation, stockpiles and loadout.

Dust shall also be controlled by ensuring vehicles leave via the designated (stabilised) site access points.

Any situations or areas which exceed the asbestos exposure standard are to be controlled to eliminate or minimise risk of exposure.

Any vehicle used to transport asbestos waste should be cleaned before leaving the site and the vehicles load should be covered prior to dispatch.

9.13 Odour

Where odour may be an issue and/or if complaints should occur, the contingency measures associated with odour control outlined in Section 8.2 will be implemented. Additional odour suppression actions will be taken to reduce the odours as necessary, which may include:

- increasing the amount of covering of excavations / stockpiles;
- mist sprays;
- odour suppressants; and
- maintenance of equipment.

9.14 Hazardous Waste

Hazardous waste is subject to strict controls regarding its movement and methods for management. If hazardous waste is present onsite storage, haulage and disposal methods will be developed and will be based on the particular contaminants and concentrations identified.

Any excess excavation soils from the fill material at the site will be stockpiled and classified separately for waste disposal as they may result in a higher level of waste classification (special, hazardous or restricted waste) due to chemical or other anthropogenic impacts.

Adoption of any strategy for the management of hazardous waste will require close management by a suitably qualified environmental consultant and will increase the time required to complete the remedial works. Liaison with relevant authorities, contractors and landfill disposal or storage sites will be required.

9.15 Disposal of Contaminated Soil

All soil will be classified, managed and disposed in accordance with the Waste Classification Guidelines Part 1: Classifying Waste (NSW EPA 2014).

Asbestos waste must also be disposed (in case onsite retainment is not possible) in accordance with the regulatory requirements under clause 42 of the Protection of the Operations (Waste) Regulation 2014 which apply to asbestos waste and includes:

- Waste stored onsite prior to disposal must be done so in an environmentally safe manner;
- Non-friable asbestos must be securely packaged at all times;
- Friable asbestos (if encountered) must be kept in a sealed container;
- Asbestos contaminated soil must be wetted down;
- All asbestos waste must be transported in a covered, leak-proof vehicle (applicable to asbestos impacted soil);
- Asbestos waste can be disposed at a landfill site that can lawfully receive this waste. It is recommended that the landfill is contacted beforehand to find out if the facility can receive the waste and whether there may be any special requirements or delivery constraints;
- It is illegal to dispose of asbestos waste in domestic garbage bags;
- It is illegal to re-use, recycle or dump asbestos waste.

If friable waste requires disposal, then only a person with a Class A removal license is permitted to remove the waste material and air monitoring will be required to be undertaken by a LAA.

If more than 100 kg of asbestos waste or 10 m^2 (in total) of asbestos sheeting is proposed to be removed from the Site, then information is to be provided to the EPA.

9.16 Site Signage and Contact Numbers

Throughout the duration of the works appropriate signage shall be erected around the remediation area with the contact details of the remediation contractor and project manager.

9.17 Complaint Reporting and Resolution

Complaints from adjoining site occupants or workers on site will be directed initially to the responsible person onsite (owner, principal contractor, civil contractor). Following that, discussion with the environmental consultant and the complainant will investigate the issue and remedy it as required or applicable.

9.18 Site Dis-establishment

On completion of the remediation works all plant, equipment and safety and environmental controls shall be removed from the site unless contracted for ongoing redevelopment or construction works.

10 HEALTH AND SAFETY

The principal remedial contractor should prepare a separate construction and environmental management Plan (CEMP) prior to the remediation works beginning. The information presented below is not exhaustive and is to be included along with additional relevant information in the CEMP.

The objectives of the health and safety plan (HASP) are:

- To apply standard procedures that reduce risks resulting from the above works;
- To ensure all employees are provided with appropriate training, equipment and support to consistently perform their duties in a safe manner; and
- To have procedures to protect other site workers and the general public. These objectives will be achieved by:

– Assignment of responsibilities;

– An evaluation of hazards;

– Establishment of personal protection standards and mandatory safety practices and procedures; and

– Provision for contingencies that may arise while operations are being conducted at the site.

This health and safety section does not provide safety information specific to construction and other demolition or excavation activities carried out by contractors, such as the safe operation, maintenance and inspection of plant, etc. Contractors will be required to prepare their own e.g. Safe Work Method Statements (SWMS), Job Hazard Analysis (JHA), Standard Operating Procedures (SOP) and task-based Risk Assessments (RA) for their work activities. All parties working on the site shall comply with all applicable Health and Safety legislation, regulations, codes and guidelines.

10.1 Responsibilities

Client Site Supervisor / Manager

The client supervisor/manager is responsible for:

- Advice on obtaining development approval;
- Helping to ensure all works are compliant with the development approval;
- Assisting with community consultation; and
- The client supervisor/manager contact details will be provided prior to the works.

Remediation Contractor

The remediation contractor is responsible for:

- Ensuring all works are undertaken as per the RAP;
- Ensure all works involving the disturbance of the ACM contaminated soils are conducted under the supervision of a suitably qualified Class A or Class B asbestos licensed contractor;
- Ensure all ACM impacted soils are wetted to reduce the potential generation of dust;
- Minimise erosion at the site, including erosion of soils exposed during excavation and demolition works;
- Protect nearby receiving environments from potential contamination;
- Ensure contaminated site plant and equipment are decontaminated prior to commencing work in soil that meets Residential A criteria;
- Signs and record keeping should indicate the origin and location of contaminated materials;

- No stockpiling of impacted soils (where possible) to prevent cross contamination of soil that meets Residential A criteria.
- Direct transport from contaminated area to burial site;
- Validated areas should be isolated to prevent cross contamination;
- Routine site inspections.
- Ensuring all works are undertaken in accordance appropriate regulations and standards;
- Ensuring all works are undertaken as per the health and safety plan;
- Ensuring a copy of the health and safety plan is available at the site during the remediation/validation activities;
- Confirming individuals are competent in performing allotted tasks;
- Liaison with the client supervisor/manager and contractor representatives, as appropriate, regarding safety matters; and
- Investigation and reporting of incidents and accidents.

The remediation contractor contact details will be provided prior to commencement of works.

Environmental Consultant

The environmental consultant is responsible for:

- Undertake remediation and validation sampling as per the RAP;
- Ensuring consultant works are undertaken as per the health and safety plan;
- Liaison with the contractor representatives, as appropriate, regarding safety matters; and
- Undertake validation and reporting as per the RAP.

The contact details of the responsible parties are provided in Table 10-1.

Table 10-1 Contact Details

Client's Supervisor / Manager	Details
Name	To be advised (TBA)
Company	TBA
Address	TBA
Contact Phone	TBA
Remediation Contractor	**Details**
Name	TBA
Company	TBA
Address	TBA
Contact Phone	TBA
Environmental Consultant	**Details**
Name	TBA
Company	TBA
Address	TBA
Contact Phone	TBA

10.2 Other Members of the Site Workforce

Every individual worker is responsible for conducting their allocated tasks in a safe manner and in accordance with their training and experience. They must give due consideration to the safety of all others in their proximity and cooperate in matters of health and safety. All workers must leave their work areas in such a condition that the location will not be hazardous to others at any time.

10.3 Hazards

The known or potential hazards associated with the work activities are listed below:

- Chemical hazards associated with the presence of contaminated soil;
- Physical hazards, including;
- Work in or near excavations;
- Operating machinery;
- Heat stress and UV exposure;
- Underground or overhead services;
- Manual handling; and
- Noise.

In the event of the discovery of any condition that would suggest the existence of a situation more hazardous than anticipated, or of any new hazard that could potentially cause serious harm to personnel or the environment, work will be suspended until the Project Manager has been notified and appropriate instructions have been provided to field personnel.

10.4 Chemical Hazards

The main chemical hazards associated with the remediation/validation works are ACM based products. SafeWork Australia has published 'How to safely remove asbestos code of practice' (October 2018) which provides additional information on safety standards when removing asbestos. The AMP (currently being prepared by Arcadis) will address asbestos hazards in more detail.

Workers involved in disturbing the known impacted soil, and surrounding stakeholders, could be exposed by:

- Respiration of dust or potential fibres generated from the soil;
- Dermal contact with asbestos contaminated soils;
- Ingestion of asbestos contaminated soils; and
- Possible secondary exposure from contaminated equipment or clothing.

Planning of the earthworks involving exposure and / or disturbance of ACM impacted soils, and implementation of appropriate health and safety measures, will minimise the potential for contact with contaminated materials through the above listed pathways.

All machinery (i.e. excavators and / or trucks) that are required to conduct work on or pass over the site will need to be enclosed (windows wound to the full up position) with re-circulatory air functioning. Movement outside of the vehicle should be conducted with the required PPE. Equipment and PPE must be handled as outlined in Section 10.3 unless done in a designated clean area of the site.

When working with contaminated materials in general, care must be taken to ensure that the contamination is not introduced to the worker via ingestion, inhalation or absorption. Personal Protective Equipment (PPE) and decontamination requirements related to the remedial works are summarised in Sections 10.6 and 10.7.

10.5 Physical Hazards

10.5.1 Operating Machinery

Heavy plant and equipment operating in the vicinity of field personnel presents a risk of physical injury. Personnel should be cognisant of their position in relation to operating machinery at all times. Personnel must wear high visibility clothing when onsite.

Never walk behind or to the side of any operating equipment without the operator's knowledge. Do not assume that the operator knows your position. Personnel should stay at least 1 m from the operational area of heavy equipment and should not stand directly below any load or piece of equipment (e.g. backhoes, excavators, vehicles).

10.5.2 Work in or Near Excavations

No site personnel are to stand closer than 0.5 m to the edge of an excavation. No site personnel are to enter excavation greater than 1 m deep. Additionally, at the end of each day excavations are to be barricaded to prevent access.

10.5.3 Cuts and Abrasions

The manual work associated with the remediation works gives rise to the risk of cuts and abrasions to personnel working in the area. As well as the direct consequences of any cut or abrasion, such injuries can lead to the possibility of exposure to contaminants through the wound as well as diseases such as tetanus. To minimise the risk of direct or indirect injury, personnel will wear the personal protective equipment described.

10.5.4 Heat Stress and UV Exposure

Site personnel may experience heat stress due to a combination of elevated ambient temperatures and the concurrent use of personal protection equipment; this depends in part on the type of work and the time of year.

In addition to heat stress, overexposure to UV radiation in sunlight can result in sunburn to exposed skin. The use of a high protection sunscreen (SPF15 or greater) on all exposed skin is recommended. Hats (including hard hats in specified areas) will also provide additional sun protection during the peak (i.e. 10:00 am to 3:00 pm) sun period. Sunglasses should be worn (where appropriate) to protect eyes from effects of UV exposure.

10.5.5 Underground Services

There is the potential for underground services (electricity, natural gas lines, water, telephone, optic fibre, sewer, and stormwater) to be present beneath the work area. The remediation contractor shall ensure that appropriate procedures will be taken to minimise the risk associated with excavation near services.

10.5.6 Aboveground Electrical Hazards

All electrical plant and equipment must comply with the requirements of Australian Standard AS 3000. Handheld portable tools shall comply with AS/NZS 3160 "hand-held portable electric tools" and shall be double insulated.

Cord connected Portable hand lamps shall comply with AS/NZS 3118. A Residual Current Device (RCD) shall protect plug-in Portable equipment, which is connected to a supply above Extra Low Voltage - 12-24volts (including equipment supplied from a generator or welding set). RCD protection shall be provided during maintenance of Portable electrical equipment at all times while the equipment is connected to a power supply above Extra Low Voltage, irrespective of whether power is

switched ON or OFF. RCD's shall comply with AS 3190 and shall be type II units, rated to trip at or below 30 milliamps within 40 milliseconds.

10.5.7 Manual Handling

When lifting or handling heavy objects, use correct lifting techniques, bending the knees not the back. If the item to be lifted is too heavy or awkward for one person to lift, seek assistance from other company employees or use mechanical help.

10.5.8 Noise

Long-term exposure to high levels of noise is unlikely. However, operating machinery may cause significant noise exposures for short periods. Earplugs or earmuffs should be worn in any situation where noise levels make normal conversation difficult.

