



School Infrastructure New South Wales

Remedial Action Plan

Fort Street Public School
Upper Fort Street
Millers Point, New South Wales

19 June 2020

56262/124832 (Rev 2)

JBS&G Australia Pty Ltd

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Abbreviations

Term	Definition
ACM	Asbestos Containing Material
AHD	Australian Height Datum
AMP	Asbestos Management Plan
ASRIS	Australian Soil Resource Information System
ASS	Acid Sulfate Soils
ASSMP	Acid Sulfate Soil Management Plan
bgs	Below Ground Surface
B(a)P TEQ	Benzo(a)pyrene toxicity equivalence quotient
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
CEC	Cation Exchange Capacity
COC	Chain of Custody
COPC	Contaminants of Potential Concern
Council	The Council of the City of Sydney
CSM	Conceptual Site Model
DA	Development application
DCP	Development Control Plan
DSI	Detailed Site Investigation
DP	Deposited Plan
DQI	Data Quality Indicator
DQO	Data Quality Objective
EIL	Ecological Investigation Levels
EMP	Environmental Management Plan
ENM	Excavated Natural Material
EPA	NSW Environment Protection Authority
ESA	Environmental Site Assessment
ESL	Ecological Screening Levels
GIL	Groundwater Investigation Levels
GPS	Global Positioning Unit
ha	Hectare
HIL	Health Investigation Levels
HSL	Health Screening Levels
JBS&G	JBS&G Australia Pty Ltd
LCS	Laboratory Control Sample
LEP	Local Environmental Plan
LOR	Limit of Reporting
NAPL	Non-Aqueous Phase Liquid
NATA	National Association of Testing Authorities
NDD	Non Destructive Drilling
NEPC	National Environmental Protection Council
OCP	Organochlorine Pesticides
OEH	Office of Environment and Heritage
PASS	Potential Acid Sulfate Soils
PAH	Polycyclic Aromatic Hydrocarbons
PARCCS	Precision, Accuracy, Representativeness, Comparability, Completeness and Sensitivity
PCB	Polychlorinated Biphenyls
pH	Potential of Hydrogen
PID	Photo-ionisation Detector
ppm	Parts Per Million
QA/QC	Quality Assurance / Quality Control
RAP	Remedial Action Plan
RCP	Remedial Concept Plan
RL	Relative Level
RPD	Relative Percent Difference
SAQP	Sampling, Analysis and Quality Plan

SEPP55	State Environmental Planning Policy
SINSW	School Infrastructure New South Wales
SPOCAS	Suspension Peroxide Oxidation Combined Acidity and Sulfur
SSDA	State Significant Development Application
TCLP	Toxicity Characteristic Leaching Procedure
TPH	Total Petroleum Hydrocarbons
TRH	Total Recoverable Hydrocarbons
UCL	Upper Confidence Limit
VENM	Virgin Excavated Natural Material
VOC	Volatile Organic Compounds

1. Introduction

1.1 Introduction and Background

1.2 Introduction and Background

JBS&G Australia Pty Ltd (JBS&G) has been engaged by Schools Infrastructure NSW (SINSW, the client), c/o Johnstaff Projects Pty Ltd (Johnstaff), to prepare a Remedial Action Plan (RAP) to facilitate the redevelopment of Fort Street Public School, located on Upper Fort Street, Observatory Hill, Millers Point, NSW (the site). The site is legally identified as Lot 2 Deposited Plan (DP) 244444, Lot 2, 3, 4 and 9 of DP 732592, Lot 106,107 and 108 DP 748340, and Lot 5 DP 258013 and comprises an area of approximately 6,200 m². The site location and layout are shown on **Figure 1** and **Figure 2** respectively.

JBS&G understand that Fort Street Public School has reached student and functional capacity in its current form and SINSW have commenced planning for the school's expansion. In seeking planning approval for the school's redevelopment, it is proposed to lodge a State Significant Development Application (SSDA) with the NSW Department of Planning and Environment (DPE).

Previous investigations at the site (JBS&G 2019) have identified heavy metals, polycyclic aromatic hydrocarbons (PAHs) and petroleum hydrocarbons (TRH) impacts to soils at the site which pose a potentially unacceptable risks to human health under the proposed redevelopment and associated land uses, pursuant to the *National Environmental Protection Measure (NEPM)* (NEPC 2013¹). As such, to facilitate the redevelopment of the site in satisfaction of the Secretary's Environmental Indicative Assessment Requirements (SEARS) for the site's SSDA, and recommendations of JBS&G (2019), the development of a Remedial Action Plan (RAP) for the required remediation/management to enable the site to be considered suitable for the proposed primary school education facility, consistent with the most conservative NEPC (2013) land use scenario - residential development with garden/accessible soil and including childcare centres, preschools and primary schools.

This RAP has been prepared with reference to relevant guidelines made or endorsed by the NSW Environment Protection Agency (EPA) inclusive of NEPC (2013) and also the requirements of *State Environmental Planning Policy 55 – Remediation of Land* (SEPP 55²).

1.3 Objective

The objectives of this RAP are to:

- Define the conceptual site model (CSM) of the proposed site development including identification of potential areas of contaminant exposure as specific to the proposed redevelopment and continued use as a primary educational facility;
- Define the extent of remedial works required to make the site suitable for the proposed redevelopment and ongoing primary school use;
- Establish a framework and methodologies to validate the removal of site contamination as identified as posing a potential risk; and
- Include provision for management of environmental and safety risks during the implementation of the remedial works, and guidance for the any requirements of ongoing management of impacted materials retained on the site.

¹ *National Environment Protection (Assessment of Site Contamination) Measure, Amendment No 1 (2013)*. National Environment Protection Council (NEPC 2013)

² *Managing Land Contamination – Planning Guidelines SEPP 55 Remediation of Land*. Department of Urban Affairs and Planning. Environment Protection Authority 1998 (DUAP 1998)

2. Site Condition & Setting

2.1 Site Location and Description

The site details are summarised in **Table 2.1**. A plan showing the location of the site is provided as **Figure 1**, and a plan showing the boundaries of the site is provided as **Figure 2**.

Table 2.1: Site Identification

Lots / DPs	Lot 2 of DP 244444 Lot 2, 3, 4 and 9 of DP 732592 Lot 106 of DP 748340 Lot 107 of DP 748340 Lot 108 of DP 748340 Lot 5 of DP 258013
Site Address	Upper Fort Street, Observatory Hill, Miller Point, NSW, 2000
Local Government Authority	City of Sydney
Site Area	Approximately 6,200 m ²
Approximate MGA Coordinates (MGA 56)	As shown on Figure 2
Site Zoning	Metropolitan Centre (B8)
Current Use	Education
Previous Use	
Proposed Use	Education

2.2 Site Description

The following site inspection is abstracted from documentation recently prepared by JBS&G (2019).

A detailed site inspection was undertaken on 4 June 2019, by one of JBS&G's trained and experienced field scientists. Site observations are discussed below.

The site is a flat, spherical shaped parcel of land located approximately 800 m southwest of the Sydney Harbour Bridge. The site is situated at the top of Observatory Hill and is bound by a portion of the Cahill Expressway which is cut into the underlying sandstone, such that the site forms an 'island', as seen in **Figure 2**.

The site is accessed via a gated accessway from Upper Fort Street. Several structures exist at the site, including Building A and associated toilet block, a style cottage building, garage (materials storage), Building B (EEC Building) and the MET Building. A large portion of the site is covered by hardstand including asphalt, concrete and astro-turf areas such that access to underlying soils is limited. Grasses cover a lesser extent of the site, largely in the southern portion of the site and surrounding the MET Building and Cottage. Several trees and small shrubs are present within the southern portion of the site, and a large, old-growth tree is located immediately to the east of Building A. Playground areas including an astro-turf area, mini sports field (astro-turf) and a newly constructed raised timber decking are present within the northern portion of the site.

2.3 Surrounding Land-Use

The current land uses of adjacent properties or properties across adjacent roads are summarised below.

- North – Cahill Expressway, beyond which lies Sydney Observatory;
- East – Major road infrastructure including the Western Distributor and Cahill Expressway;
- South – Cahill Expressway, beyond which lies infrastructure including a fire station, cafes and art gallery; and
- West – Cahill Expressway, beyond which lies residential housing and the Barangaroo Redevelopment Precinct.

2.4 Site Natural Setting

The environmental setting is detailed in JBS&G (2019) and summarised below for completeness.

Table 2.2: Summary of Environmental Characteristics

Environmental Aspect	Characteristics
Topography	Review of published regional topographic information obtained from the Photomaps tool hosted by Nearmap (2019 ³) indicates the site is generally flat, with the approximate elevation of 40 m Australian Height Datum (AHD). The site is situated atop Observatory Hill and as such, the surrounding land generally dips to the north, east and south, beyond the Cahill Expressway.
Meteorology	A review of average climatic data for the nearest Bureau of Meteorology monitoring location (Observatory Hill⁴) indicates the site is located within the following meteorological setting: • Average minimum temperatures vary from 8.1 °C in July to 18.9 °C in February; • Average maximum temperatures vary from 16.4 °C in July to 26.0 °C in January; • The average annual rainfall is approximately 1215.7 mm with rainfall greater than 1 mm occurring on an average of 100.0 days per year; and • Monthly rainfall varies from 67.8 mm in September to 133.2 mm in June.
Hydrology	Due to the site's topography and geographic isolation, precipitation falling in areas surrounding the site are not likely to influence the hydraulic condition of the site. At the site, precipitation is anticipated to fall onto buildings and precipitation falling on asphalted/paved areas will flow into engineered drainage lines and the local stormwater system. In areas unconfined by hardstand (e.g. garden beds, unpaved areas across the school grounds), rainfall is likely to penetrate soils and migrate to the water table where it may be released as seepage water on the Cahill Expressway, and/or flow into stormwater infrastructure in heavy rain events. The closest waterbody to the site is the Parramatta River at Barangaroo, located approximately 250m west of the site.
Geology and Soils	Based on the Sydney Geological Map⁵, the site is located in the vicinity of the Triassic aged Hawkesbury Sandstone, typically comprising medium to coarse-grained quartz sandstone with minor shale and laminate lenses. Observations of the exposed geology of the Cahill Expressway cutting made during the site inspection indicate that sandstone is present at relatively shallow depths beneath the site surface (i.e. within 2m below ground surface (m bgs), consistent with Curio (2019). During the site investigation, 18 boreholes were advanced across the site, in which fill overlying natural materials was encountered from beneath hardstand (0.15 m bgs) to 2.7 m bgs. Natural materials encountered were observed to comprise sandstone. Based on information provided on the NSW Environment and Heritage Soil and Land Information web application⁶, the site is situated in the GyMEA Erosional environment – characterised by shallow to moderately deep (30-100 cm) yellow earths and earthy sands, on crests and inside of benches; shallow (<20 cm) siliceous sands on leading edges of benches; localised Gleyed Podzolic Soils and Yellow Podzolic Soils on shale lenses; shallow to moderately deep (<100 cm) siliceous sands and leached sands along drainage lines. Based on a review of the Salinity Potential Map of Sydney (DIPNR 2003), soils at the site are not considered to be saline.