10.6 Personal Protective Equipment (PPE)

All workers who may come into direct contact with contaminated soil will wear the following personal protective equipment for areas with no ACM exposure risks:

- overalls or long-sleeved collared shirt and long pants;
- heavy duty outer gloves (e.g. leather) where there is a risk of cuts or abrasions, otherwise PVC outer gloves if in direct contact with contaminated soil;
- steel capped boots;
- safety glasses;
- high visibility vest or jacket; and
- hard hat.

It is further noted that additional PPE may be required as part of the WorkCover permitting process. If this occurs, then the above PPE requirements will be upgraded to reflect WorkCover's requirements.

In the event that workers will be exposed to highly odorous soil conditions during remediation works, the following additional PPE should be adopted:

- Impermeable disposable overalls; and
- Half or full-face respirator with organic vapour cartridge (as per action levels identified in Table 10-2.

A PID shall be used to monitor the concentrations of VOCs within the workspace, with the following action levels at which the additional PPE mentioned above is required.

Table 10-2 - Action Levels for Respirator Use

Instrument	Airborne Levels	Level of Protection
PID	< 1 ppm	No additional protection
PID and/or Dräger or Kitagawa tubes	> 1 ppm	Half or full faced respirator*
PID and/or Dräger or Kitagawa tubes	> 10 ppm** or > 1 ppm on the site boundary	Stop work, cover excavation to minimise production of hydrocarbons

*If action levels exceed the action level following 5 minutes, the use of a respirator is required. Organic respirator cartridge to be changed daily.

**10 times the benzene exposure limit as recommended by 3M Respirator Selection Guide.

For areas where a risk of exposure to ACM is present, personal protective clothing should be made from materials that provide protection against fibre penetration and not from wool or other materials that attract fibrous dusts.

All equipment used for the removal of asbestos should be inspected before the commencement of the asbestos removal work, after any repairs and at least once every seven days when it is continually being used. A register with the details of these inspections, the state of the equipment and any repair details should be maintained.

The level of PPE would also need to address / include any other requirements relating to the nature of the activities to be undertaken. Additional PPE may be required at the request of the appropriately asbestos licensed (Class A or Class B) contractor if supervising the works.

All persons engaged in intrusive works within the vicinity of the affected area should wear respiratory protective equipment conforming to the requirements of AS/NZS1716-2003 *Respiratory Protective Devices.*

10.7 Decontamination Procedures

At the end of the asbestos removal work and upon leaving the asbestos removal work area, all PPE must be disposed of as asbestos waste or decontaminated and stored in sealed double bags before being removed from the asbestos removal site to be laundered by a laundry with facilities for laundering asbestos-contaminated materials. PPE should be thoroughly wet before being placed in bags.

The additional decontamination procedures specified below will be followed whenever personnel, plant or equipment leave the site.

Personnel

The following steps should be taken to ensure personnel do not leave the site with potentially contaminated clothing:

- wash boots in clean water;
- remove outer gloves and store for reuse;
- remove overalls (if used) and store for reuse;
- remove respirator and goggles (if used) and store clean for reuse or decontamination, as appropriate;
- thoroughly wash hands and face.

If any part of a worker's body comes into direct contact with any potentially contaminated material, the affected part(s) should be immediately washed with clean water.

Vehicle, Plant, and Equipment

All equipment, including personal protective equipment, will be washed or otherwise cleaned to ensure that contaminated soil, water or dust is removed before it leaves the Site. All plant and equipment will have their outer bodies thoroughly cleaned of soil and sediment before moving off the site.

10.8 Contamination Control Zone

The lunch shed/crib hut and office will be located outside of any contamination control zone and will be designated clean zones. Any personal and plant leaving the contamination zone must undergo appropriate decontamination procedures, in a designated area (decontamination zone) as discussed above, prior to entering the site clean zones.

10.9 Additional Health and Safety Controls for the Bored Piling Process

In the case that ACM impacted materials are penetrated, exposed or must be moved around due to the bored pile installation requirement underneath Block R, the following controls must be implemented in addition to the controls listed in Sections 10.1 to 10.8.

- Piling must only be undertaken outside of school hours to reduce the risk of ACM exposure to the school children.
- Soils around the pile locations must be moistened using a mist curtain.
- Air monitoring is required.
- Drill spoil from the installation of the bored piles must be disposed of off-site as 'Special Waste – GSW' to an appropriately licenced landfill.
- A class A contractor should be engaged since there is a possibility that ACM pieces will be releasing asbestos fibres as a result of the drilling process.
- In order to ensure that ACM impacted soils are not moved and/or tracked away from the containment cell, all machinery involved in the remediation process should be kept within the containment cell footprint until piling works are complete (and as a result until all excess ACM impacted spoil has been removed). After this, all machinery must be decontaminated as specified briefly in Section 10.7 of this RAP, and in more detail in the AMP (Arcadis, 4 December 2019).

11 REGULATORY APPROVALS / LICENCING

11.1 State Environment Planning Policy Number 55 (SEPP55) Remediation of Land

The SEPP 55 maintains two categories of remediation work:

- Category 1 – works that require development consent;
- Category 2 – works that may be carried out without development consent.

The proposed remediation works are considered to be classified as “Category 2” Remediation Works.

SEPP 55 requires Council to be notified 30 days before remediation works commence. The notification will provide Council with the information needed to verify the work is Category 2 but with due reference to the following criteria.

- The work is not designated development under schedule 3 of the EP & A Regulation or under a planning instrument;
- The work proposed is not on land identified as critical habitat under the Threatened Species Conservation Act 1995;
- Consideration of s.5A of the EP&A Act indicates the remediation work is not likely to have a significant effect on threatened species, populations, ecological communities or their habitats;
- The work is not proposed in an area or zone identified in a planning instrument as being an area of environmental significance such as coastal protection areas, scenic areas or wetlands;
- Work is not carried out in a manner inconsistent with Council’s policy on contaminated land.

Notice is also required to be given to council within 30 days of remediation works completion.

11.2 Protection of the Environment Operations Act 1997

In relation to the licensing requirements under the Protection of the Environment Operation Act 1997 (POEO Act):

- The works do not fall within the licensing requirements for Contaminated Soil Treatment Works (i.e. works will not incinerate more than 1,000 m^3 of contaminated soil per year, treat and store more than 30,000 m^3 of contaminated soil or disturb more than 3 hectares of contaminated soil); and
- The works do not fall within the licensing requirements for Crushing, Grinding or Separating Works (i.e. works will not process more than 150 tonnes of material per day or 30,000 tonnes of material per year).

All material to be excavated and removed from the site (including associated activities such as classification) will be undertaken in strict accordance with the requirements of the POEO Act 1997. Such requirements include:

- Ensuring waste is classified appropriately and in accordance with relevant guidelines;
- Waste materials are disposed offsite to appropriately licensed facilities; and
- Other materials are removed to facilities lawfully able to accept such materials.

11.3 Protection of the Environment Operations (Waste) Regulation 2014

The regulations make requirements relating to non-licensed waste activities and waste transporting. The proposed works on the site will not require to be licensed. Section 48 of the Regulation requires that wastes are stored in an environmentally safe manner and that vehicles used to transport waste must be covered when loaded.

The Regulation exempts certain waste streams from the full waste tracking and record keeping requirements. Waste tracking is required only for special and restricted solid wastes.

11.4 Protection of The Environment Operations (Clean Air) Regulation 2010

Requirements in relation to emission from vehicles and general obligations that the occupiers of non-residential premises do not cause air pollution by failing to operate or maintain plant, carry out work or deal with materials in a proper and efficient manner.

11.5 Waste Classification Guidelines, Part 1: Classifying Waste

All wastes generated shall be classified and managed in accordance with the NSW EPA Waste Classification Guidelines (2014).

11.6 Work Health and Safety Act 2011

Requirements in relation to ensure work safety that are enforceable by law.

11.7 Roads and Rail Transport (Dangerous Goods) Act 1997

Transport of waste classified as Dangerous Goods in accordance with Regulations.

11.8 NSW EPA Asbestos and Waste Tyres Guidelines (2015)

Outlines the legal requirements that consignors, transporters, and occupiers of premises must meet in addition to their obligations under the Waste Regulation.

12 CONCLUSIONS

It is considered that the objectives of the onsite remediation will be achieved subject to the successful implementation of the actions contained in this RAP, which will enable the site to be suitable for the proposed upgrades and development at 126 Kent Road, Marsfield.

Validation of on-site soils will be undertaken over the remediation surface across the site by way of a visual inspection and an asbestos clearance certificate. An EMP will need to be prepared as the ACM impacted fill soils will remain on-site within a containment cell.

LIMITATIONS

The findings of this report are based on the scope of work outlined in Section 1.3. Arcadis performed its services in a manner consistent with the normal level of care and expertise exercised by members of the environmental assessment profession. No warranties expressed or implied are made.

Subject to the scope of work, Arcadis' assessment was limited strictly to identifying the environmental conditions associated with the subject property and does not include evaluation of any other issues. The absence of any identified hazardous or toxic materials should not be interpreted as a guarantee that such materials do not exist on the subject property.

Additionally, unless otherwise stated Arcadis did not conduct soil, air, wastewater or other matrix analyses including asbestos or perform contaminated sampling of any kind. Nor did Arcadis investigate any waste material from the property that may have been disposed of at the site or undertake an assessment or review of related site waste management practices.

All conclusions and recommendations regarding the property are the professional opinions of the Arcadis personnel involved with the project, subject to the qualifications made above.

While normal assessments of data reliability have been made, Arcadis assumes no responsibility or liability for errors in any data obtained from regulatory agencies, statements or sources outside of Arcadis, or developments resulting from situations outside the scope of this project.

Arcadis is not engaged in environmental assessment and reporting for the purpose of advertising sales promoting, or endorsement of any client interests, including raising investment capital, recommending investment decisions, or other publicity purposes. The client acknowledges that this report is for the exclusive use of the client.

REFERENCES

Arcadis Australia Pacific Pty Ltd (Arcadis, 27 April 2018) Preliminary Site Investigation

Arcadis Australia Pacific Pty Ltd (Arcadis, 30 July 2018) Due Diligence Soil Contamination Assessment

Arcadis Australia Pacific Pty Ltd (Arcadis, 11 November 2019) Further Supplementary Soil Contamination Assessment

Arcadis Australia Pacific Pty Ltd (Arcadis, 4 December 2019) Asbestos Management Plan

Arcadis Australia Pacific Pty Ltd (Arcadis, 29 November 2019) Unexpected Finds Protocol

AS4482.1 – 2005 Guide to the Sampling and Investigation of Potentially Contaminated Soil Part 1

AS4482.2 – 1999 Guide to the Sampling and Investigation of Potentially. Contaminated Soil Part 2: Volatile Substances

NSW Environment Protection Authority (2015) Guidelines on the Duty to Report Contamination Under the Contaminated Land Management Act 1997

NSW Environment Protection Authority (1995) Sampling Design Guidelines

National Environment Protection Council (NEPC, 10th December 1999) as amended 11th April 2013, *National Environment Protection (Assessment of Site Contamination) Measure* [NEPM]

NSW Office of Environment & Heritage (NSW OEH, August 2011) *Guidelines for Consultants Reporting on Contaminated Sites*

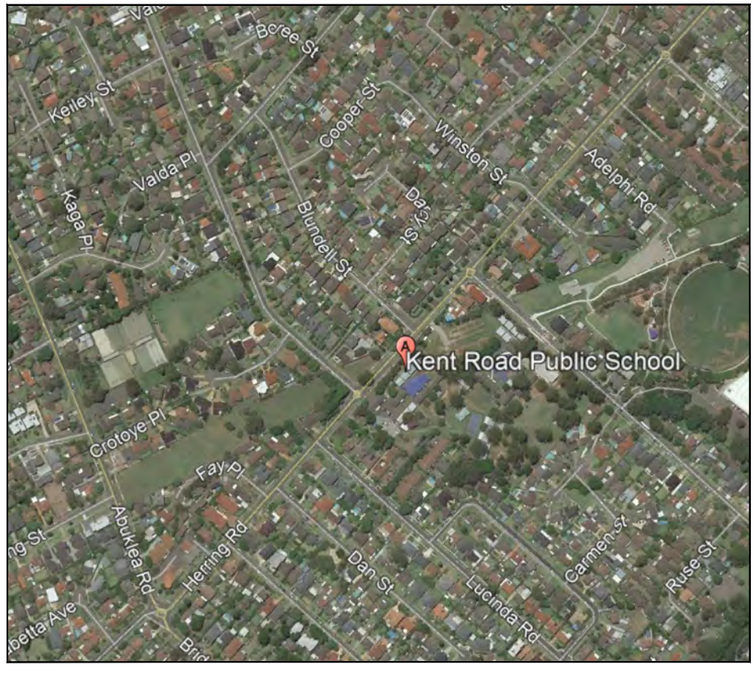
NSW EPA (2014) Waste Classification Guidelines – Part 1: Classification of Waste

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

APPENDIX A FIGURES

COUNTRY

REGION



SITE LOCATION

LEGEND:

Site Boundary

N

KENT ROAD PUBLIC SCHOOL- 126 KENT ROAD
MARSFIELD, NSW, AUSTRALIA

SITE LOCATION PLAN

ARCADIS Design & Consultancy for natural and built assets

FIGURE
1

LEGEND:

- Site Boundary
- Test Pit Location (2019)
- Borehole Location (2018)
- Study Area Due Diligence Assessment

N

NOTE:

HISTORICAL FEATURE LOCATIONS ARE APPROXIMATE.

0 20 40

SCALE IN METRES

KENT ROAD PUBLIC SCHOOL- 126 KENT ROAD
MARSFIELD, NSW, AUSTRALIA

LOCATION OF SOIL BORES AND TEST PITS FROM PREVIOUS INVESTIGATIONS

ARCADIS Design & Consultancy for natural and built assets

FIGURE 2

LEGEND:

- Site Boundary
- Test Pit Location
- 14 m Grid

N

0 20 40

SCALE IN METRES

KENT ROAD PUBLIC SCHOOL- 126 KENT ROAD
MARSFIELD, NSW, AUSTRALIA

TEST PIT SAMPLING LOCATIONS

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FIGURE 3

BLUNDELL ROAD

HERRING ROAD

KENT ROAD

HERRING ROAD

TP-01
TP-02
TP-03
TP-04
TP-05
TP-06
TP-07
TP-08
TP-09
TP-10
TP-11
TP-12
TP-13
TP-14
TP-15
TP-16
TP-17
TP-18
TP-19
TP-20
TP-21
TP-22
TP-23
TP-24
TP-25
TP-26
TP-27
TP-28
TP-29
TP-30

LEGEND:

- Site Boundary
- Test Pit Location
- Approximately 14 m Grid
- GSW CT1 Recyclable
- GSW due to TRH exceedance
- GSW CT1 Recyclable. Providing no ACM is observed when excavating anthropogenic material observed in fill
- Special Waste with GSW matrix

N

0 40

SCALE IN METRES

KENT ROAD PUBLIC SCHOOL- 126 KENT ROAD
MARSFIELD, NSW, AUSTRALIA

Indicative Waste Classification

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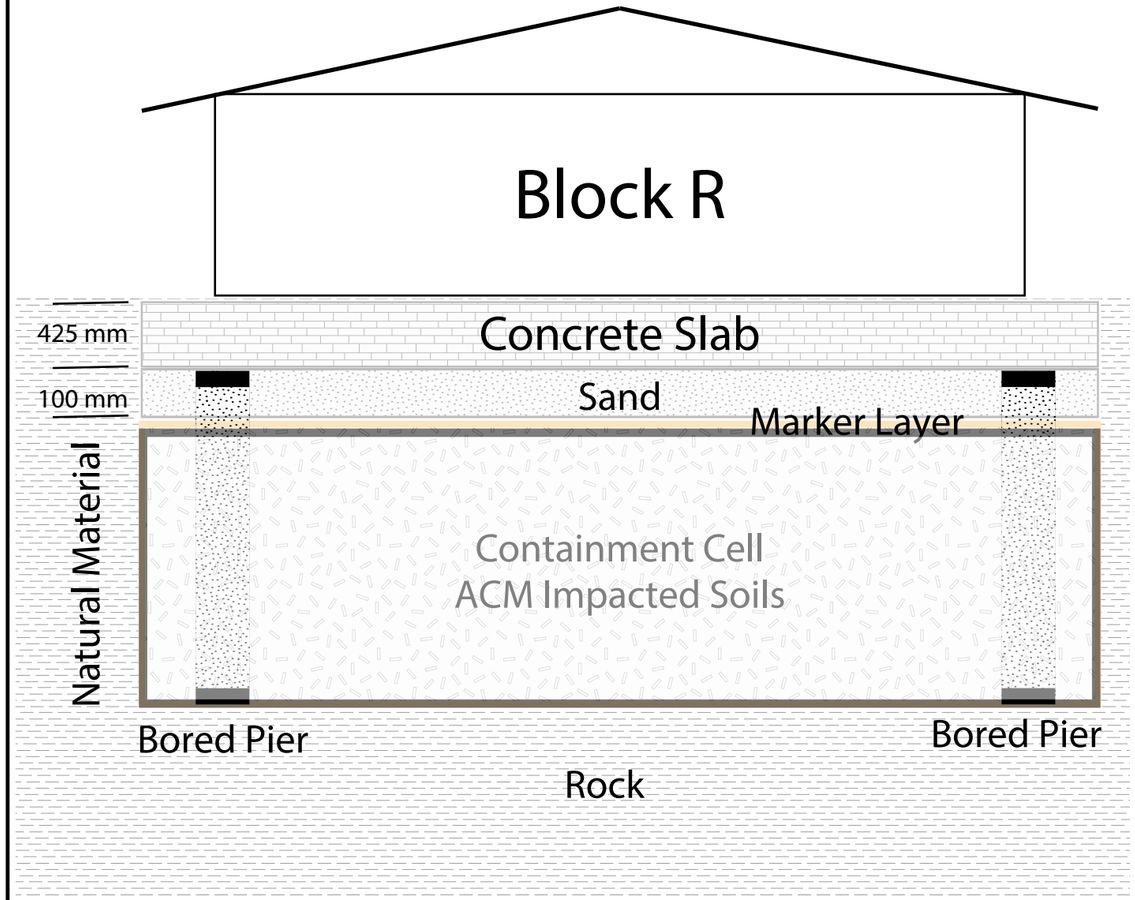
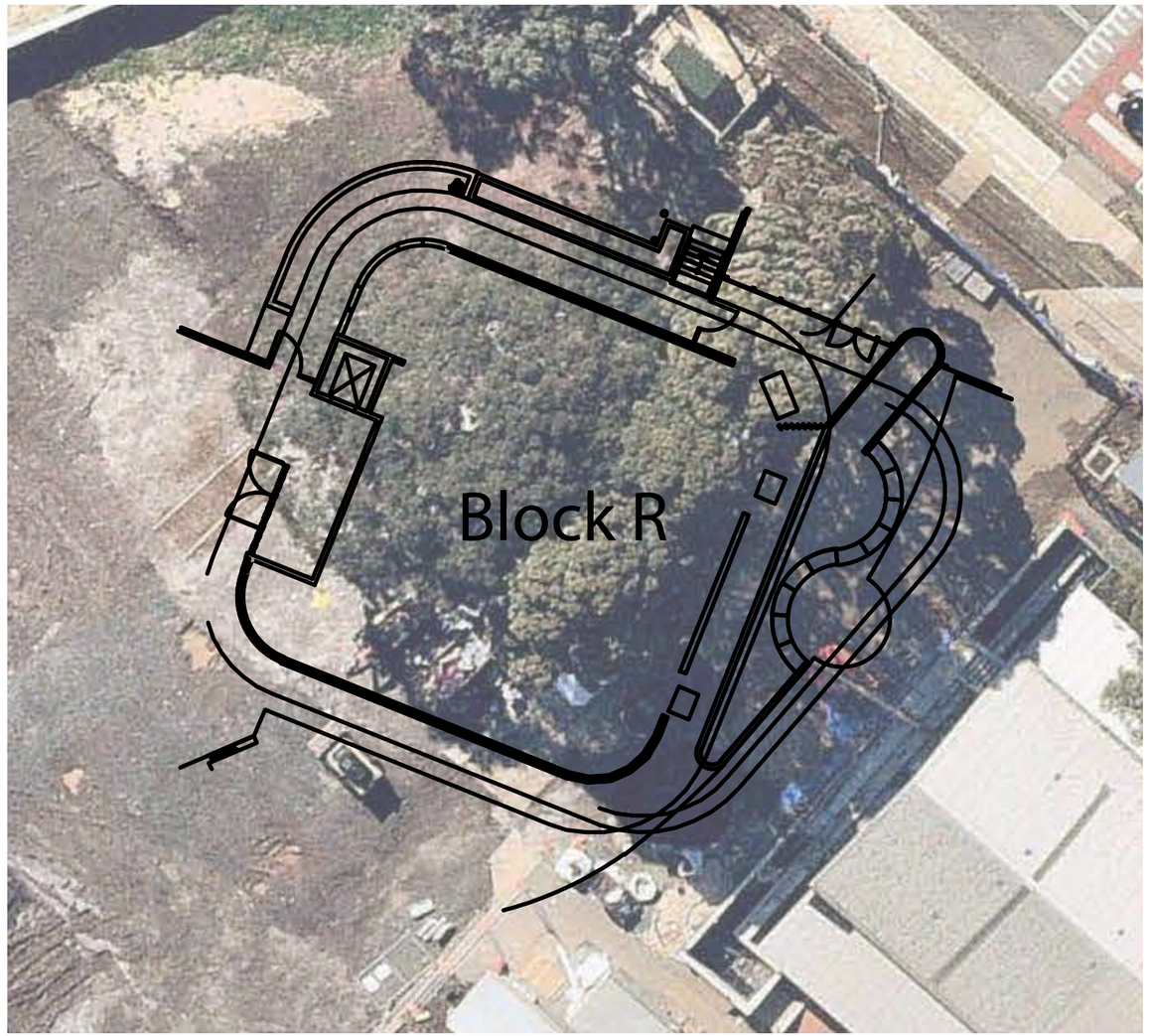
FIGURE
4