³ 'Photomaps', Nearmap, Accessed 22 July 2019, Nearmap (2019) <https://www.nearmap.com.au/>

⁴ http://www.bom.gov.au/climate/averages/tables/cw_066062.shtml, Commonwealth of Australia, 2013 Bureau of Meteorology, Product IDCJCM0028 prepared on 22 July 2019 and accessed by JBS&G on 22 July 2019.

⁵ Sydney, 1:250,000 Geological Series Sheets S156-5, 3rd Edition, 1965

⁶ www.environment.nsw.gov.au/eSpadeWebApp (viewed 23 August 2016)

Environmental Aspect	Characteristics
Acid Sulfate Soils (ASS)	Review of the 1:25 000 scale <i>Prospect Paramatta Acid Sulfate Soil (ASS) Risk Map</i> (DLWC 1997 ⁷) indicates that the site is located within an area of 'no known or expected occurrences of acid sulfate soils (ASS) materials'. Based on review of geology maps, soil maps, site topography and site observations, it is unlikely that actual and/or potential acid sulfate soils would be present on-site. Based on the site's elevation, the reported geology, the ASS Risk Map classification and observations made during the intrusive investigations, as documented herein and in JK (2017), no further consideration for the assessment/management of acid sulfate soil is required.
Hydrogeology	A total of thirty-eight registered groundwater wells fall within a 1.0 kilometre radius of site, and are located largely toward the northwest, west and southwest of the site. These wells were installed within the years 2008 – 2011 for water monitoring purposes and have reported drill depths between 3 and 17 metres below ground surface (m bgs). No data regarding standing surface water levels were reported within any of the wells.

2.5 Summary of Site History

A review of the site's history, as described in JBS&G (2019), indicates that the site has been owned by the Crown since records began. A review of Curio (2019) indicates that the site was utilised as a medical facility in the 1800s, and then later as an education facility. The site has largely remained the same since the early 1940s.

2.6 Other Significant Site Information

JBS&G (2019) included searches for the site and surrounding areas of the NSW Environmental Protection Authority (EPA) databases and the Australian and NSW Heritage Inventories. The significant information is summarised as follows:

- No prevention, clean-up or prohibition notices and no transfer, variation, suspension, surrender or revocation of an environmental protection licence has been issued under the Protection of the Environment Operations Act 1997 (POEO Act) for the site and immediate surroundings, and no notices have been issued under the Contaminated Lands Management Act (1997) (CLM Act) for the site and immediate surroundings;
- A search of the EPA's Perfluorooctanesulfonic Acid (PFAS) register indicated that there were no records pertaining to the site or surrounds;
- A search of the NSW Fair Trading loose fill asbestos insulation register indicated that there were no records pertaining to the site; and
- The Section 10.7 Planning Certificate indicates that the land is located within a Heritage Conservation Area (Sydney Local Environment Plan (LEP) 2012), contains items of Environmental Heritage (Sydney LEP 2012), and is identified as being of state significance and has been entered on the State Heritage Register (Amendment to Heritage Act, 1997, gazetted 2/4/99).

⁷ *Prospect Paramatta Acid Sulfate Soil Risk Map* (Edition 2), NSW Department of Land and Water Conservation (DLWC 1997)

3. Previous Investigations

3.1 Geotechnical Investigation (JK 2017⁸)

JK Geotechnics (JK) was commissioned by Conrad Gargett Ancher Mortlock Wooley, on behalf of the Department of Education, to complete a geotechnical investigation for the proposed Fort Street Public School upgrade. The purpose of the investigation was to obtain geotechnical information on subsurface conditions as a basis for preliminary comments and recommendations on excavation conditions, earthworks, retention, footings and pavements.

As part of the investigation, JK advanced 13 boreholes (BH1 – BH4 and BH6 – BH14 inclusive) to a depth between 2.3 m bgs and 6.0 m bgs and one test pit (TP5) to a depth of 0.85 m bgs.

Fill materials were encountered beneath pavements at locations BH1 to BH4, TP5, BH10 and BH14 to depths ranging between 0.8 m bgs and 2.1 bgs, with the remaining boreholes encountering fill beneath grassed surfaces to depths ranging from 0.4 m bgs to 3.47 m bgs. Encountered fill materials generally comprised gravelly sand, sandy gravel, and clayey sand (with some silty sand in BH11, BH12 and BH13) with inclusions of gravel, fractions of brick, mortar, concrete and timber fragments.

Weathered sandstone bedrock was encountered in all boreholes across the site, increasing in depth from 0.4 m bgs in the south western portion of site to 3.47 m bgs in the south eastern portion.

It was noted that all boreholes were dry on completion of solid flight auger drilling, i.e. no groundwater interception. Boreholes to depths greater than 5.0 m bgs were advanced by coring where water was introduced into the borehole artificially inflating groundwater levels, therefore data about groundwater levels at depth (max 6.0 m bgs) was not recorded.

The report then detailed various recommendations for excavation batters, retaining walls, footings, slabs, pavements and earthquake design parameters which are not applicable to the PSI documented herein.

3.2 Detailed Site Investigation (DSI) (JBS&G 2019)

JBS&G was engaged by SINSW to undertake a Detailed Site Investigation (DSI) at the site. The objectives of the DSI were to characterise potential contamination at the site, and to draw conclusions regarding the suitability of the site for the proposed land use, or, to make recommendations to enable such conclusions.

JBS&G undertook sampling at 18 locations across the site utilising a combination of systematic and targeted sampling approaches. Noting the archaeological significance of the site, JBS&G collected soils samples from a combination of trenches that were advanced by Curio for dual-purpose assessment of site characterisation and archaeological investigations and four test pits.

Fill materials were encountered at most sample locations from the ground surface (or beneath hardstands) to depths of between 0.4 and 2.7 m bgs and generally comprised silty gravels, gravelly sand and clayey gravelly sand. The depth of fill materials was generally shallowest in the western portion of the site, with increasing depth towards the east. Inclusions of brick, sandstone cobbles, asphalt, minor ash and slag and glass were observed at several locations across the site. Three small fragments of non-friable (bonded) asbestos containing materials (ACM) were identified in fill materials excavated from TP01B from a depth of 0.2-0.3 m bgs. The three fragments of ACM were collected for laboratory analysis which confirmed the presence of asbestos fibres in the fragments. No other fragments of ACM in soil were observed by JBS&G from materials excavated from the trench associated with TP01A and TP01B. An additional soil sample was collected from material from

⁸ *Geotechnical Investigation for Proposed School Upgrade at Fort Street Public School*. Fort Street Public School, Upper Fort Street, millers Point, NSW. 28 June 2019. JK Geotechnics (JK 2017)

this sample interval for asbestos in soils analysis, in which no asbestos was reported by the testing laboratory. A subsequent asbestos clearance certificate was issued by JBS&G.

The results of the soil analytical data indicate that there are potentially unacceptable risks to human and ecological health at several locations resulting from PAHs, heavy metals and TRH in soil. JBS&G's assessment did not identify potential risks relating to the migration of contamination from the site based on current site conditions. Soil sampling locations collected as part of JBS&G (2019) are shown in **Figure 4A** and **4B**, and soil exceedances are shown in **Figure 4C**.

JBS&G recommended interim management of identified lead contamination in accessible surface soils such that access to these soils is restricted, either by fencing the area off, or by providing physical separation to soils (for example, utilising artificial turf) to restrict exposure to soil but allow access to the area.

Based on the findings of the DSI, the site was considered to pose potentially unacceptable risks to current and future users of the site in a primary education setting (residential with garden/accessible soils land use scenario that includes application to primary schools, consistent with NEPC (2013)). For current use of the site, JBS&G recommended an interim environmental management plan (EMP) be developed and implemented to address lead contamination in surface soil at TP05B.

For the development and future use, JBS&G recommend the development of a RAP to guide the required remediation in order for the site to be made suitable for the proposed redevelopment and ongoing primary school land use.

4. Conceptual Site Model

Based on the findings of JBS&G (2019), the following conceptual site model (CSM) has been developed for the site.

4.1 Areas of Environmental Concern

Based on the review of the site history and of previous investigations, JBS&G's assessment and understanding of site conditions, potential areas/aspects of environmental concern (AEC) and associated contaminants of potential concern (COPC) have been identified as summarised in **Table 4.1**. The actual presence of these constituents is discussed further in the following sections.

Table 4.1 – Areas of Environmental Concern and Associated Contaminants of Potential Concern

AEC	AEC Description	Potentially Effected Media	Extent of AEC	COPC
1	Fill Materials Imported and/or reworked fill materials of unknown origin used to create former site levels, comprising materials of unknown character and/or origin	Soil	Site wide	Heavy metals, PAHs, TRH/BTEX, foreign anthropogenic materials and asbestos
2	Current and Former Site Structures Contamination to soils from hazardous building materials utilised in historical and existing site structures that have either been demolished and/or become friable.	Soil	Site wide	Lead and asbestos
3	Vehicular Fallout The proximity of the site to key arterial roadways may have resulted in the contamination to soils from vehicle exhausts that utilised leaded fuels.	Soil	Site wide	Lead

4.2 Contaminated Media - Soils

Soil contamination identified at the site assessed by JBS&G (2019) with respect to the most conservative NEPC (2013) land use criteria, residential with accessible soils and including primary schools (HIL/HSL A, NEPC 2013) is presented in **Table A**, and historical soil sampling locations are shown in **Figure 4A** (current site layout) and **4B** (proposed site layout). Soil exceedances are shown in **Figure 4C**.

In consideration of the site's data set, potentially unacceptable risks to the health of human receptors at the site under the adopted land use were constrained to the heavy metal of lead, PAHs (naphthalene, carcinogenic PAHs as B(a)P TEQ, total PAHs) and TRH.

A review of the testpit logs for the site indicate that several sample locations, and particularly TP2A and TP2B where the highest concentrations of PAHs were reported, were observed to contain slag inclusions within fill materials – the likely source of PAHs at these locations. This was also the case for TP10.

TP05A reported the second highest concentrations of PAHs from materials sampled from 0.14 to 0.23 m bgs. Review of the testpit log for this location indicates that materials from this interval were asphaltic. The binding agent utilised in asphalt is bitumen - a hydrocarbon product comprised of long-chain hydrocarbons and rich in PAHs.

Potentially unacceptable health risks from the potential intrusion of vapours to future site structures was noted from naphthalene at two locations, TP1B 0.2-0.3 and TP7B 1.9-2.0. The former location was advanced in proximity to the school car park (west), and the latter was located near the eastern boundary. With consideration to the proposed design plans, as shown in **Figure 4B**, TP1B will be located external to building footprints and as such, is not considered likely to pose a risk to future users of the structure in proximity.

A review of the design plans, as shown in **Figure 4B**, indicates that sampling location TP7B 1.9-2.0 is situated external to the proposed building in the southern portion of the site, however is close enough to warrant further consideration of potential impacts to future users of the site. The reported concentration of naphthalene (7.9 mg/kg) at this location was reported in excess of the adopted HSL criterion of 3 mg/kg for sandy soils within 0-1m of a land use consistent with HSL-A (i.e. uses directly associated with primary school aged children, e.g. classroom). The proposed plans for this portion of the site indicate that a basement level is to be constructed, and will house a mechanical plant room, hydraulic pump and sprinkler rooms, communications equipment, and provide storage space for the school's operations. With consideration to the exposure scenarios provided in NEPC (2013), the application of criteria consistent with a commercial/industrial (HSL-D) land use is considered appropriate for the basement level, consistent with NEPC (2013) guidance, in which case the reported concentrations do not represent an unacceptable risk to human health. In addition, it is likely that materials from TP7B will be excavated and disposed from the site to facilitate the construction of the basement level, thereby removing the source materials from the site.