APPENDIX B CONCEPTUAL CONTAINMENT CELL



Block R Containment Cell Design



Block R Containment Area

N

0 10 20

SCALE IN METRES

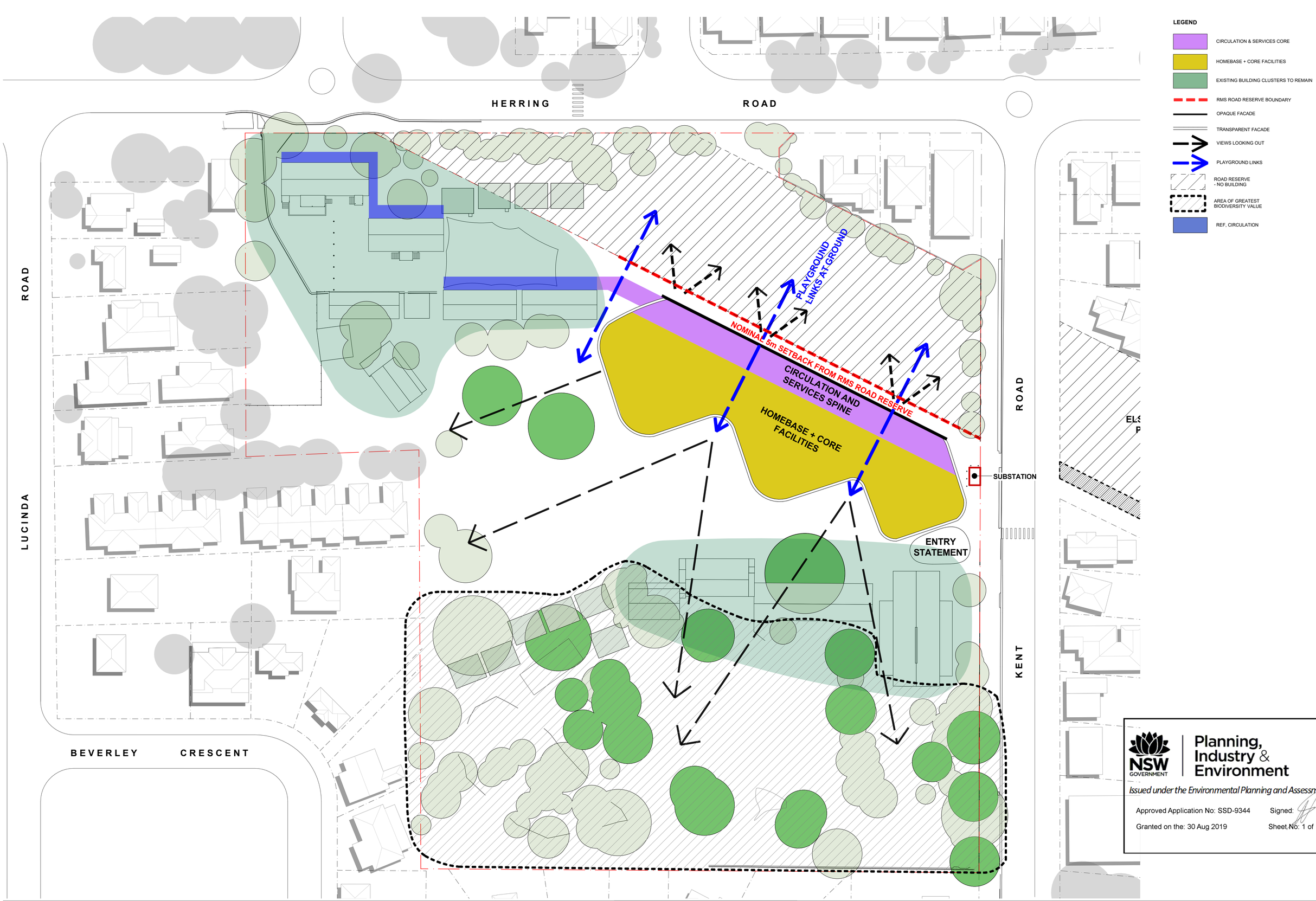
KENT ROAD PUBLIC SCHOOL- 126 KENT ROAD
MARSFIELD, NSW, AUSTRALIA

ACM Impacted Soil Contaminment

ARCADIS Design & Consultancy for natural and built assets

FIGURE
5

APPENDIX C PROPOSED DESIGN DETAILS



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St Leonards 2065
Nominated Architect - Alistair Ross Gardner (Reg No. 3949)

Butler & Co Architects

pwc

Kent Road Public School Development
Herring Road MARSFIELD NSW 2122

NSW GOVERNMENT Education School Infrastructure
School Infrastructure NSW
259 George Street SYDNEY NSW 2000

No	Initial	DATE	REVISION DETAILS
A	CBu	12/09/2018	ISSUED FOR CONSULTANT INFORMATION
B	CBu	24/09/2018	ISSUED FOR CONSULTANT INFORMATION
C	CBu	30/10/2018	ISSUED FOR SSDA
D	CBu	7/11/2018	ISSUED FOR SSDA

N

ORIGINAL SIZE
0 10 20 30 50m

DRAWING NAME
Concept Diagram

PROJECT No 17058
SHEET SIZE A1
SCALE 1:500 @A1 1:1000 @A3
DRAWING No SSDA-0202
REVISION D

LEGEND

- EXISTING BUILDINGS
- NEW BUILDINGS
- EXISTING COLA AND SHADE SAIL RETAINED
- HARDPAVING / RAMPS
- EXISTING TREES
- PROPOSED TREES
- ROAD RESERVE - NO BUILDING **NOT** PART OF SSDA
- EXISTING CYCLEWAY
- **NOT** PART OF SSDA
- EXTENT OF SSDA

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C	CBu	12/09/2018	ISSUED FOR CONSULTANT INFORMATION
D	CBu	19/09/2018	ISSUED FOR CONSULTANT INFORMATION
E	CBu	24/09/2018	ISSUED FOR CONSULTANT INFORMATION
F	DCo	3/10/2018	ISSUED FOR CO-ORDINATION
G	CBu	30/10/2018	ISSUED FOR SSDA
H	CBu	7/11/2018	ISSUED FOR SSDA

ORIGINAL SIZE
0 10 20 30 50m

DRAWING NAME
Proposed Site Plan

PROJECT No 17058
SHEET SIZE A1
SCALE 1:500 @A1 1:1000 @A3
DRAWING No SSDA-0400
REVISION H

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Herring Road MARSFIELD NSW 2122

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C	CBu	24/09/2018	ISSUED FOR CONSULTANT INFORMATION
D	CBu	30/10/2018	ISSUED FOR SSDA
E	CBu	7/11/2018	ISSUED FOR SSDA

N

ORIGINAL SIZE
0 2 6 12 20m

DRAWING NAME

Ground Floor Plan

PROJECT No	SHEET SIZE	SCALE
17058	A1	1:200 @A1 1:400 @A3

DRAWING No	REVISION
SSDA-1200	E

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C	CBu	24/09/2018	ISSUED FOR CONSULTANT INFORMATION
D	CBu	30/10/2018	ISSUED FOR SSDA
E	CBu	7/11/2018	ISSUED FOR SSDA

N

ORIGINAL SIZE
0 2 6 12 20m

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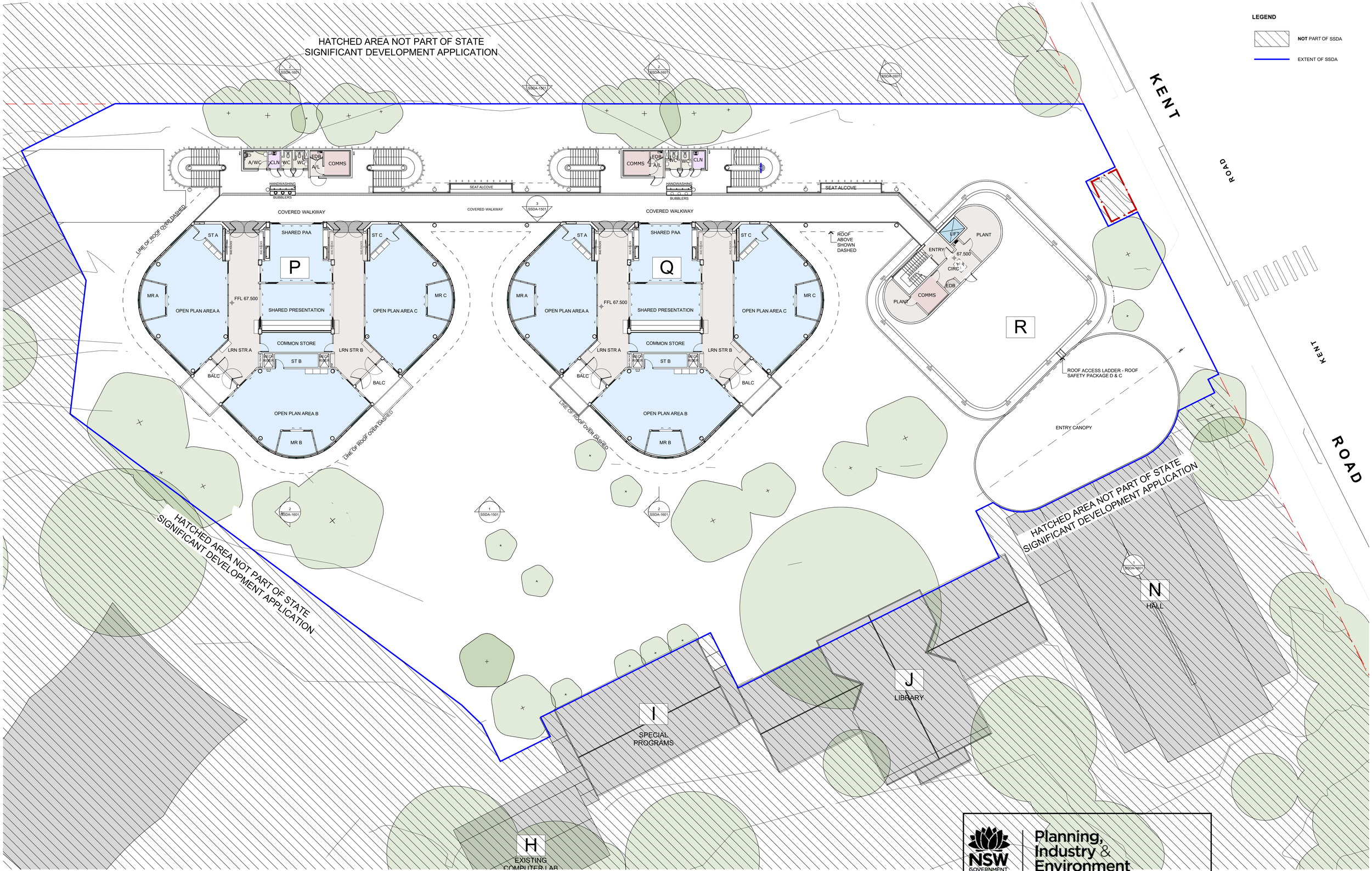
DRAWING NAME
Level 1 Plan

PROJECT No	SHEET SIZE	SCALE
17058	A1	1:200 @A1 1:400 @A3

DRAWING No	REVISION
SSDA-1201	E



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School Infrastructure NSW
259 George Street SYDNEY NSW 2000

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D	CBu	30/10/2018	ISSUED FOR SSDA
E	CBu	7/11/2018	ISSUED FOR SSDA

ORIGINAL SIZE
0 2 6 12 20m

DRAWING NAME
Level 2 Plan

PROJECT No 17058
SHEET SIZE A1
SCALE 1:200 @A1 1:400 @A3
DRAWING No SSDA-1202
REVISION E

HATCHED AREA NOT PART OF STATE
SIGNIFICANT DEVELOPMENT APPLICATION

LEGEND

NOT PART OF SSDA

EXTENT OF SSDA

KENT

ROAD

ROOF ACCESS HATCH WITH HOOD

MR0002 A.C CONDENSERS

72.080

4.00° FALL ROOF OVER WALKWAY LINK BELOW

4.00° FALL ROOF OVER SKYBRIDGE LINK BELOW

P

Q

R

FALL

GUTTER

CONCRETE ROOF

SOLAR ARRAY OVERFLOW 2

SOLAR ARRAY OVERFLOW 1 ON ROOF

SOLAR ARRAY PRIMARY ZONE

67.500

72.000

LIFT LOCATION

ROOF ACCESS HATCH

STAIR LOCATION CONCRETE ROOF

CONCRETE ROOF SOLAR ARRAY PRIMARY ZONE

68.700

71.000

ENTRY CANOPY

HATCHED AREA NOT PART OF STATE
SIGNIFICANT DEVELOPMENT APPLICATION

BLOCK N
HALL

I
SPECIAL PROGRAMS

J
LIBRARY

H
EXISTING

EXISTING FENCED TENNIS COURT

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Approved Application No: SSD-9344

Granted on the: 30 Aug 2019

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BIM Server: GWABIM1 - BIM Server 21\17058 Kent Road Public School\17058 Master 181011

Kent Road Public School Development

Herring Road MARSFIELD NSW 2122

NSW GOVERNMENT Education School Infrastructure

School Infrastructure NSW
259 George Street SYDNEY NSW 2000

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D	CBu	30/10/2018	ISSUED FOR SSDA
E	CBu	7/11/2018	ISSUED FOR SSDA

N

ORIGINAL SIZE

0 2 6 12 20m

DRAWING NAME

Roof Plan

PROJECT No	SHEET SIZE	SCALE
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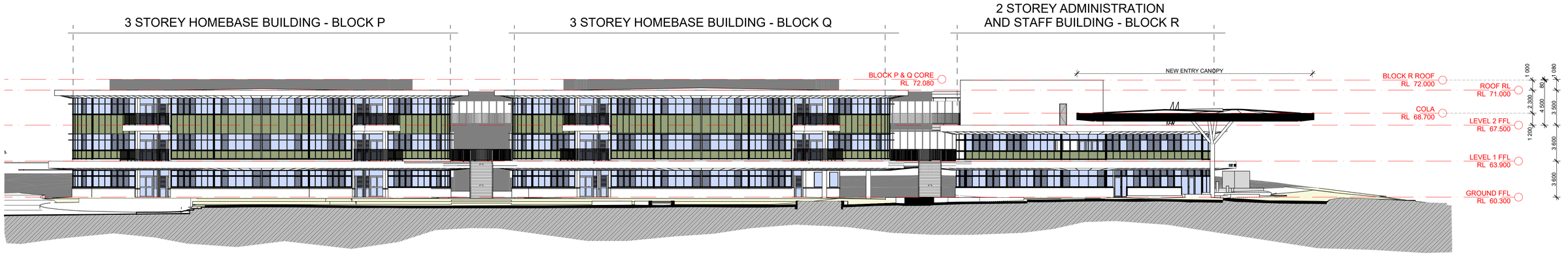
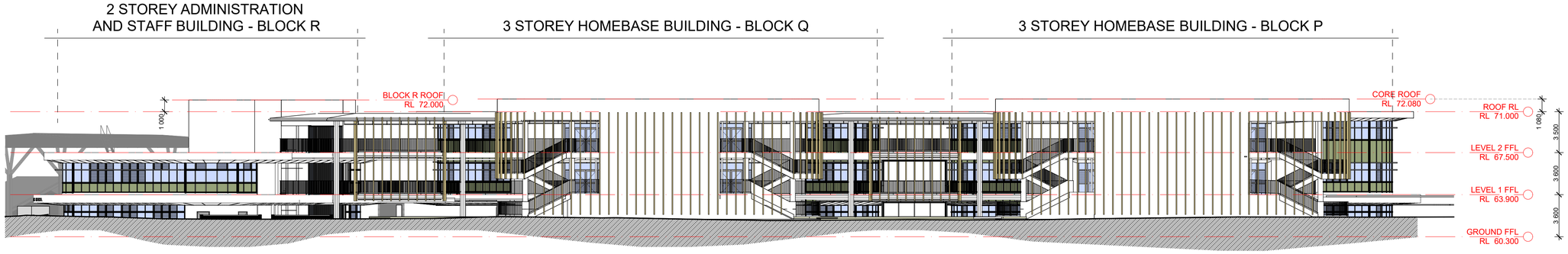
DRAWING No: SSDA-1300

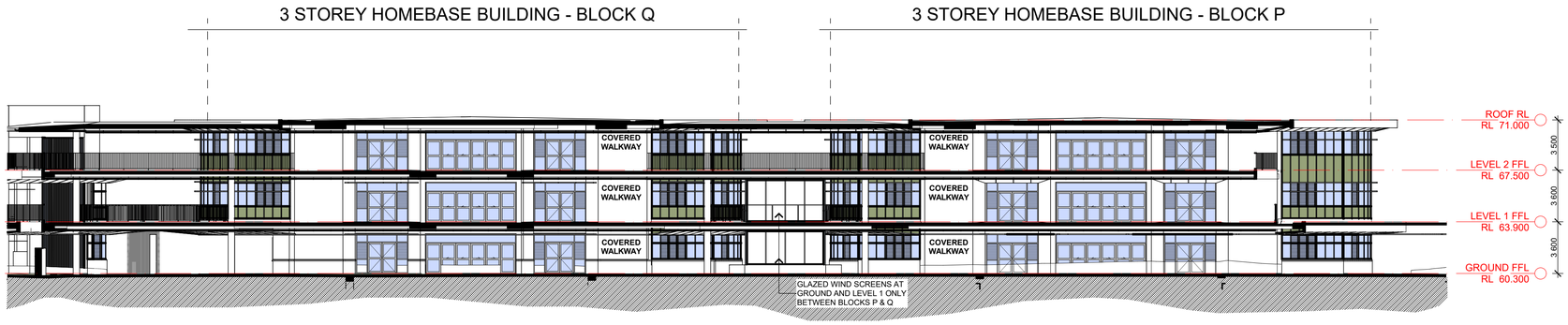
REVISION: E



1 South East Elevation
17058 Master SF017
SCALE 1:200



2 North West Elevation (from Road Reserve)
17058 Master SF017
SCALE 1:200



3 Block D - South Elevation
17058 Master SF017
SCALE 1:200

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BIM Server: G:\KABIM1 - BIM Server 2\17058 Kent Road Public School\17058 Master 181011

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Herring Road MARSFIELD NSW 2122

Education
School Infrastructure
School Infrastructure NSW
259 George Street SYDNEY NSW 2000

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B	CBu	24/09/2018	ISSUED FOR CONSULTANT INFORMATION
C	CBu	30/10/2018	ISSUED FOR SSDA
D	CBu	7/11/2018	ISSUED FOR SSDA

ORIGINAL SIZE
0 2 6 12 20m

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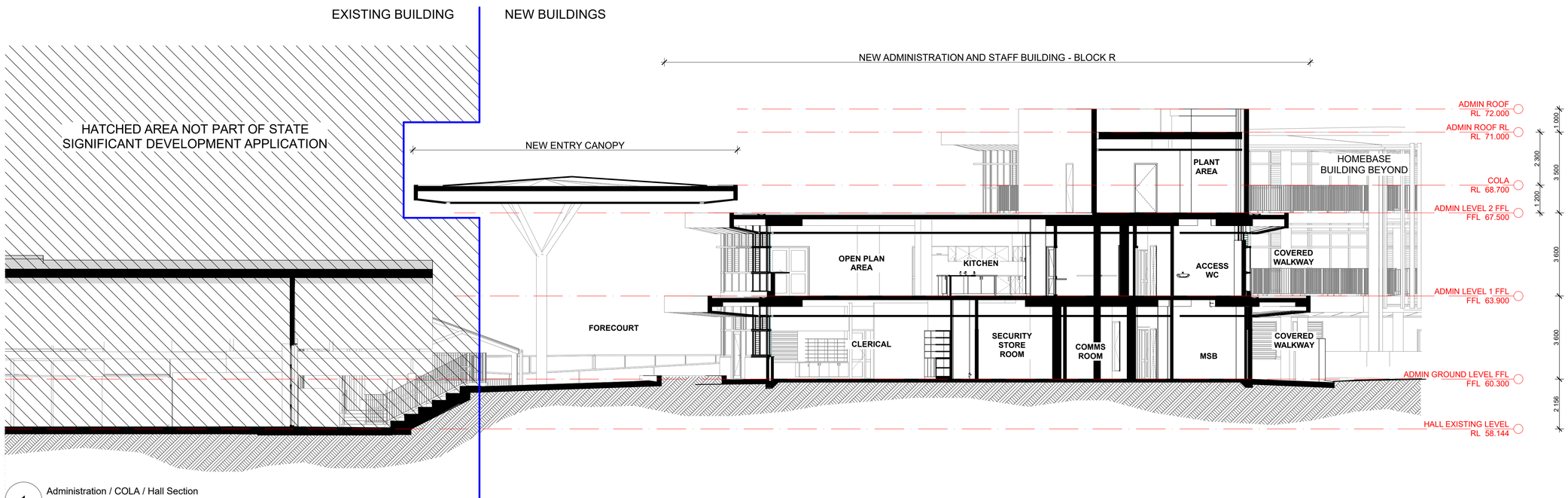
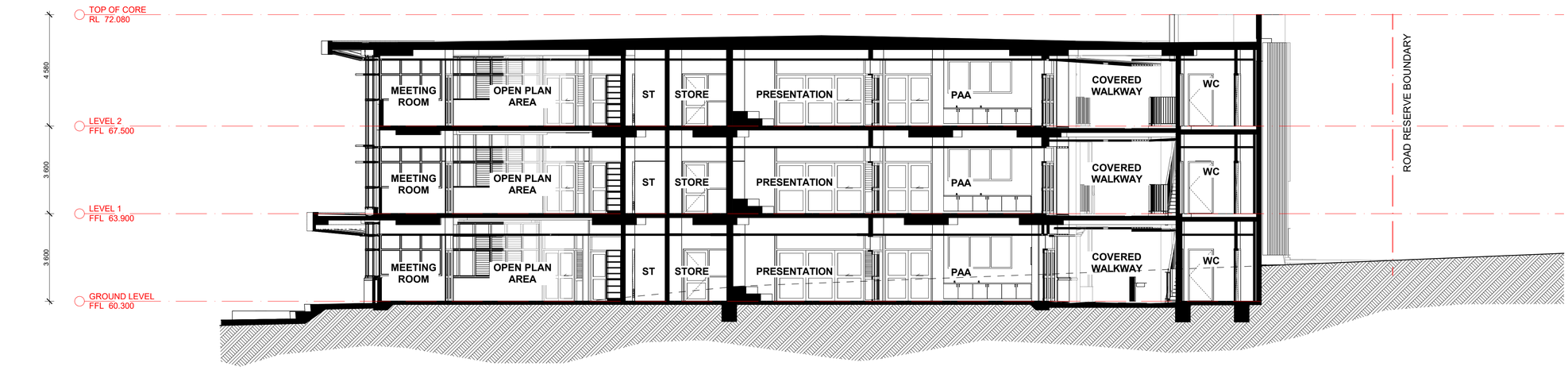
DRAWING NAME
Site Elevations

PROJECT No 17058
SHEET SIZE A1
SCALE 1:200 @A1 1:400 @A3
DRAWING No SSDA-1501
REVISION D



1 Administration / COLA / Hall Section
17058 Master 181011
SCALE 1:100



2 Block P & Q, Homebase Building Section
17058 Master 181011
SCALE 1:100

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Kent Road Public School Development
Herring Road MARSFIELD NSW 2122

NSW GOVERNMENT Education School Infrastructure
School Infrastructure NSW
259 George Street SYDNEY NSW 2000