Lead was identified in surface and near surface soils at concentrations that pose a potentially unacceptable risk to current and future users of the site. Based on a review of the historical and environmental setting of the site, it is likely that soil impacts are associated with the cross-contamination from the historical use of lead-based paints on structures across the site and possibly from the deposition in surface soils from vehicle exhaust that historically utilised lead-based petrol from nearby roadways. In addition, sources of lead in fill materials may also be attributed to the presence of ash and slag, as observed in fill materials at the site.

In relation to the fragments of non-friable (bonded) asbestos identified in soils from TP01B, JBS&G do not consider there to be unacceptable risks to future users from soils at TP01B from asbestos noting that the fragments were removed from the soils for laboratory analysis, subsequent inspection of the trench and spoil did not identify any additional fragments, and laboratory data for soils did not identify the presence of asbestos in soil (JBS&G 2019). No further asbestos in soil was identified during the DSI.

Risks to ecological health are often considered in respect to the risks various compounds within the environment pose to ecological health under a given land use scenario and exist for the protection of soil processes, plant species and organisms that inhabit or contact soils.

In relation to the site's data set, concentrations of COPCs were generally reported below the adopted ecological criteria (ESLs/EILs), with the exception of the heavy metals of nickel and zinc, petroleum hydrocarbons, and B(a)P. A review of the testpit logs indicates that the elevated concentrations of nickel and zinc in soils is likely attributed to the presence of igneous gravels in roadbase gravels (TP01), and potential historical sources (slag and/or metal use from historical usage, as evident by archaeological footings at TP05).

In relation to the reported concentrations of B(a)P and TRH reported in excess of the adopted ecological screening levels, observations made during the completion of field works indicated that vegetation in proximity to sampling locations that reported elevated levels of these compounds, and across the site in general, appeared to be healthy with no visual indicators of vegetative stress, indicating that soil processes responsible for ecological health did not appear to be inhibited. Furthermore, NEPC (2013) notes that high molecular weight PAHs such as B(a)P are not readily taken

up by plants, and as such are unlikely to pose an unacceptable risk to plant growth. This would particularly be the case of PAH sources such as slag or asphalt where the PAHs are bound into the matrix.

4.3 Potential for Migration

The potential for migration of contaminants offsite is considered low given the nature, distribution and depth of identified contamination. In relation to the potential for migration of contamination to groundwater via percolating surface water, the site is surrounded by a significant sandstone cutting which acts to isolate the site from significant groundwater interactions. In addition, the proposed redevelopment contains large areas of concrete/asphalt hardstand and structures, which will limit the capacity for surface water collection by site soils. In addition, accessible soils at the site (not covered by hardstand) are largely located at the site's peripheries, and as such, are not likely to interact with a significant portion of the site's soils.

JBS&G considers there is the potential for the aeolian transport of contamination from areas of the site that are not covered by hardstand, albeit low due to the presence of vegetation which acts to retard dust generation. The management strategy developed for the site will need to consider potential implications of aeolian transport.

4.4 Potential Exposure Pathways

Based on the contaminants of potential concern identified in soil media, as discussed above, the exposure pathways for the site during and following development works include:

- Potential dermal and oral contact to impacted soils as present at shallow depths and/or accessible by future service excavations across the extent of the site; and/or
- Potential oral and dermal contact to shallow groundwater as accessible by potential future service excavations and/or installed services pits.

4.5 Receptors

Potential human populations who may be exposed to site impacts in the future (if they are not remediated or appropriate management is not implemented prior to or during development) include:

- Potential future primary school students (children);
- Current and future workers of the site (teachers, support staff, grounds-keepers, etc);
- Future construction and site maintenance workers;
- Future and current sub-surface excavation and intrusive workers; and
- Future ecological receptors (largely limited to flora)

4.6 Preferential Pathways

Man-made preferential pathways are present throughout the assessment area, generally associated with fill materials, and at near surface depths over the remainder of the assessment area. Fill materials are anticipated to have a higher permeability than the underlying clayey soils.

Sub-surface services will be present as part of site redevelopment and preferential pathways can be created by the generally higher permeability backfill used to re-instate these trenches.

5. Remedial Action Plan

5.1 Remedial Goal

The goal for the remediation and/or management of environmental impact is to:

- Remove unacceptable risks to human populations utilising/working on/visiting the primary education facility by fill materials/soil contamination;
- Remove or manage unacceptable ecological risks to flora/fauna posed by fill/soil contamination; and
- Undertake remedial works, and associated site development works (i.e. bulk excavation, waste disposal etc) in a manner that best complies with the principles of ecologically sustainable development (ESD).

5.2 Extent of Remediation

The extent of remedial works has been determined by a review of the environmental status of the site as discussed in previous assessments and summarised in **Section 3** and **Section 4**. As well as addressing the areas of site contamination as required to meet health risk outcomes for the site, the remedial and validation works have been further designed to ensure that the direct contact pathway, which is considered to be the primary source-receptor pathway, has been appropriately managed such that the site can be considered suitable for the proposed land use.

Soils on the site are unsuitable for potential direct contact for potentially sensitive human users of the site and/or ecological receptors. Levels of a range of constituents including heavy metals, TRH, PAHs exceed criteria provided for the protection of health and/or ecological exposures. These soils are located across the whole extent of the site and are specifically shown on **Figure 4C**.

5.3 Assessment of Remedial Options

The *National Environmental Protection Measure* (NEPC 2013) lists the following order of preference for soil remediation and management:

- On-site treatment of the contamination so that it is either destroyed or the associated risk is reduced to an acceptable level; and
- Off-site treatment of excavated soil so that the contamination is either destroyed or the associated risk is reduced to an acceptable level, after which the soil is returned to the site; or, if these are not practicable
- Consolidation and isolation of the soil on-site by containment within a properly designed barrier;
- Removal of contaminated soil to an approved site or facility, followed where necessary by replacement with appropriate material; or
- Where the assessment indicates remediation would have no net environmental benefit or would have a net adverse environmental effect, implementation of an appropriate management strategy.

Remedial options have been assessed for the proposed development as detailed in **Table 5.1** following.

Table 5.1: Remediation Options Assessment Matrix

Remedial Option	Applicability	Assessment
1. On-site treatment so that the contaminants are either destroyed or the associated hazards are reduced to an acceptable level.	<u>Metals</u> Metals are unable to be destroyed. However, there are a number of microencapsulation treatment technologies which can reduce the mobility of the identified inorganic contaminants of concern (e.g. cement stabilisation).	<u>Metals, PAHs, TRH Compounds</u> Not a suitable option Metals are unable to be destroyed, so this is not an option which is able to be considered. Based on the widespread extent of metals impacts in fill soils, methods for onsite treatment, such as ‘microencapsulation’, would require remediation of a substantial volume of soils. Remediation options are available for PAH contaminated fill contaminants, generally restricted to thermal treatment processes which are energy intensive. These options are not considered consistent with the ESD objectives for the site. Although petroleum hydrocarbons may be destroyed by bioremediation, the co-distribution of heavy metals and PAHs will result in the soils still not being considered suitable for the proposed site use without additional management. As these other constituents are not amenable to attenuation, this strategy is not considered viable. In addition, significant excavation activities would be required to facilitate treatment of the identified impacts, impacting upon items of heritage significance (Aboriginal and European) at the site.
	<u>PAHs</u> Polycyclic aromatic hydrocarbons present in site soils are typically restricted to heavier non-volatile constituents. These can be remediated by thermal processes. However, this requires substantial investment in plant and equipment and substantial energy use. Similarly, for heavy metals, there are a number of microencapsulation treatment technologies which can reduce the mobility of the identified organic contaminants of concern (e.g., cement stabilisation).	
	<u>TRH</u> Petroleum hydrocarbons reported in soils are restricted to non-volatile fractions and are associated with observed inclusions of bitumen and/or slag and are typically co-distributed with other solid contaminants (i.e. PAHs and heavy metals). These can be remediated by bioremediation and thermal processes. However, for thermal processes, this requires substantial investment in plant and equipment and substantial energy use. In regard to bioremediation, the potential success for the bioremediation of hydrocarbon impacts is limited by the presence of other co-distributed contaminants that are unable to be bioremediated. The presence of these other contaminants will thence be the driver of remediation and as such, this is not a suitable option.	
2. Off-site treatment so that the contaminants are either destroyed or the associated hazards are reduced to an acceptable level, after which the soil is returned to the site.	<u>Metals</u> Metals are unable to be destroyed. However, there are a number of microencapsulation treatment technologies which can reduce the mobility of the identified inorganic contaminants of concern (e.g. cement stabilisation).	<u>Metals/TRH/PAHs Constituents</u> Not a suitable option. Energy/resource use associated with the transport and return of materials is not considered consistent with ESD objectives for the project. In addition, significant excavation activities would be required to facilitate treatment of the identified impacts, impacting upon items of heritage significance (Aboriginal and European) at the site.
	<u>PAHs</u> PAHs present in site soils are typically restricted to heavier non-volatile constituents. These can be remediated by thermal processes. However, this requires substantial investment in plant and equipment and substantial energy	

Remedial Option	Applicability	Assessment
	use. Similarly, for heavy metals, there are a number of microencapsulation treatment technologies which can reduce the mobility of the identified organic contaminants of concern (e.g., cement stabilisation). <u>TRH</u> As above (Option 1), however, additional time, energy and costs are incurred to take soils off site and return them to the site, in addition to there being no currently licensed facilities in close proximity of the site to undertake soil treatment.	
3. On-site in situ management of the soil by physical separation, and ongoing management.	<u>Fill Materials (TRH, PAHs, heavy metals)</u> Fill materials have been found to contain concentrations of compounds that are able to be readily managed at the site. On this basis, the impacted soils are suitable for retention on the site in areas where human/ecological exposures can be restricted.	<u>Fill Materials (TRH, PAHs, heavy metals)</u> This is the preferred option for the management of impacted fill materials. The retention of the materials will reduce the waste generation and resource requirements of the remediation of the site, as consistent with the ESD objectives. The proposed redeveloped site will be subject to significant areas of building and pavements which will provide physical separation between users of the redeveloped site and retained fill materials. This will assist with preservation of potential heritage items by reducing/avoiding excavation activities. This option is of highest ranking with respect to the ESD principles as a result of the low waste volumes and energy use.
4. Excavation and off-site removal of the impacted material.	<u>Fill Materials (TRH, PAHs, heavy metals)</u> There are currently suitably licensed waste facilities in the Sydney Metropolitan region capable of accepting the identified contaminants within fill materials.	<u>Fill Materials (TRH, PAHs, heavy metals)</u> A potentially applicable option, however constraints at the site may limit the operational applicability of this option. It is noted that the site contains items of high heritage significance (Aboriginal and European), as such, heritage preservation requirements may not allow for excavating large quantities of in-situ soils for remediation. In addition, contamination at the site is considered to be wide-spread in soils and shows no discernible pattern of contaminant distribution. As such, remedial approach of hotspot removal is not likely to be successful without significant excavation and offsite disposal of impacted materials. Whilst this method is viable from a technical and practical view point, as a result of resource consumption and waste generation volume considerations and potential impacts to the archaeological significance of the site, this is not the most preferred remedial option available.

5.4 Regulatory and Planning Requirements

The following planning requirements for the proposed remedial works are presented.

Environment Planning and Assessment Act 1979/SEPP 55

Due to the state significant development status of the proposed redevelopment, the remediation works are classified as Category 1 Remediation Works as per the meaning provided in SEPP 55 and will require development consent under the *Environmental Planning and Assessment Act 1997*.

The nature of remediation works is relatively straightforward, and it is considered most appropriate that development applications for remediation works are included with DA documentation for the associated earthworks as ancillary to other development, or otherwise included in an 'early works' development application.

Environment Planning and Assessment Regulation 2000 – Schedule 3 Designated Development

The proposed remediation works do not constitute designated development.

It is anticipated that the proposed remediation works will not incorporate any on-site treatment of soil. However, in the event that soil is required to be pre-treated prior to off-site disposal, an assessment of potential triggers for the works to be designated development as presented in Schedule 3 – Clause 15 will be required to be completed.

Protection of the Environment Operations Act 1997

All potential discharges from the remediation works will require to be maintained below applicable assessment criteria/threshold guidelines during the remediation works. This would apply to potential emissions in air and water. Levels of discharges are typically assessed at a site boundary.

Site specific environmental management plans, as prepared and maintained by remedial contractors, will require to ensure appropriate controls and monitoring criteria to assess compliance with these aspects.

The proposed remediation/validation activities are not required to be licensed under the *Protection of the Environment Operation Act (1997)*. The site is less than 3 ha in area, does not propose handling of greater than 30,000 m³ of contaminated fill and hence does not trigger the licensing requirements.

Water Management Act 2000

Dewatering is not required for the proposed redevelopment works and as such, notification and/or approvals are not required to be sought from the NSW Department of Primary Industry - Water (DPI-Water).

Protection of the Environment Operations (Waste) Regulation 2014

The regulations make requirements relating to non-licensed waste activities and waste transporting. The proposed works will not require to be licensed. The regulation requires that wastes are stored in an environmentally safe manner. It also stipulates that vehicles used to transport waste must be covered when loaded. This regulation also details additional tracking requirements for vehicles carrying Special (Asbestos) waste.

Provision is provided in the Regulation and EPA (2014⁹) guidelines for the NSW EPA to approve the immobilisation of contaminants in waste (if required).

It is noted that no waste will be received at the site and only VENM, excavated natural material (ENM) or materials covered by a NSW EPA exemption will be imported to the site/site.

⁹ Waste Classification Guidelines – Part 1: Classifying Waste. NSW EPA 2014 (EPA 2014)

Waste Classification Guidelines (EPA 2014)

All wastes generated and proposed to be disposed off-site shall be assessed, classified and managed in accordance with this guideline. Where wastes require immobilisation prior to off-site disposal (to reduce waste classifications) an immobilisation approval shall be sought in accordance with Part 2 of this guideline, or otherwise General Approvals for the immobilisation of wastes in soils as historically issued by the NSW EPA. Immobilisations are only anticipated to be required with unexpected finds.

Based on observations of slag and ash within fill soils (JBS&G 2019), *General Approval of the Immobilisation of Contaminants in Waste*, 1999, NSW EPA (2009/07 – Metallurgical Furnace Slag) will apply for most of the fill materials across the site.

City of Sydney (2004) 'Contaminated Land Development Control Plan'

The Council contaminated land development control plan (DCP) provides a number of environmental and site management provisions required to be employed during remediation works. These have been incorporated into this RAP as minimum standards for the environmental management of remediation works.

Work Health and Safety Act 2011 No 10 and Work Health and Safety Regulation 2017

The information and data provided in this RAP should be considered by the Principal/Remediation Contractor in preparation of its health and safety plans for the remedial works.

If asbestos is encountered as an unexpected find, the removal and disposal of asbestos will be managed in accordance with the Work Health and Safety Act (2011) and Work Health and Safety Regulation (2017), *How to Safely Remove Asbestos: Code of Practice* (SafeWork NSW 2019), *How to Manage and Control Asbestos in the Workplace Code of Practice* (SafeWork NSW 2019), the NSW WorkCover Managing Asbestos in or on Soil Guidelines, the NSW EPA (2014) Waste Classification Guidelines, and requirements under the Protection of the Environment Operations (Waste) Regulation (2014) for asbestos waste monitoring.

In the event asbestos impacts are identified, a licensed asbestos removalist and SafeWork notification regarding the scope of the removal works is required. If >10 m² non-friable (bonded) ACM is identified at the site, the appointed remediation contractor is required to obtain a site-specific permit approving the asbestos works from SafeWork NSW. A permit will not be granted without a current licence and the permit application must be made at least seven days before the work is due to commence. Removal of non-friable ACM (>10 m²) is required to be conducted by a contractor holding at least a Class B licence. No friable ACM has been encountered at the site to date, as such asbestos-related works do not require a Class A licence.

5.5 Remedial Scope of Works

The proposed scope of remedial works will be limited to the management of contaminated soils via on-site in situ management of the soil by physical separation, and ongoing management. As such, only materials considered to be surplus to construction requirements will be disposed from the site.

5.5.1 Site Establishment

All safety and environmental controls are to be implemented as the first stage of remediation works, as outlined in **Section 8.2**. It is anticipated that all remedial works will be undertaken concurrently with construction of the site, and will include, but not be limited to:

- Locate and isolate all required utilities in the proximity of the works;
- Assess need for traffic controls;
- Work area security fencing;
- Site signage and contact numbers;

- Sediment fencing (attached to security fencing); and
- Stormwater runoff and bioremediation area sediment controls (hay bales).

5.5.2 In-Situ / Ongoing Soils Management (Physical Separation Remedial Strategy)

The impacted soil on the site can be retained on site with the site development with appropriate physical separation to remove exposure pathways subject to ongoing management controls.

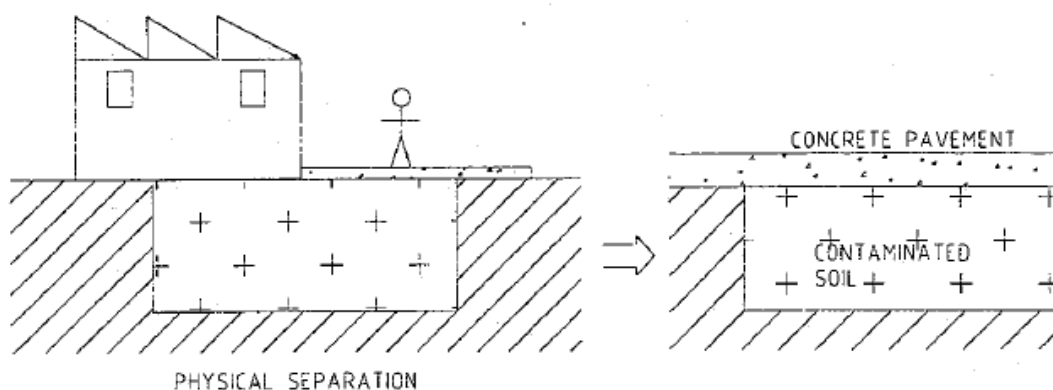
The principal of the on-site management approach is to retain materials in-situ by providing physical separation between impacted fill/soil materials and receptors (e.g. site users, flora, fauna etc). The management approach prevents direct contact via permeant pavements/minimum soil thickness arrangement (i.e. physical separation), and implementation of a long-term EMP to maintain the physical separation arrangements.

Following the removal of materials considered to be surplus to site requirements, control of vapour intrusion is not required as remaining contaminants generally fall within Groups 1, 2 and 10, as listed in Table 1 (ANZECC 1999¹⁰). Therefore, implementation of a 'physical separation' strategy as indicated in ANZECC (1999), in conjunction with appropriate control measures, is appropriate with respect to management of the health risk.

The minimum typical requirements in ANZECC (1999) for physical separation include:

- Permanent concrete floor slab or asphalt surfaced pavement. The pavement outside of the building/basement footprint shall be underlain by a marker layer; or
- A thickness of soil that is unlikely to be penetrated by future users of the site under the intended land use, underlain by a layer of 'marker layer' in areas of exposed site soil (i.e. landscaped beds). A minimum soil cover thickness of 0.5m is commonly adopted however thinner soil cover may be acceptable where site constraints limit separation thickness.

As shown schematically below:



Source: ANZECC (1999)

Given the specific development plans, as shown in **Figure 3** (ground floor) (and provided in full in **Appendix B**) and as understood at the time of preparation of this RAP, and the general preference for landscaping to include grassed areas and shrubs, the following physical separation arrangements are to be implemented within the extent of the site inclusive of accessible / open space areas (as shown in **Figure 6a/b**):

¹⁰ *Guidelines for the Assessment of On-site Containment of Contaminated Soil*, Australian and New Zealand Environment and Conservation Council (ANZECC), September 1999 (ANZECC 1999)

- Cover of fill materials by permanent paved areas (includes concrete, asphalt, pavers and synthetic grass areas) – installation of a marker layer underlying the depth of the pavement and overlying potentially contaminated material;
- Covering of fill materials in landscaped areas;
 - For grassed and shrub areas of the site, either:
 - Installation of the marker layer and geogrid (geosynthetic materials that have an open grid-like appearance and which make casual penetration more difficult) at a minimum depth of 0.3 m below final finished site levels in areas of shallow planting (for grasses and shrubs), and use of environmentally suitable materials placed above to the final levels; OR
 - Installation of the marker layer (no geogrid) at a minimum depth of 0.5 m below final finished site levels in areas of shallow planting (for grasses and shrubs), and use of environmentally suitable materials placed above to the final levels;
 - Installation of the marker layer at a minimum depth of 0.7m below final finished site levels in areas of new tree planting (or as required for the depth of the plant's root-ball) and use of environmentally suitable materials placed above to the final levels;
 - In areas of existing plants that are to be retained, removal of at least 0.1m of impacted soils, installation of the marker layer at a minimum depth of 0.1m, and placement of wet-pour rubber or similar material to the finish level; and
- Within underground services trenches – in the event underground services are to be installed, the service infrastructure will require to be installed above a marker layer within suitable materials for potential human and/or ecological exposure. The marker layer is to be placed at the base and covering the walls of the trenches to the elevation of the surrounding area marker layer.

The marker layer shall consist of contrasting brightly-coloured (e.g. orange) geofabric of suitable tensile strength and durability to ensure it remains intact upon completion of development works and into the future. The specific details of the proposed marker layer material will require to be approved by the validation consultant prior to application and the details then included in the validation report and long-term EMP documents in addition to survey plans showing the extent of its application both laterally and vertically within the site.