No	Initial	DATE	REVISION DETAILS
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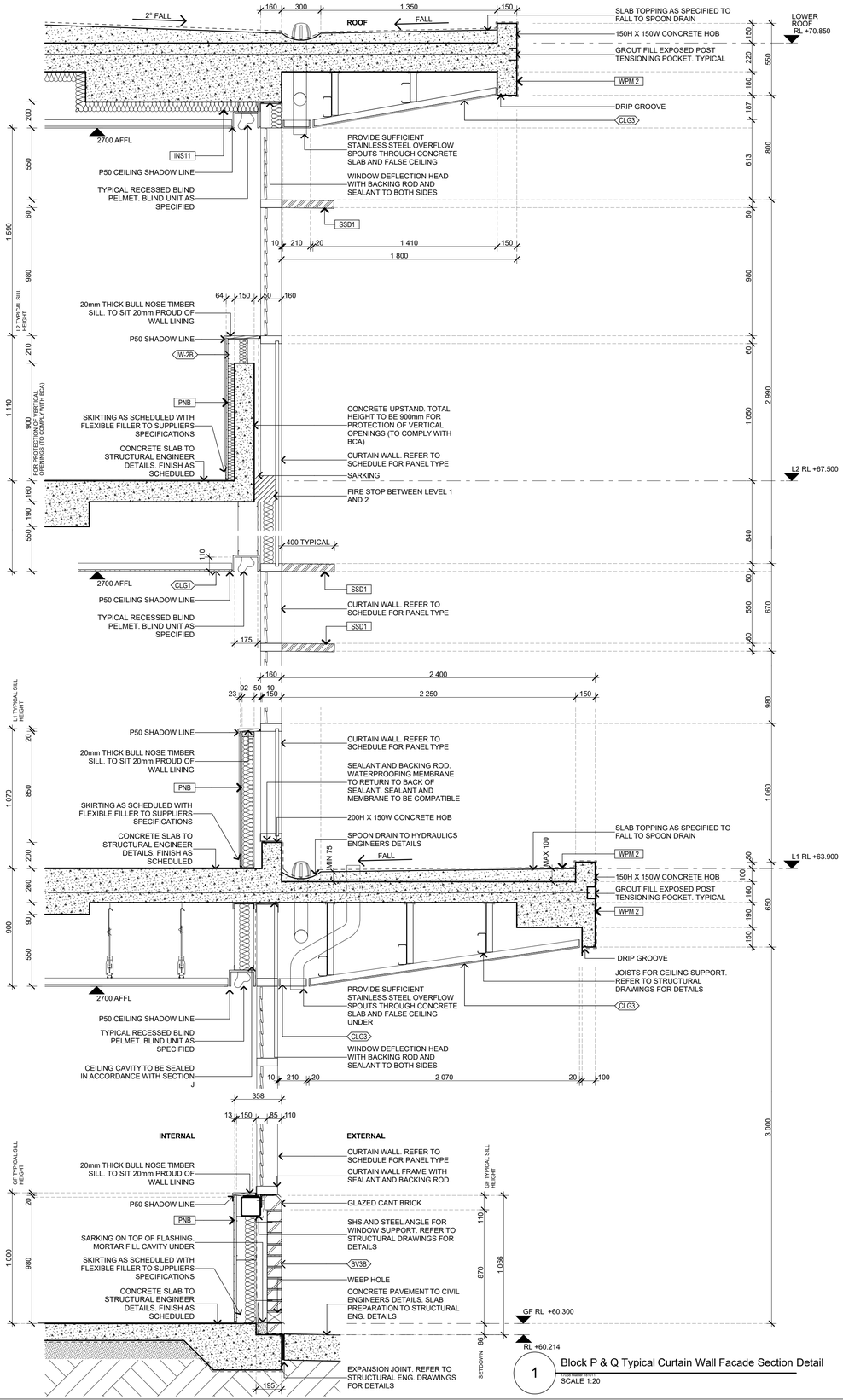
C	CBu	30/10/2018	ISSUED FOR SSDA
D	CBu	7/11/2018	ISSUED FOR SSDA

ORIGINAL SIZE
0 1 3 6 10m

DRAWING NAME
Sections

PROJECT No **17058**
SHEET SIZE **A1**
SCALE **1:100 @A1** **1:200 @A3**
DRAWING No **SSDA-1601**
REVISION **D**

BIM Server: GWABIM1 - BIM Server 2\17058 Kent Road Public School\17058 Master 181011



1 Block P & Q Typical Curtain Wall Facade Section Detail
17058 Master 181011
SCALE 1:20

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Herring Road MARSFIELD NSW 2122

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School Infrastructure NSW
259 George Street SYDNEY NSW 2000

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C	CBu	30/10/2018	ISSUED FOR SSDA
D	CBu	7/11/2018	ISSUED FOR SSDA

DRAWING NAME
Detailed Section

PROJECT No 17058
SHEET SIZE A1
SCALE 1:20 @A1 1:40 @A3
DRAWING No SSDA-1602
REVISION D

BIM Server: GWABIM1 - BIM Server 21\17058 Kent Road Public School\17058 Master 181011

HATCHED AREA NOT PART OF STATE
SIGNIFICANT DEVELOPMENT APPLICATION

LEGEND

NOT PART OF SSDA

EXTENT OF SSDA

STAIR QA
ST
COMMS
EDB
A/L
WC
WC
CLN
A/WC
STAIR QB
OTHER-USER SPACE
1:50 FALL
60.500
61.515
5 400
61.209
1:20 FALL
1:12 TRANSITION
1:8 FALL
60.293
60.570
6 000
2 400
5 400
60.346
SUB-STATION
COVERED WALKWAY
SHARED PAA
ST A
MR A
OPEN PLAN AREA A
SHARED PRESENTATION
CANTEEN
FF
FF
SERVERY ZONE
FF
FF
ST + OFF
COMMON STORE
LRN STR A
LRN STR B
MECH RISER
ST B
MECH RISER
ENTRY
ENTRY
OPEN PLAN AREA B
MR B
1910.0
FUTURE MSSB
MSB
LIFT
HEARING FRAME
ENTRY
PRINCIPAL'S OFFICE
CIRC
INTERVIEW 2
COMMS ROOM
TEA STATION
INTERVIEW 1
EGRESS STAIR
CLN
STAFF WC
ACCESS WC
SEC STORE
ENTRY
INT / OFFICE
SICK BAY
CLERICAL
DEPUTY 1
DUPLICATION
DEPUTY DOUBLE OFFICE
RECEPTION
DEPUTY 2

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pwc

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C	CBu	30/10/2018	ISSUED FOR SSDA
D	CBu	7/11/2018	ISSUED FOR SSDA

N

ORIGINAL SIZE
0 1 3 6 10m

DRAWING NAME
Typical GF Homebase, Canteen & Admin FF&E Plan

PROJECT No	SHEET SIZE	SCALE
17058	A1	1:100 @A1 1:200 @A3
DRAWING No		REVISION
SSDA-1801		D

HATCHED AREA NOT PART OF STATE
SIGNIFICANT DEVELOPMENT APPLICATION

LEGEND

NOT PART OF SSDA

EXTENT OF SSDA

STAIR QA
COMMS
EDB
A/L
WC
WC
CLN
STAIR QB

COVERED WALKWAY

ST A
SHARED PAA
ST C
MR A
OPEN PLAN AREA A
SHARED PRESENTATION
OPEN PLAN AREA C
MR C
COMMON STORE
LRN STR A
LRN STR B
MEZZ RISER
ST B
MEZZ RISER
BALC
BALC
OPEN PLAN AREA B
MR B

CLNR
ACCESS WC
LIFT
WC
WC
WC
WC
ENTRY
CIRC
COPIER ALCOVE
EGRESS STAIR
STAFF ANNEX
SP STORE
STAFF KITCHEN
VOID
SPECIAL PROGRAMS 1
STAFF ROOM
SPECIAL PROGRAMS 2
ST
BALC

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259 George Street SYDNEY NSW 2000

No	Initial	DATE	REVISION DETAILS
A	CBu	12/09/2018	ISSUED FOR CONSULTANT INFORMATION
B	CBu	24/09/2018	ISSUED FOR CONSAULTANT INFORMATION
C	CBu	30/10/2018	ISSUED FOR SSDA
D	CBu	7/11/2018	ISSUED FOR SSDA

N

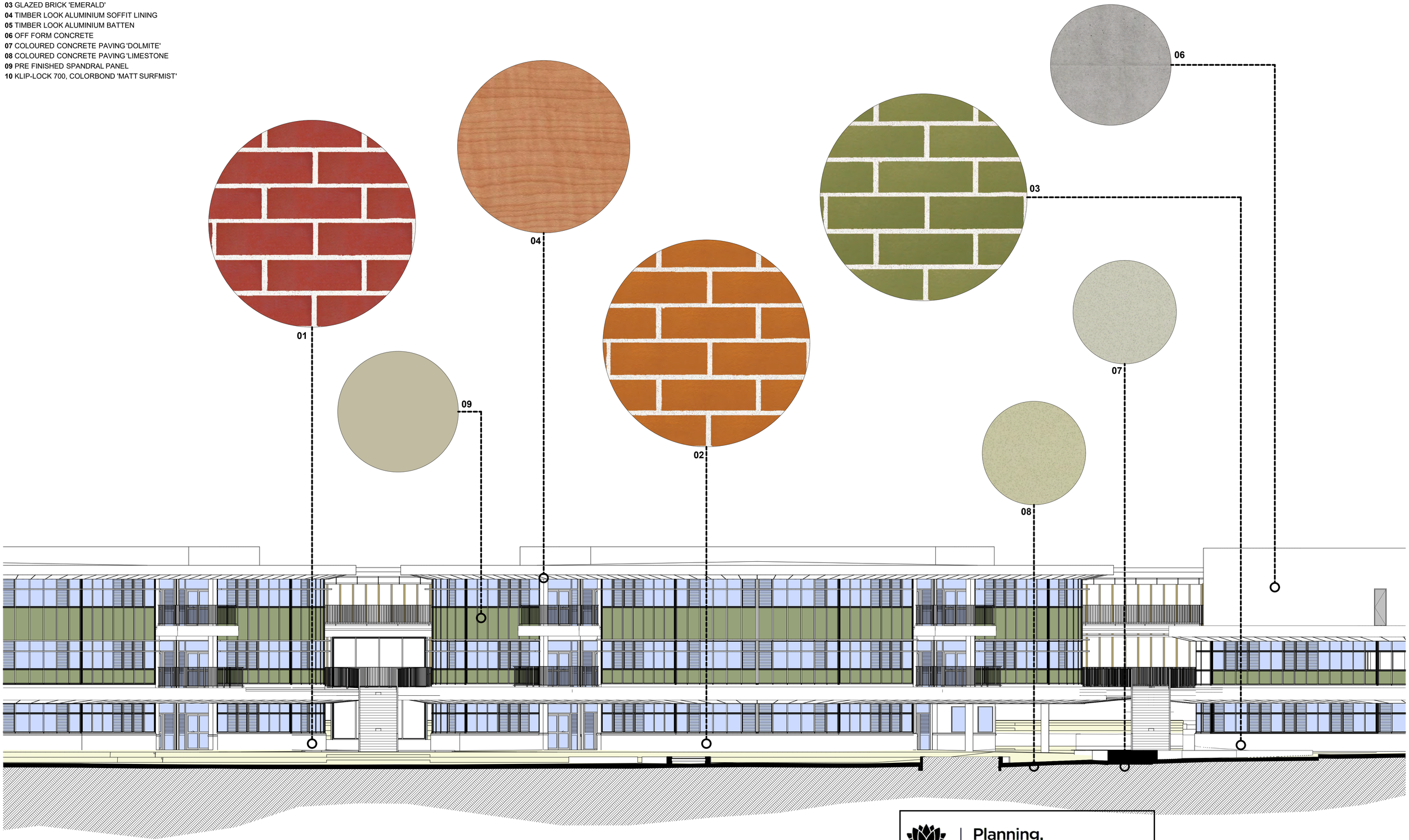
ORIGINAL SIZE
0 1 3 6 10m

DRAWING NAME
Typical L1 & L2 Homebase FF&E Plan

PROJECT No 17058
SHEET SIZE A1
SCALE 1:100 @A1 1:200 @A3
DRAWING No SSDA-1802
REVISION D

BIM Server: GWABIM1 - BIM Server 21\17058 Kent Road Public School\17058 Master 181011

01 GLAZED BRICK 'LUSCIOUS RED'
02 GLAZED BRICK 'BURSTING ORANGE'
03 GLAZED BRICK 'EMERALD'
04 TIMBER LOOK ALUMINIUM SOFFIT LINING
05 TIMBER LOOK ALUMINIUM BATTEN
06 OFF FORM CONCRETE
07 COLOURED CONCRETE PAVING 'DOLMITE'
08 COLOURED CONCRETE PAVING 'LIMESTONE
09 PRE FINISHED SPANDRAL PANEL
10 KLIP-LOCK 700, COLORBOND 'MATT SURFMIST'



South East Elevation

GARDNER WETHERILL ASSOCIATES
T (02) 9929 6777
F (02) 9929 3999
E design@gardnerwetherill.com.au
A.C.N. 104 476 833
LEVEL 2 Suite 2.01
460 Pacific Highway
St Leonards 2065
Nominated Architect - Alistair Ross Gardner (Reg No. 3949)

Butler & Co Architects

pwc

Kent Road Public School Development
Herring Road MARSFIELD NSW 2122

Education School Infrastructure
School Infrastructure NSW
259 George Street SYDNEY NSW 2000

No	Initial	DATE	REVISION DETAILS
A	CBu	12/09/2018	ISSUED FOR CONSULTANT INFORMATION
B	CBu	24/09/2018	ISSUED FOR CONSAULTANT INFORMATION
C	CBu	30/10/2018	ISSUED FOR SSDA
D	CBu	7/11/2018	ISSUED FOR SSDA