Material above the marker layer extending to the final finished ground level will be required to be environmentally suitable material for human and/or ecological exposure (as appropriate). These physical separation arrangements shall generally comprise growing media but may potentially comprise material originating from within the site validated as suitable for reuse in accordance the requirements outlined in **Section 5.6**, imported Virgin Excavated Natural Material (VENM) or material certified in accordance with a Resource Recovery Order and Exemption issued by the NSW EPA. Where materials are proposed for beneficial reuse under an NSW EPA exemption (i.e. imported to the site), fill material will need to be further assessed for land use suitability. Sampling densities and analysis for COPC will be dependent on the volume, material type, source and subject to the Environmental Consultant's endorsement and acceptance along with meeting the facilities Environmental Protection License (EPL).

Installation of physical separation arrangements shall be defined by survey as completed by a registered surveyor and/or building as-built drawings sufficient to identify:

- The lateral extent and upper depth height of known environmentally impacted materials (i.e. residual fill materials underlying the cover) within each remediation area/stage;

- The lateral extent and type of cover (e.g. permanent pavement, validated fill material, etc) within the remediation area/stage; and
- Confirmation, by photos or otherwise, of the installation of the 'marker layer' underlying the cover (as required).

5.5.3 Excavation and Off-site Removal of Site Fill Materials

It is anticipated that there will be some excavation of site fill material required to obtain construction sub-grade levels.

Where excavation of fill material is required across the site to achieve construction sub-grade levels, the installation of services, etc; this material is proposed to be managed via off-site disposal to an appropriately licensed facility. Following identification of the location and extent of material to be removed, a review of the existing data will be completed to identify whether a waste classification based on existing available data may be prepared for the material, or alternatively additional sampling and laboratory analysis will be implemented to appropriately characterise the material prior to off-site disposal.

All materials requiring offsite disposal will require to be assessed in accordance with the Waste Classification Guidelines, Part 1: Classifying Waste (NSW EPA 2014) and be disposed at a facility lawfully able to accept such wastes.

The material will be excavated under the supervision of the Remediation Consultant with the material stockpiled on hardstand/durable plastic, placed in a skip bin or alternatively directly loaded onto a haulage vehicle for off-site disposal. The material will be removed from site under a waste classification as per EPA guidance (2014a) for disposal to a facility lawfully able to accept the material.

5.5.4 Asbestos Management (if required)

Based on the available site characterisation information as discussed in **Sections 3 and 4**, fill materials within the site are not considered to be contaminated with asbestos. However, noting that three fragments of non-friable ACM were identified during the DSI works, site personnel will require to be made aware of the potential for ACM / asbestos impact to be present on the site. However, in lieu of a positive detection by JBS&G assessments of actual occurrence of asbestos contamination, the site is not definitively considered to be impacted by asbestos and the following should be considered in the event of an unexpected find.

Asbestos contaminated soil (if identified) necessitating management for potential asbestos exposure is defined in *Code of Practice: How to Manage and Control Asbestos in the Workplace*, August 2019, SafeWork NSW 2019 (SafeWork NSW 2019) as:

- Soil that contains visible asbestos as determined by a competent person; or
- Soil that contains asbestos fibres at quantities exceeding trace levels (considered to be the analytical detection limit in lieu of alternate guidance) as reported by analysis undertaken in accordance with AS4964:2004 *Method for the qualitative identification of asbestos in bulk samples*.

Environmental, health and safety management requirements for the handling of these materials will be based on the requirements provided for asbestos-related works in SafeWork NSW (2019). This will include preparation of an asbestos register and associated asbestos removal control/management plan as outlined in SafeWork NSW (2019).

Where sampling and analysis of specific fill materials is completed in conjunction with inspection by a competent person, and the results indicate the material does not fall within the "asbestos contaminated soil" definition, the requirements for management of "asbestos contaminated soils"

will not be required to be implemented. The extent of asbestos contaminated soils may be further delineated within a work stage by a similar assessment (i.e. identification of asbestos contamination hotspots).

For the purposes of remediation works within the site, a competent person shall be considered to be a person who holds a tertiary degree in an environmental discipline, has experience in contaminated site assessment and has completed a WorkSafe approved Asbestos Removal Supervisor course.

If areas of the site are unexpectedly found to be affected by gross levels of asbestos impacted soils (considered to be ACM and/or asbestos fines (AF) or fibrous asbestos (FA) exceeding the HSL A criteria for the occurrence of asbestos in soils), these soils may be excavated and disposed to an appropriately licensed facility, or may be retained at the site and appropriately managed. Should asbestos-impacted soils be retained at the site, the impacted materials will be retained beneath the marker-layer and capping, and will be subject to management as part of the long-term Environmental Management Plan (EMP) to be developed for the site, and the locations and extents of any identified impacts will be entered into an Asbestos Register. Requirements for the validation/management of asbestos impacted soils is outlined in **Section 6.3.4**.

5.6 Materials Importation

In accordance with current EPA policy, only material that does not represent an environmental or health risk at the receiving site may be considered for resource recovery. Imported materials will only be accepted to the site if they meet the restrictions placed on these materials and meet the definition of:

- Virgin Excavated Natural Material (VENM) as defined in the *Protection of the Environment Operations Act* (1997) Schedule 1;
- Excavated Natural Material (ENM) as defined in the ENM Exemption/Order; or
- Resource recovery materials as per an EPA exemption.

All material imported onto the site are required to be accompanied by appropriate documentation that has been verified by the appointed site contamination (environmental) consultant.

Materials proposed to be imported for use under a Resource Recovery Exemption/Order will be subject to review and endorsement by the environmental consultant prior to the importation of materials to the site. This is to ensure that the materials are fit-for-purpose and appropriate for the sensitive primary educational land use.

5.7 Validation

Validation of the remedial works will be conducted by the Environmental Consultant to demonstrate the remediation objectives have been achieved. Details of the validation program are provided in **Section 6**.

5.8 Site Disestablishment

On completion of the remediation works all plant / equipment and safety / environmental controls shall be removed from the site by the appointed Remediation Contractor. All equipment used during remediation works will need to be appropriately decontaminated or disposed of as waste by the Remediation Contractor, in accordance with relevant waste regulations.

6. Validation Plan

6.1 Overview

Validation data is required to be collected to verify the effectiveness of the remedial works and document the final site conditions as being suitable for the proposed future use(s).

The following sections establish the DQOs to be adopted during validation of the site remediation works.

6.2 State the Problem

The site has historically been used for medical and educational purposes and ancillary activities (cut and fill, demolition of historical structures), which have resulted in contamination to soils that require remediation so that the site can be considered suitable for use as a primary education facility.

The potential impacts to site users from these contaminants will require a long-term EMP to be prepared for the site to ensure that the site remains suitable for the proposed land use following validation of the site.

During remediation activities, sufficient validation of the site is required to demonstrate that the identified environmental and health-based risks to future user(s) of the site, as summarised in **Sections 3 and 4.2**, have been adequately managed to render the site suitable for the proposed land use.

6.2.1 Identify the Decision

The decisions which are required to be made for validation of the site are:

1. Have physical separation arrangement layers been installed appropriately and final placement verified in accordance with the RAP requirements?
2. Have materials disposed from the site been appropriately classified and disposed from the site in accordance with the EPA (2014) *Waste Classification Guidelines, Part 1: Classifying Waste* and disposed of at facilities lawfully able to accept such waste?
3. Where unexpected finds were identified, has assessment of potential risks been undertaken in accordance with the RAP and any additional remediation and validation been completed in accordance with the RAP objectives?
4. Are imported soils environmentally suitable for their proposed use?
5. Is the site suitable for the proposed use?

6.2.2 Identify Inputs to the Decision?

Inputs to the decisions are:

- Detailed development plans to be provided by JohnStaff/FJMT (architect);
- Waste classification and/or material characterisation data obtained during assessment of fill materials/soils.
- Materials tracking records.
- Importation assessment criteria.
- Disposal dockets and relevant documents in relation to appropriate disposal of material to be removed from site/site as part of the remediation works (landfill dockets, beneficial reuse/recycling dockets).

- Survey data in areas of fill retention, marker layer installation (in areas not capped by a concrete slab and external to basement) to validate physical separation from site users to in-situ/retained fill.
- Data quality indicators as assessed by quality assurance/quality control (QA/QC).

Specifically, sufficient data needs to be collected from each of the identified potentially impacted media (e.g. fill material) across the site for associated COPC.

In addition, the EMP is required to demonstrate that the protective measures for physical separation from in-situ/retained fill are suitable to ensure the suitability of the site for the continued primary education school land use and has been made legally enforceable.

6.2.3 Define the Study Boundaries

The property is legally identified as Lot 2 Deposited Plan (DP) 244444, Lot 2, 3, 4 and 9 of DP 732592, Lot 106, 107 and 108 DP 748340, and Lot 5 DP 258013 and comprises an area of approximately 6,200 m². A plan showing the location of the site is provided as **Figure 1**, and a plan showing the boundaries of the site is provided as **Figure 2**.

The vertical extent of the works will be the maximum depth of excavation works required to facilitate the construction requirements of the site.

6.2.4 Develop a Decision Rule

Decision rules are provided following for each of the decisions:

- **Decision 1:** Have physical separation arrangement layers been installed appropriately and final placement verified in accordance with the RAP requirements?
 - **Decision Rule:** The marker layer must be installed to the RAP requirements, as well as the manufacturer's installation requirements. The vertical and lateral extents of the marker layer must be surveyed (**Section 5.5.2**), along with consistent and comprehensive photographic evidence.
 - Where soil material is to be used for physical separation as placed above the marker layer and readily accessible to human users, this material is required to be validated as meeting the health (public open space – NEPC 2013) and ecological (urban residential and public open space – NEPC 2013) validation requirements for the site in addition to aesthetic requirements.
 - Physical Separation arrangements are discussed in **Section 5.5.2**.
 - If the marker layer and physical separation arrangements have been installed with the requirements of the RAP, then the answer will be 'Yes'.
 - Otherwise, the decision will be 'No' and additional assessment and/or remediation is required to demonstrate the objectives of the RAP have been achieved.
- **Decision 2:** Have materials disposed from the site been appropriately classified and disposed from the site in accordance with the *Waste Classification Guidelines, Part 1: Classifying Waste* and disposed of at facilities lawfully able to accept such waste?
 - **Decision Rule:** If materials have been appropriately assessed against NSW EPA (2014) and appropriate waste classification documentation provided, and waste disposal dockets show materials were disposed of at a facility lawfully able to accept such wastes, then the answer is 'Yes'.
 - Otherwise, the decision is 'No'.

- **Decision 3:** Where unexpected finds were identified, has assessment of potential risks been undertaken in accordance with the RAP and any additional remediation and validation been completed in accordance with the RAP objectives?
 - **Decision Rule:** If unexpected finds have been suitably characterised such that determinations on the required remediation/management can be undertaken, and whether the implemented remediation actions have been suitably validation such that the unexpected find does not inhibit the ability to draw conclusions regarding site suitability, then the answer is 'Yes'.
Otherwise, the decision is 'No'.
- **Decision 4:** Are imported soils environmentally suitable for their proposed use?
 - **Decision Rule:** If imported soils are comprised of VENM or ENM or another suitable material covered by a NSW EPA Resource Recovery Order and Exemption, and used in accordance with the relevant exemptions, and analyte levels within the soils meet all the adopted human and ecological criteria (**Section 6.3**) for accessible soils on the site then the decision will be Yes.
Otherwise the decision will be No.
- **Decision 5:** Is the site suitable for the proposed use?
 - **Decision Rule:** Was the answer to any of the above decisions 'No'? If so, were the outstanding issues appropriately addressed by implementation of the EMP?
Otherwise, the decision will be No and the requirements for further remediation of the site and / or implementation of additional management measures (as documented in an amended EMP) will be required to be documented such that the answer to the decision can be Yes.

6.2.5 Specify Limits of Decision Error

This step is to establish the decision maker's tolerable limits on decision errors, which are used to establish performance goals for limiting uncertainty in the data. Data generated during this project must be appropriate to allow decisions to be made with confidence.

Specific limits for this project have been adopted in accordance with the appropriate guidance from the NSW EPA, NEPC (2013), appropriate indicators of data quality (DQIs used to assess QA/QC) and standard JBS&G procedures for field sampling and handling.

To assess the usability of the data prior to making decisions, the data will be assessed against pre-determined DQIs for completeness, comparability, representativeness, precision and accuracy.

The pre-determined Data Quality Indicators (DQIs) established for the project are discussed below in relation to precision, accuracy, representativeness, comparability, completeness and sensitivity (PARCCS parameters), and are shown in **Table 6.1**.

- **Precision** - measures the reproducibility of measurements under a given set of conditions. The precision of the laboratory data and sampling techniques is assessed by calculating the Relative Percent Difference (RPD) of duplicate samples.
- **Accuracy** - measures the bias in a measurement system. The accuracy of the laboratory data that are generated during this study is a measure of the closeness of the analytical results obtained by a method to the 'true' value. Accuracy is assessed by reference to the analytical results of laboratory control samples, laboratory spikes and analyses against reference standards.

- **Representativeness** –expresses the degree which sample data accurately and precisely represent a characteristic of a population or an environmental condition. Representativeness is achieved by collecting samples on a representative basis across the site, and by using an adequate number of sample locations to characterise the site to the required accuracy.
- **Comparability** - expresses the confidence with which one data set can be compared with another. This is achieved through maintaining a level of consistency in techniques used to collect samples; ensuring analysing laboratories use consistent analysis techniques and reporting methods.
- **Completeness** – is defined as the percentage of measurements made which are judged to be valid measurements. The completeness goal is set at there being sufficient valid data generated during the study.
- **Sensitivity** – expresses the appropriateness of the chosen laboratory methods, including the limits of reporting, in producing reliable data in relation to the adopted criteria.

If any of the DQIs are not met, further assessment of the data set will be required in order to determine whether the non-conformance has significant effects on the usefulness of the data. Corrective action to correct an adverse impact on the reliability of the dataset may include, but is not limited to, the request of further information from samplers and/or analytical laboratories, downgrading of the quality of the data or alternatively, re-collection of the data.

Table 6.1: Summary of Quality Assurance / Quality Control Program

Data Quality Objectives	Frequency	Data Quality Indicator
Precision		
Blind duplicates (intra laboratory)	1 / 20 samples	<50% RPD ² , asbestos in agreement
Blind duplicates (inter laboratory)	1 / 20 samples	<50% RPD ² , asbestos in agreement
Laboratory duplicates	1 / 20 samples	<50% RPD ² , asbestos in agreement
Accuracy		
Surrogate spikes	All organic samples	70-130%
Laboratory control samples	1 per lab batch	70-130%
Matrix spikes	1 per lab batch	70-130%
Representativeness		
Sampling appropriate for media and analytes		-. ³
Samples extracted and analysed within holding times.	-	Soil: organics (14 days), inorganics (6 months)
Trip spike	1 per sampling event	70-130% recovery
Storage blank	1 per sampling event	<LOR
Rinsate blank	1 per sampling data where reusable equipment is used	<LOR
Method blank (soil vapour only) ¹	1 per lab batch	<LOR
Equipment blank (soil vapour only) ¹	1 per lab batch	<LOR
Laboratory blanks	1 per lab batch	<LOR
Comparability		
Standard operating procedures for sample collection & handling	All Samples	All samples ³
Standard analytical methods used for all analyses	All Samples	All samples ³
Consistent field conditions, sampling staff and laboratory analysis	All Samples	All samples ³
Limits of reporting appropriate and consistent	All Samples	All samples ³
Completeness		
Sample description and COCs completed and appropriate	All Samples	All samples ³
Appropriate documentation	All Samples	All samples ³
Satisfactory frequency and result for QC samples	All QA/QC samples	-. ³
Data from critical samples is considered valid	-	Critical samples valid ³
Sensitivity		
Analytical methods and limits of recovery appropriate for media and adopted site assessment criteria	All Samples	All samples

¹ Inclusion of soil vapour DQI in the unlikely event soil vapour data is required to be collected.

² If the RPD between duplicates is greater than the pre-determined data quality indicator, a judgment will be made as to whether the excess is critical in relation to the validation of the data set or unacceptable sampling error is occurring in the field.

³ A qualitative assessment of compliance with standard procedures and appropriate sample collection methods will be completed during the DQI compliance assessment.

6.2.6 Optimise the Design for Obtaining Data

The validation sampling design is summarised for each specific type of validation works as follows. The validation/characterisation sampling and analytical program for the site is outlined in **Table 6.2** below.

6.2.6.1 Installation of the Physical Barrier

Installation of physical separation arrangements shall be defined by survey as completed by a registered surveyor and/or building as-built drawings sufficient to identify:

- The lateral extent and upper boundary of known environmentally impacted materials (i.e. residual fill materials underlying the cover) within each remediation area/stage;

- The lateral extent and type of cover (e.g. permanent pavement, soil thickness) within the remediation area/stage;
- Survey of the marker layer and finished ground surface to allow for the assessment of capping layer depth. The survey plan shall show the extent of the capped fill materials and should also show the containment area in relation to the site; and
- Confirmation, by photos or otherwise, of the installation of the 'marker layer' and geogrid (if required, see **Section 5.5.2**) underlying the cover (as required).

Physical separation arrangement requirements (i.e. thickness etc.) are detailed in **Section 5.5.2**.

It is anticipated the following materials will be used across the site for engineering and growing media purposes will be characterised/validated as per the following for each material type:

Growing Media

Soils to be imported and used as growing media within the site shall be sampled at a rate of at least one sample per 100 m³ with a minimum of three samples per source/end location. Samples shall be analysed for TRH/BTEXN, PAHs, heavy metals, (including As, Cd, Cr, Cu, Pb, Hg, Ni and Zn), OCPs, PCBs, asbestos and soil pH. The materials shall be further inspected for any aesthetic indicators of contamination.

VENM

VENM shall be as defined under the *Protection of the Environment Operations (POEO) Act 1997* and characterised by at least five samples per source site and one per 1,000 m³ being collected if more than 10,000 m³.

The environmental consultant is required to conduct a site inspection of the material at the source site (except for quarried materials) prior to importation to the site. An additional inspection is required following importation of material to the site.

ENM

Sampling and analysis is required to be undertaken as per the exemption. Asbestos analysis is also required for all ENM proposed to be imported to the site.

The environmental consultant is required to conduct a site inspection of the material at the source site (except for quarried materials) prior to importation to the site. An additional inspection is required following importation of material to the site.

6.2.6.2 Waste Classification

Materials sampled for waste classification in accordance with the *Waste Classification Guidelines, Part 1: Classifying Waste* (NSW EPA 2014) shall be sampled at an appropriate rate to characterise the materials prior to off-site disposal.

Sampling of materials as per the ENM exemption (or similar) requires to be undertaken in accordance with the exemption.

Sampling of site sourced materials as per a VENM classification will require the collection of at least 10 samples with one per 1,000 m³ being collected if more than 10,000 m³ has been removed.

Table 6.2: Remediation and Validation Sample Plan

Validation Sample Type & Source	RAP Sampling Frequency	Analytical Suite
Material Importation		
VENM	If adequate source site documentation is available, then no sampling is required, beyond visual inspection at the source site and when the material arrives to site. In the event that no chemical data is available, or the existing information does not meet the standard required, at least five samples per source site and one per 1,000 m³ being collected if more than 10,000 m³	Heavy Metals TRH/BTEX PAHs OCPs/PCBs
Material under NSW EPA Resource Recovery Exemptions (Recycled Materials)	1 per 70 m³ Visual inspection at the source site and when the material arrives to site.	Heavy Metals TRH/BTEX PAHs Asbestos (500 mL) In addition to suite as required by exemption
Imported Growing Media (Accessible Soils)	1 per 100 m³ with a minimum of 3 per source site	Heavy Metals TRH PAHs OCPs/PCBs Asbestos (500 mL) pH
Waste Classification		
In-situ materials	No set frequency – sufficient data required to suitably characterise materials for offsite disposal.	No set frequency – sufficient data required to suitably characterise materials for offsite disposal. Likely analytical requirements will include: Heavy Metals TRH/BTEX PAHs OCPs PCBs Asbestos (500 mL)

6.2.6.3 Stockpile Soil Sampling Methodology

For stockpile sampling, material will be obtained from a minimum depth of 300 mm below the surface of the stockpile at the time of sampling. Following each sample, non-disposable hand tools will be decontaminated as discussed in **Section 6.2.7.4**. Where possible, disturbance to soils prior to sampling should be minimised so as to avoid the potential loss of volatile fractions from soils.

During the collection of soil samples, features such as seepage, discolouration, staining, odours and other indications of contamination will be noted on the field documentation and a PID will be used, as appropriate, to assess the potential occurrence of volatile compounds.

6.2.7 Soil Sampling Methodology

6.2.7.1 Sample Handling

During the collection of soil samples, features such as seepage, discolouration, staining, odours and other indications of contamination shall be noted on field reporting sheets/field logs.

Collected soil samples shall be immediately transferred to sample containers of appropriate composition (glass jars) fitted with Teflon sealed lids. Where asbestos analysis is required samples shall be collected and placed in new 500 mL zip lock bags. Sample labels shall record sample identification number and date and time of sampling. Sample containers shall be transferred to a chilled ice box for sample preservation prior to and during shipment to the testing laboratory. A chain-of-custody form shall be completed and forwarded with the samples to the testing laboratory, containing the following information:

- Sample identification;
- Signature of sampler;
- Date of collection;
- Type of sample;
- Number and type of container;
- Inclusive dates of possession; and
- Signature of receiver.

6.2.7.2 PID Screening

Should PID screening of soils be required, soil samples obtained for PID screening will be placed in a sealed plastic bag for approximately 5 minutes to equilibrate, prior to a PID being attached to the bag. Readings will then be monitored for a period of approximately 30 seconds or until values stabilise and the stabilise/highest reading will be recorded on the field sample forms. The PID will be calibrated prior to the commencement of field works and then check readings will be completed on a daily basis during the field program using suitable calibration gas. If required, the PID will be re-calibrated during the field program in accordance with manufacturer's instructions.

6.2.7.3 Field Duplicate and Triplicate Preparation

Field soil duplicate and triplicate samples for the validation assessment will be obtained during sampling using the procedures outlined above at a frequency of 1 in 20 primary samples for both field intra-laboratory duplicates and field inter-laboratory duplicates. The soil samples will be divided laterally into three samples with minimal disturbance to reduce the potential for loss of volatiles and placed in three clean glass jars and/or plastic bags. All jars will be filled with no headspace to reduce the potential for loss of volatiles and separately labelled as the primary, duplicate and triplicate samples before being placed in the same chilled esky for laboratory transport.