NSW GOVERNMENT Planning, Industry & Environment

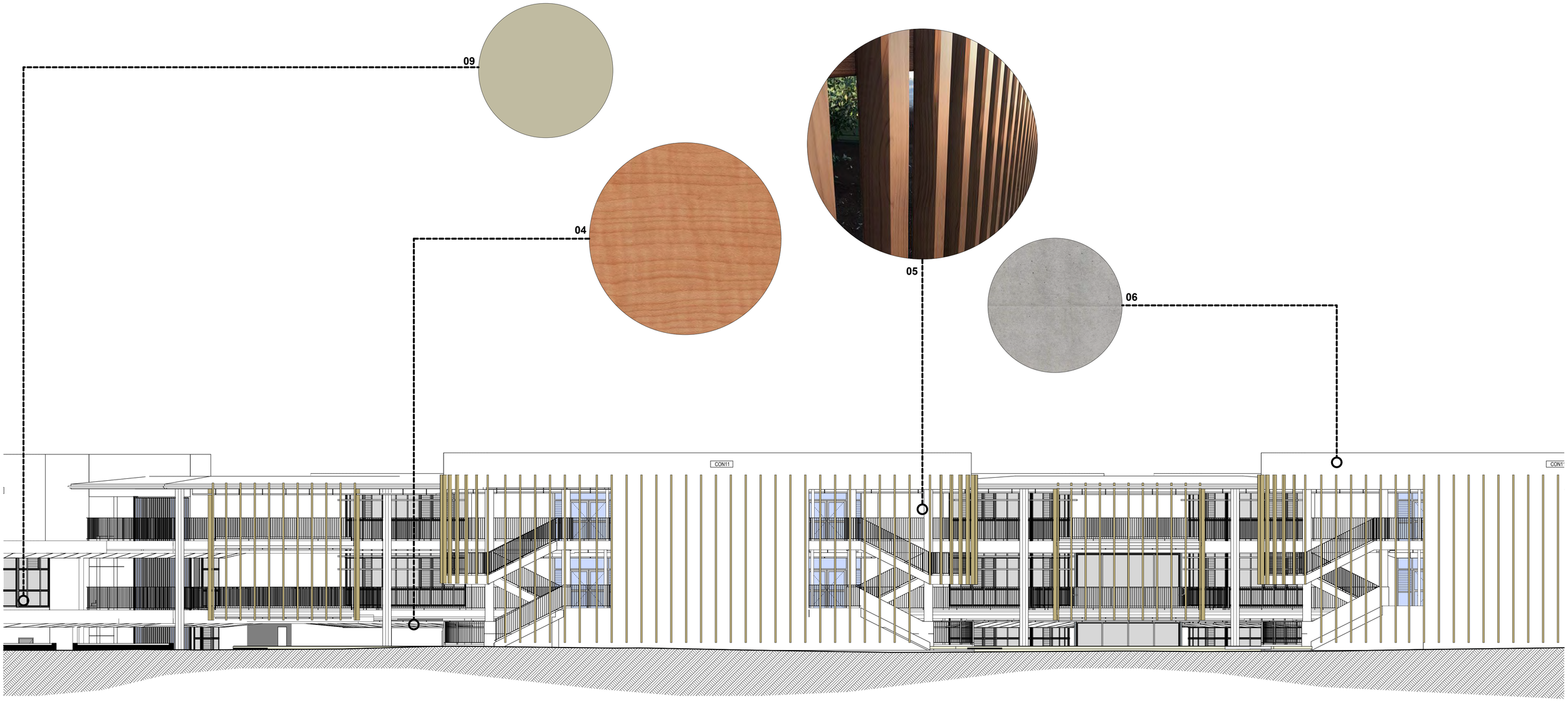
Issued under the Environmental Planning and Assessment Act 1979

Approved Application No: SSD-9344
Granted on the: 30 Aug 2019
Signed:
Sheet No: 12 of 15

DRAWING NAME
Materials and Finishes 01

PROJECT No 17058
SHEET SIZE A1
SCALE 1:100 @A1 1:200 @A3
DRAWING No SSDA-1910
REVISION D

01 GLAZED BRICK 'LUSCIOUS RED'
02 GLAZED BRICK 'BURSTING ORANGE'
03 GLAZED BRICK 'EMERALD'
04 TIMBER LOOK ALUMINIUM SOFFIT LINING
05 TIMBER LOOK ALUMINIUM BATTEN
06 OFF FORM CONCRETE
07 COLOURED CONCRETE PAVING 'DOLMITE'
08 COLOURED CONCRETE PAVING 'LIMESTONE
09 PRE FINISHED SPANDRAL PANEL
10 KLIP-LOCK 700, COLORBOND 'MATT SURFMIST'



North West Elevation (from Road Reserve)

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A.C.N. 104 476 833
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460 Pacific Highway
St Leonards 2065
Nominated Architect - Alistair Ross Gardner (Reg No. 3949)

Butler & Co Architects

pwc

Kent Road Public School Development
Herring Road MARSFIELD NSW 2122

NSW GOVERNMENT Education School Infrastructure
School Infrastructure NSW
259 George Street SYDNEY NSW 2000

No	Initial	DATE	REVISION DETAILS
A	CBu	12/09/2018	ISSUED FOR CONSULTANT INFORMATION
B	CBu	24/09/2018	ISSUED FOR CONSAULTANT INFORMATION
C	CBu	30/10/2018	ISSUED FOR SSDA
D	CBu	7/11/2018	ISSUED FOR SSDA

NSW GOVERNMENT Planning, Industry & Environment

Issued under the Environmental Planning and Assessment Act 1979

Approved Application No: SSD-9344
Granted on the: 30 Aug 2019
Signed:
Sheet No: 13 of 15

DRAWING NAME
Materials and Finishes 02

PROJECT No **17058**
SHEET SIZE **A1**
SCALE **1:100 @A1** **1:200 @A3**
DRAWING No **SSDA-1911**
REVISION **D**

RAIN GARDENS

A planted rain garden and swale will rung along the edge of the playground area collecting rain run off from running into the building area. A series of stormwater pits will connect into the rain gardens. Timber bridges will provide access across the rain gardens. The rain gardens will feature local native plant species.

TIMBER PLATFORM

A raised timber deck will provide seating and performance opportunities. The platform can be used as an informal stage to the amphitheater seating area.

LEGEND

- EXISTING TREES TO BE RETAINED
- EXISTING TREES TO BE REMOVED
- PROPOSED TREES
- PROPOSED SCREEN SHRUBS/HEDGES
- MASS PLANTING AREAS
- NEW PAVING. REFER TO ARCHITECTS DETAILS.
- SYNTHETIC GRASS
- PROPOSED DECKING
- SANDSTONE SPALLS SWALE

PLAYGROUND

NEW AMPHITHEATRE SEATING

NEW AMPHITHEATRE SEATING

COVERED WALKWAY

KENT ROAD

SUBSTATION

PROPOSED 3 STOREY CLASSROOM BLOCK

COVERED COURTYARD

PROPOSED 3 STOREY CLASSROOM BLOCK

1:40 FALL

COVERED COURTYARD

PROPOSED 2 STOREY ADMIN BLOCK

ENTRY CANOPY & COLA

NEW QUADRANGLE AREA

HANDBALL COURTS

Existing tree to be relocated

PROPOSED HALL EXTENSION

EXISTING HALL

EXISTING PLAYSPACE

Relocated tree

AMPHITHEATRE SEATING

BLOCK J

BLOCK I

GAMES COURT

EXISTING TENNIS COURT

ENTRY AREA

Entry gardens and large trees on either side of the main entrances, highlight the entry area.

SEATING

Raised planters with gardens and shade trees to add interest into the quadrangle area. Sections of the planters will feature timber bench seating built in creating sitting areas.

RAIN GARDEN

A rain garden outside the existing Block I will capture any run off rain water from the new quadrangle area. New trees will also provide shade to the existing classrooms. A timber bridges, including one disabled accessible bridge, and new stairs will link the two areas.

AMPHITHEATER

Amphitheater seating steps lead from the new quadrangle to games court and existing play areas.

0 2 4 6 8 10 20

NSW GOVERNMENT | Planning, Industry & Environment

Issued under the Environmental Planning and Assessment Act 1979

Approved Application No: SSD-9344 Signed:

Granted on the: 30 Aug 2019 Sheet No: 14 of 15

REVISIONS

A 19.09.18
1. Revisions to suit revised architectural plans.

B 21.09.18
1. Early works removed.
2. Adjustments to planting.

Kent Road Public School

LANDSCAPE SKETCH PLAN

iScape LANDSCAPE ARCHITECTURE
office. 16/303 pacific highway
lindfield nsw 2070
postal. 25 bent street
lindfield nsw 2070
ph 9416 4290 fax 9416 4735
A.C.N 097 328 580
email ijla@netspace.net.au

date September 2018
job.dwg no. 80.18/191'A'
designed by IJ
scale 1:200 @ A1 1:400 @ A3
no. in set ONE/THREE
drawn by AM/HL