6.2.7.4 Decontamination of Sampling Equipment

The following procedure will be used to clean non-disposable equipment, including the trowel, prior to the collection of each sample:

- Scrubbing with a wire brush to remove excess material;
- Pressure spray with Decon 90 detergent and potable water mix;
- Pressure spray rinse with potable water; and
- Air drying.

Rinsate samples will be obtained during the field decontamination procedures at regular intervals during validation sampling activities that do not utilise disposable sample equipment. Each rinsate sample will be obtained by rinsing the trowel (or other equipment) with laboratory grade demineralised water following the decontamination procedure. The water sample will be appropriately preserved and stored with the site soil samples prior to and during transport to the laboratory for chemical analysis.

6.2.8 Laboratory Analysis

NATA accredited laboratories shall be used for all analysis of samples. Appropriate methods and LORs are required for comparison to relevant criteria.

6.3 Validation Criteria

6.3.1 Accessible Soils/Exposed Natural Soils

Based on the proposed development details, in accordance with the decision process for assessment of urban redevelopment sites (EPA 2017), and with consideration of JBS&G (2019), only imported materials will be utilised in areas with accessible soils, for example, planter boxes constructed above a marker layer.

Soils proposed to be utilised in areas of accessible soils will require to comprise VENM (NSW EPA 2019), ENM, or another suitable material subject to an NSW EPA Resource Recovery Exemption and Order. Analytical data for materials used in areas of accessible soils (growing media) shall be compared against adopted criteria as follows:

- Site specific ecological investigation levels (EILs) derived through the methodology outlined in NEPC (2013);
- Ecological Screening Levels (ESLs) for TRH fractions, BTEX and benzo(a)pyrene in coarse grained soil for residential land use (NEPC 2013);
- HILs/HSLs for residential with accessible soils, as per NEPC (2013) – HIL/HSL A.

Consideration to requirements of **Section 6.3.3** is also required for imported media.

6.3.1.1 Application of Soil Assessment Criteria

For soils to be considered as meeting the health/ecological based assessment criteria (i.e., not posing an unacceptable risk), the following criteria will be adopted:

Either:

- All contaminant concentrations were less than the adopted site assessment criteria,

Or:

- The upper 95% confidence limit on the average concentration for each analyte (calculated for samples collected from consistent soil horizons, stratigraphy or material types) was below the adopted criterion;
- No single analyte concentration exceeded 250% of the adopted criterion; and
- The standard deviation of the results was less than 50% of the criterion.

6.3.2 Material Characterisation for Off-site Disposal

Where contaminated fill/soil is not suitable for onsite management or is surplus to construction requirements, materials are proposed to be remediated by off-site disposal. Materials shall be classified in accordance with EPA (2014) *Waste Classification Guidelines* or an appropriate exemption as created under the *Protection of the Environment Operations (Waste) Regulation 2014*.

Given the identification of ash and slag inclusions in fill material samples with elevated total PAH and metal concentrations, the widespread occurrence of ash and further observations of some slag inclusions are concluded to be a significant source of these contaminants. On this basis, it is appropriate to apply the associated NSW EPA general immobilisation approvals (POEO (Waste) 2014) when consideration is given to evaluating a waste classification(s) for material required to be excavated during the remedial works.

Material will require to be removed to a facility lawfully able to receive it.

6.3.3 Imported Materials

In accordance with current EPA policy, only material that does not represent an environmental or health risk at the receiving site may be considered for resource recovery. Imported materials will only be accepted to the site if they meet the restrictions placed on these materials and meet the definition of:

- Virgin Excavated Natural Material (VENM) as defined in the *Protection of the Environment Operations Act* (1997) Schedule 1;
- Excavated Natural Material (ENM) as defined in EPA (2014); or
- Resource recovery materials as per an EPA exemption.

All material imported onto the site are required to be accompanied by appropriate documentation that has been verified by the appointed site contamination (environmental) consultant.

6.3.4 Validation of Marker Layer and Physical Barrier

For all other site soils, validation of the marker layer and capping will require to satisfy the requirements of **Section 5.5.2**, as summarised below:

- Cover of fill materials by marker layer and permanent paved areas, or in areas not covered by permanent structures, installation of a marker layer underlying the depth of the pavement (and subgrade) and overlying potentially contaminated material. As-built survey of structures and marker-layer placement is required;
- Covering of fill materials in landscaped areas – installation of the marker layer at a minimum depth of 0.5m below final finished site levels in areas of shallow planting (for grasses and shrubs), or installation of marker layer AND geogrid layer at a minimum depth of 0.3m below finished site levels and in areas of shallow planting (for grasses and shrubs), and a minimum of 0.7m below final finished site levels in areas of new tree planting (or as required for the root-ball of proposed plants), with environmentally suitable materials placed above to the final levels. In areas of retained trees, marker layer should be installed 0.15m below the finished level, with the remaining depth to finish site levels to be covered with wet-pour rubber. Survey of marker-layer depth and top of growing media demonstrating satisfaction of minimum requirements; and
- Within underground services trenches – in the event underground services trenches are to be installed, the service infrastructure will require to be installed above a marker layer within suitable materials for potential human and/or ecological exposure. Survey of marker-layer depth and of completed trenches required to demonstrate satisfaction of minimum requirements.

Soils which are to be moved to another area of the site will be subject to the following data recording process for future reference purposes, and will be included in the Validation Report to be prepared following remediation:

- A location plan of the placed materials with co-ordinates based on an agreed grid system (e.g., GPS or relative to the lot boundaries);

- The levels in m AHD of the base of the placement location(s) prior to the material placement;
- The levels in m AHD of the placement locations once all materials have been placed;
- The levels in m AHD of any defining layers and capping layers; and
- Subsequently, the total placed volume of materials.

6.4 Reporting

At the completion of site remediation works, a validation report will be prepared in general accordance with EPA (2017) and OEH (2011) *Guidelines for Consultants Reporting on Contaminated Site* (or as updated), documenting the works as completed.

This report will contain information including:

- Details of the remediation works conducted;
- Present all sampling field notes and laboratory data including calibration certificates for field monitoring equipment, environmental monitoring etc.;
- Undertake an assessment of QA/QC of analytical data generated by the works and identify data that is reliable for use in characterising the site;
- Sort data into data sets as required by the decision rules;
- Assess whether sufficient data has been obtained to meet required limits on decision error;
- Undertake assessment to the decision rules and identify any environmental data which causes decision rules to be failed;
- Information demonstrating compliance with appropriate regulations and guidelines;
- Any variations to the strategy undertaken during the implementation of the remedial works;
- Results of all environmental monitoring undertaken during the course 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;
- Verification of regulatory compliance;
- Provide a summary of waste disposal activities and volumes of waste removed from the Site including supply of all waste disposal dockets confirming final waste disposal/landfill destination;
- Provide a summary of material importation activities (general fill soil/crushed rock, growing media, earthworks aggregates, drainage backfill etc), including material source, type, assessment of suitability, approximate quantities, date of importation and final placement location;
- Identify the requirements for the EMP (where appropriate) including inclusion of a survey clearly identifying the extent of the retained impacted material and associated capping; and
- Provide a comment on the suitability of the Site (or portions thereof) for the proposed use and requirements for any ongoing monitoring/management (where applicable).

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

6.5 Environmental Management Plan

The validation of the site as suitable for the proposed mixed-use redevelopment will be contingent upon the implementation of an EMP to manage residual risks posed by contaminated material to future site users.

Where required, the EMP shall contain the following elements:

- A statement of the objectives of the EMP – i.e., to ensure continued suitability of the site after it has been remediated;
- Identification of residual environmental contamination issues at the site that require ongoing management/monitoring to meet the EMP objectives, including the type of contamination and location within the site (including survey plans);
- Documentation of environmental management measures which have been implemented to address the identified environmental issues at within the site;
- Description of management controls to limit the exposure of the site users to known areas of contamination to acceptable levels;
- Description of responsibilities for implementing various elements of the provisions contained in the EMP;
- Timeframes for implementing the various control/monitoring, etc. elements outlined in the EMP;
- Environmental monitoring and reporting requirements (if required) for the future management of environmental impact underlying the site;
- Corrective action procedures to be implemented where EMP assessment criteria are breached.

7. Contingency Plan

A review of the proposed contamination-related aspects of the works associated with development the site has been undertaken and has identified a number of potential risks, outlined in the following sections that required the development of contingencies to ensure that the objectives of this RAP are met.

The Contingency Plan is required to be part of the CEMP, as described in **Section 8**, below, and part of the Work Health and Safety Plan (WHSP), as described in **Section 8**.

7.1 Unexpected Finds

The possibility exists for hazards that have not been identified to date to be present within fill materials or underlying existing pavements/building on the site. The nature of hazards which may be present and which may be discovered at the site are generally detectable through visual or olfactory means, for example:

- The presence of significant aggregates of friable asbestos materials (visible) as opposed to minor occurrences of fragments or fibre bundles in soil; and/or
- Excessive quantities of Construction/Demolition Waste (visible); and/or
- Hydrocarbon impacted materials (visible/odorous); and/or
- Drums, waste pits, former pipework or USTs (visible); and/or
- Oily Ash and/or oily slag contaminated soils/fill materials (visible/odorous); and/or
- Tarry like impacted soil/fill material (visible/odorous); and/or
- Potential chlorinated hydrocarbon impact (sweet odour soils).

As a precautionary measure to ensure the protection of the workforce and surrounding community, should any of the abovementioned substances (or any other unexpected potentially hazardous substance) be identified, the procedure summarised in **Figure 7.1** is to be followed.

An enlarged version of the Unexpected Finds Protocol, suitable for use on the site, should be posted in the Site Office and referred to during the site-specific induction by the Principal Contractor.

The sampling strategy for each “unexpected find” shall be designed by a suitably qualified environmental consultant. The strategy will, however, be aimed at determining the nature of the substance – that is, is it hazardous and, if so, is it 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 outlined in EPA (1995).

7.1.1 Change in Development Plans

In the event that the development plans are changed from those available at the time of preparation of this RAP, particularly where significant amendment of the extent of permanent paving at the site and/or alterations to the retention design, consideration of the suitability of the proposed remedial strategy will be required.

7.1.2 Material Storage Breach

In the event that any materials storage containment controls are breached, and stockpiled materials classified as asbestos contaminated soil or otherwise have escaped (or have the potential to escape), then the management controls shall be rectified and investigations undertaken to review the adequacy of the controls and any improvements implemented. The CEMP (**Section 8.1**) shall include a documented process for identifying and responding to such incidents.