Landscape Elements

Timber bridges

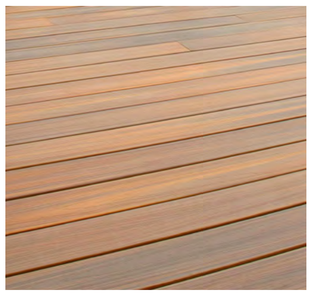
Timber seating attached to planters

Raised performance platform

Planted sandstone spalls rain garden

Surface Materials

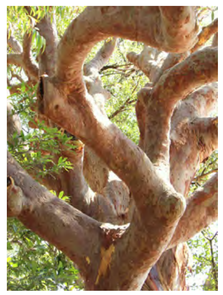
Synthetic grass



Composite decking

Planting Palette

Acer buergerianum
Trident Maple



Angophora costata
Sydney Red Gum

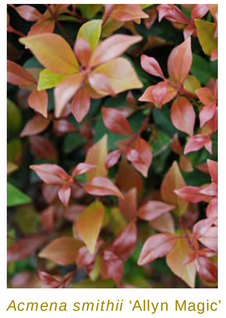
Elaeocarpus reticulatus
Blueberry Ash

Nyssa sylvatica
Tupelo

Pyrus ussuriensis
Manchurian Pear

Syncarpia glomulifera
Turpentine

Tristaniopsis laurina
Water Gum

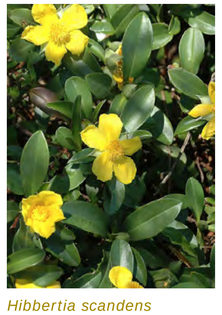


Acmena smithii 'Allyn Magic'
Dwarf Lilli Pilli

Banksia ericifolia
Heath Banksia

Dianella caerulea
Paroo Lily

Hardenbergia violacea
Native Sarsparilla



Hibbertia scandens
Guinea Flower

Isolepis nodosa
Nobby Clubrush

Lomandra 'Seascape'
Mat Rush

Phormium 'Bronze Baby'
Dwarf NZ FLax

Themeda australis
Kangaroo Grass

Viola hederacea
Native Violet

REVISIONS

A **19.09.18**

1. Revisions to suit revised architectural plans.

Kent Road Public School

MATERIALS PALETTE

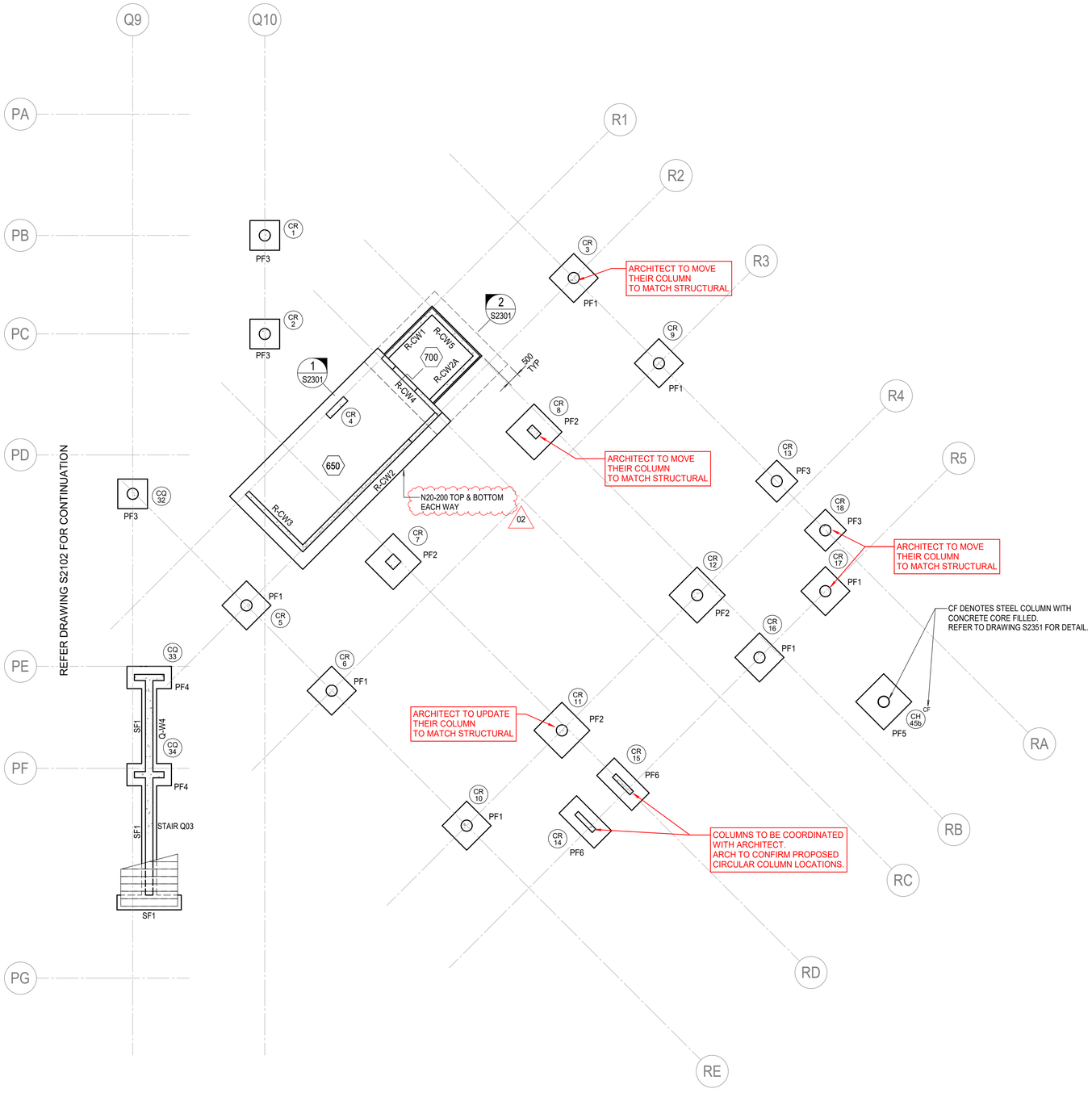
iscape LANDSCAPE ARCHITECTURE

office. 16/303 pacific highway
lindfield nsw 2070
postal. 25 bent street
lindfield nsw 2070
ph 9416 4290 fax 9416 4735
A.C.N 097 328 580
email ijla@netspace.net.au

date September 2018
job.dwg no. 80.18/192'A'
designed by IJ
scale -
no. in set TWO/THREE
drawn by AM/HL

APPENDIX D FOOTING AND FOUNDATION DESIGN FOR BLOCK R

THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT NOTES ON DRAWING NO. S2001



PAD FOOTING SCHEDULE

MARK	LENGTH	WIDTH	DEPTH	REINFORCEMENT
PF1	1400	1400	600	N16-200 TOP & BOTTOM EACH WAY, COGGED
PF2	1600	1600	600	N16-200 TOP & BOTTOM EACH WAY, COGGED
PF3	1200	1200	600	N16-200 TOP & BOTTOM EACH WAY, COGGED
PF4	1800	900	600	N16-200 TOP & BOTTOM EACH WAY, COGGED
PF5	1600	1600	800	N16-150 TOP & BOTTOM EACH WAY, COGGED
PF6	2000	1000	600	N16-200 TOP & BOTTOM EACH WAY, COGGED

02

STRIP FOOTING SCHEDULE

MARK	WIDTH	DEPTH	REINFORCEMENT
SF1	600	600	4N16 TOP & BTM, N12-300 LIGS
SF2	750	600	5N24 TOP & BTM, N16-300 LIGS
SF3	750	400	5N16 TOP & BTM, N12-300 LIGS
SF4	600	600	4N20 TOP, 4N24 BTM, N16-300 LIGS
SF5	1500	600	N16-200 TOP & BOTTOM EACH WAY, COGGED TOP UPPER AND BOTTOM LOWER BARS TO BE NORTH/SOUTH

NOTE: TOP & BOTTOM REINFORCEMENT TO EXTEND A MINIMUM LAP LENGTH INTO ANY CONNECTED PAD FOOTINGS.

02

FOOTING PLAN - BLOCK R

Scale 1 : 100

1. ALLOW 15 MPa BLINDING CONCRETE TO FOUND PAD AND STRIP FOOTINGS A MINIMUM 200mm INTO CLASS 5 SHALE WHICH HAS A MINIMUM SAFE ALLOWABLE BEARING PRESSURE OF 700 kPa.
2. REFER TO CIVIL DRAWINGS FOR OSD TANK AND EXTERNAL PAVEMENT.
3. REFER DRAWING S2241 FOR CONCRETE COLUMN SCHEDULE.
4. ~~RW1 DENOTES 200 THICK INSITU WALL WITH N16-200 EACH WAY, EACH FACE.~~
5. REFER TO DRAWINGS S2201-S2211 FOR WALL ELEVATIONS & DETAILS.

02

Rev	Description	Eng	Draft	Date
02	ISSUED FOR CONSTRUCTION	MJ	MW	04.10.19
01	ISSUED FOR CONSTRUCTION	EB	NFB	26.07.19

Project

KENT ROAD
MARSFIELD

Sheet Subject

FOOTING OUTLINE PLAN
BLOCK R

Architect
GARDNER WETHERILL ASSOCIATES
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460 Pacific Highway, St Leonards NSW 2065
Phone: 02 9929 6777 Email: design@gardnerwetherill.com.au

Structural Engineer
Taylor Thomson Whitting
612 9439 7288 | 48 Chandos Street St Leonards NSW 2065

Scale : A1	Drawn	Authorised
1 : 100	MW	HN

Job No	Drawing No	Revision
171518-SBAA	S2103	02

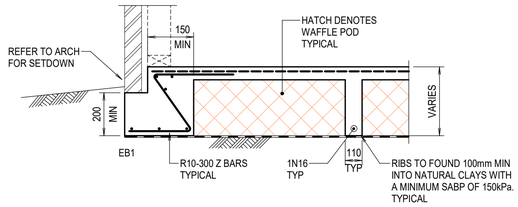
4/10/2019 12:15:41 PM

FOR CONSTRUCTION

PLOTTED BY: MW ON 4/10/2019 12:15:41 PM

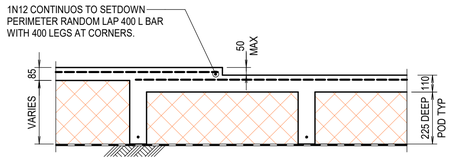
A1 0 1 2 3 4 5 6 7 8 9 10

THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT NOTES ON DRAWING NO. S2001



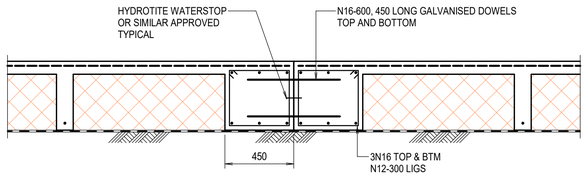
SECTION 1 / S2111
Scale 1 : 20

TYPICAL WAFFLE SLAB SECTION



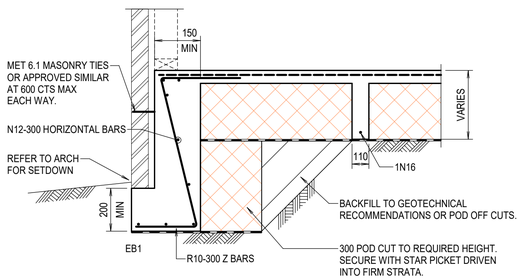
TYPICAL WAFFLE SLAB SETDOWN

Scale 1 : 20



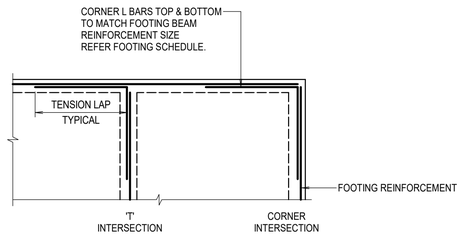
TYPICAL WAFFLE SLAB CONSTRUCTION JOINT

Scale 1 : 20



TYPICAL WAFFLE WITH DEEPENED BEAM

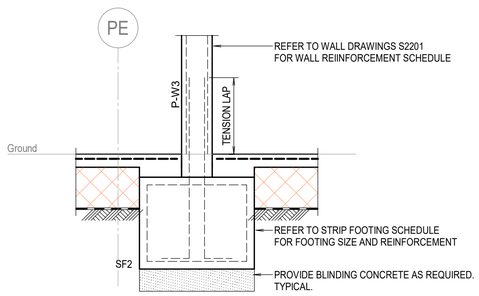
Scale 1 : 20



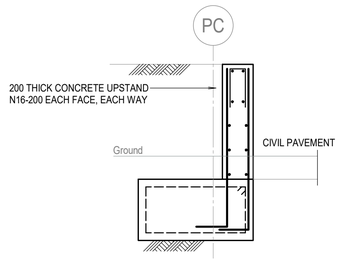
PLAN VIEW

TYPICAL WAFFLE SLAB BEAM INTERSECTION DETAIL

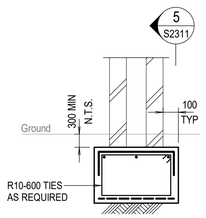
Scale 1 : 20



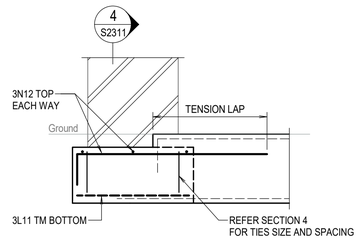
SECTION 2 / S2111
Scale 1 : 20



SECTION 3 / S2101
Scale 1 : 20



SECTION 4 / S2111
Scale 1 : 20



SECTION 5 / S2111
Scale 1 : 20

TYPICAL WAFFLE SLAB AT FOOTING DETAIL

Rev	Description	Eng	Draft	Date
01	FOR COORDINATION ONLY	MJ	MW	04.10.19
E	DD 98% UPDATE	EB	NFB	26.07.19
D	ISSUED FOR DD 98%	EB	MW	06.06.19
C	ISSUED FOR DD 80%	EB	ZW	10.05.19
B	REVISED 60% TENDER	EB	MW	07.12.18
A	ISSUED FOR 60% TENDER	EB	MW	13.09.18
P1	FOR COORDINATION ONLY	EB	JC	07.09.18

Project

KENT ROAD
MARSFIELD

Sheet Subject

GROUND SECTIONS SHEET 1

Architect
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Phone: 02 9929 6777 Email: design@gardnerwetherill.com.au

Structural Engineer
Taylor Thomson Whitting
612 9439 7288 | 48 Chandos Street St Leonards NSW 2065

Scale : A1	Drawn	Authorised
1 : 20	MW	HN

Job No	Drawing No	Revision
171518-SBAA	S2311	01

4/10/2019 12:17:17 PM

FOR CONSTRUCTION

PLOTTED BY: MW ON 4/10/2019 12:17:17 PM

A1 0 1 2 3 4 5 6 7 8 9 10