7.1.3 Emissions Complaints

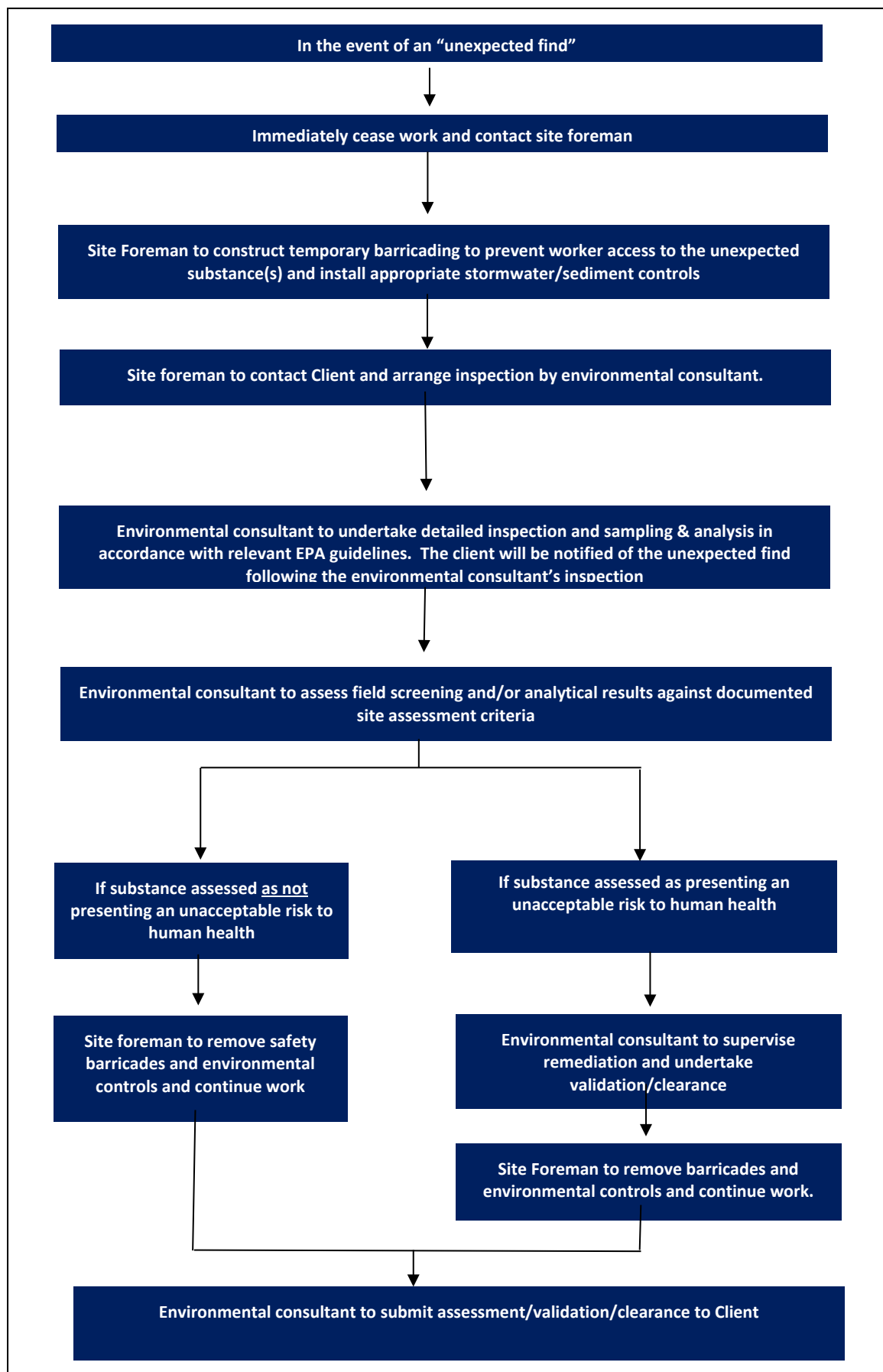
Due to the nature of the activities and type of contaminants identified within the site, there is a potential for complaints to be received from members of the public and/or occupants of surrounding properties relating to environmental emissions including:

- Odour emissions arising from handling of malodorous soil;
- Noise and vibration arising from excavation, piling and other works;
- Dust emissions arising from excavation, material handling and placement; and
- Visibly impacted water quality in surface water discharge from the site.

Monitoring of all environmental emissions shall be undertaken during the works as detailed in the CEMP (discussed in **Section 8.1**) and appropriate actions taken to further control emissions following receipt of a complaint. The CEMP shall contain provision for contingency actions where excessive emissions occur, however it is anticipated that one or more of the following actions will be considered:

- Increased application of odour screening/masking chemicals on odorous materials;
- Disturbance of soils during meteorologically favourable periods only; and/or
- Covering of impacted soils.

Figure 7.1 - Unexpected Finds Protocol



8. Other Remediation Documents

8.1 Environmental Management

8.1.1 Preparation of a Construction Environmental Management Plan (CEMP)

Prior to commencement of remediation works, a CEMP shall be prepared by the Principal Contractor or the Principal Contractors Remediation Contractor, which documents the environmental monitoring and management measures required to be implemented during the remediation and construction related activities associated with the construction of the site.

The CEMP shall address each of the nominated items in **Section 8.1.2** and shall include the Contingency Plan, referred to in **Section 7**, above. Additional environmental management requirements may be required as part of development consent.

8.1.2 Required Elements/Procedures

An assessment of the proposed activities and the associated elements required to be incorporated into the CEMP is provided in **Table 8.1**. The REMP is required to address each of the required elements and procedures in full detail and to include detailed monitoring processes and procedures, corrective actions and reporting requirements.

Table 8.1 Required Elements of the REMP

Element	Specific Minimum Requirements to be included in CEMP
1. Dust Control	Provisions for dust control if required.
2. Flora and Fauna	N/A
3. Heritage/Archaeological	N/A
4. Visual Impacts	N/A
5. Emergency Response	As appropriate. Procedures required for spill incident response including material storage breach.
6. Noise Control	Hours of operation. Boundary monitoring at commencement of work site activities with potential for environmental noise emissions. Potential noise monitoring at nearest receptors. Procedures for control and management of noise emissions, as appropriate (e.g., restricted hours).
7. Traffic	Controls on vehicle movements on public roads. Controls on transport in asbestos exclusion zones (if required)
8. Protection of Adjoining Structures	N/A
9. Odour Control	Procedures for management of potentially odorous works.
10. Handling of Contaminated Soil and Groundwater	Soil and water (if encountered) management (stockpiling, site access, excavation pump out, reinstatement).
11. Soil Storage/Placement Areas	Soil and water management (stockpiling, site access, excavation pump out, reinstatement). Bunding. Heavy vehicle/personnel decontamination. Interim storage requirements for materials requiring later treatment. Site drainage requirements, incorporating clean/dirty areas and modifications to existing surface water and drainage controls beneath retained pavements. Monitoring as required.
12. Sediment Control	Bunding. Collection/treatment/handling impacted sediments.
13. Operation of Site Office	As appropriate.
14. Asbestos Works (if required)	Required notifications, permits, signage and exclusion zones. Required personal (e.g. Class A or B removalist). PPE and decontamination. Staging of asbestos and non-asbestos works.

Element	Specific Minimum Requirements to be included in CEMP
15. Environmental Monitoring	Monitoring of dusts, noise, odour and fibres (if required). Monitoring as required for vibration and water releases. Inspection checklists and field forms.
16. Environmental Criteria	Soil criteria as sourced from RAP.
17. Material Classification	As detailed in this RAP.
18. Waste Management	All waste materials classified in accordance with the RAP are required to be disposed of at a licensed waste facility that are lawfully able to accept such materials. Material tracking in the form of disposal dockets will be required for the purposes of satisfying the validation report.
19. Community Relations Plan	Client to provide project specific communication protocols, incorporating nomination of specific contact persons & details and requirements for communications/response register.
20. Incident Reporting	As appropriate, including standard form/checklist.
21. Security and Signage	Secure site perimeter. Site boundary signage. Remediation exclusion zone signage where required.
22. EMP Review	As appropriate.
23. Training	As appropriate. Contamination awareness training for all workers.
24. Contact Details	Company/personnel details, including names/phone numbers for: - Principal Contractor - Site Auditor (if involved) - Environmental Consultant - Contractor - OH&S Compliance - Environmental Compliance

8.2 Health and Safety

8.2.1 Work Health and Safety Management Plan

A WHSP shall be prepared by the Remediation Contractor prior to commencement of remediation works. The Plan shall contain procedures and requirements that are to be implemented as a minimum during the works, in addition to the Contingency Plan, referred to in **Section 7.1**.

The objectives of the WHSP are:

- To apply standard procedures that minimises risks resulting from the 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, mandatory safety practices and procedures;
- Monitoring of potential hazards and implementation of corrective measures; and
- Provision for contingencies that may arise while operations are being conducted within the site.

8.2.2 Asbestos Works

In the event that asbestos impacts be identified during the course of remediation and/or construction, all associated works shall be undertaken in accordance with the Work Health and

Safety Regulation (2019), SafeWork NSW (2019) Code of Practice: How to Safely Remove Asbestos, and SafeWork NSW (2019) How to Manage and Control Asbestos in the Workplace.

During the remedial works and only following the positive detection of asbestos impact present in site soils, perimeter asbestos in air monitoring will be conducted at each applicable remedial works area boundary when soil with asbestos are being disturbed. Air monitoring will be conducted on a daily basis at relevant locations whilst disturbance of asbestos contaminated areas takes place.

Air monitoring will be conducted during any ground disturbance activities within (asbestos) impacted soil within the site to verify that implementation of appropriate control measures have been successful at managing the risk of airborne fibre generation. Air monitoring will be undertaken in accordance with the requirements of the National Occupational Health and Safety Commission (NOHSC) Asbestos Code of Practice and Guidance Notes, in particular the *Guidance note for the estimation of airborne asbestos dust* [NOHSC 3002:2005].

8.2.3 Additional Consideration of Chemical Contaminants

In addition to general assessment of the potential for exposure to chemical contaminants the WHSP should also include specific consideration of additional contaminants such as lead and PAHs distributed throughout fill materials.

As a precautionary measure, the WHSP should include the requirement for the plan to be revised in the event of an unexpected find of contaminated material during remediation and/or construction.

When working with contaminated materials in general, care needs to be taken to ensure that the contamination is not introduced to the worker via ingestion, inhalation or absorption. The WHSP must detail the PPE and decontamination requirements to be followed to control the risks posed by potential exposure to chemical contaminants at/within the site.

9. Conclusions and Recommendations

9.1 Conclusions

Overall, it is considered that the proposed actions outlined in this RAP conform to the requirements of the *Contaminated Land Management: Guidelines for the NSW Site Auditor Scheme (3rd Edition)* (EPA 2017) because they are: technically feasible; environmentally justifiable; and consistent with relevant laws policies and guidelines endorsed by NSW EPA.

Subject to the successful implementation of the measures described in this RAP it is concluded that the site can be made suitable for continued use as a primary educational facility and that the risks posed by contamination can be managed in such a way as to be adequately protective of human health and the environment.

9.2 Recommendations

It is recommended that the processes outlined in this RAP be implemented and that the following documentation be developed and implemented to ensure the risks and impacts during remediation works are controlled in an appropriate manner:

- A CEMP, to document the monitoring and management measures required to control the environmental impacts of the works and ensure the validation protocols are being addressed; and
- A WHSP to document the procedures to be followed to manage the risks posed to the health of the remediation workforce.

Upon completion of the remediation works, the Validation Report is required to be prepared to verify remedial works were completed in accordance with the RAP.

10. Limitations

This report has been prepared for use by the client who has commissioned the works in accordance with the project brief only and has been based in part on information obtained from the client and other parties.

The advice herein relates only to this project and all results conclusions and recommendations made should be reviewed by a competent person with experience in environmental investigations, before being used for any other purpose.

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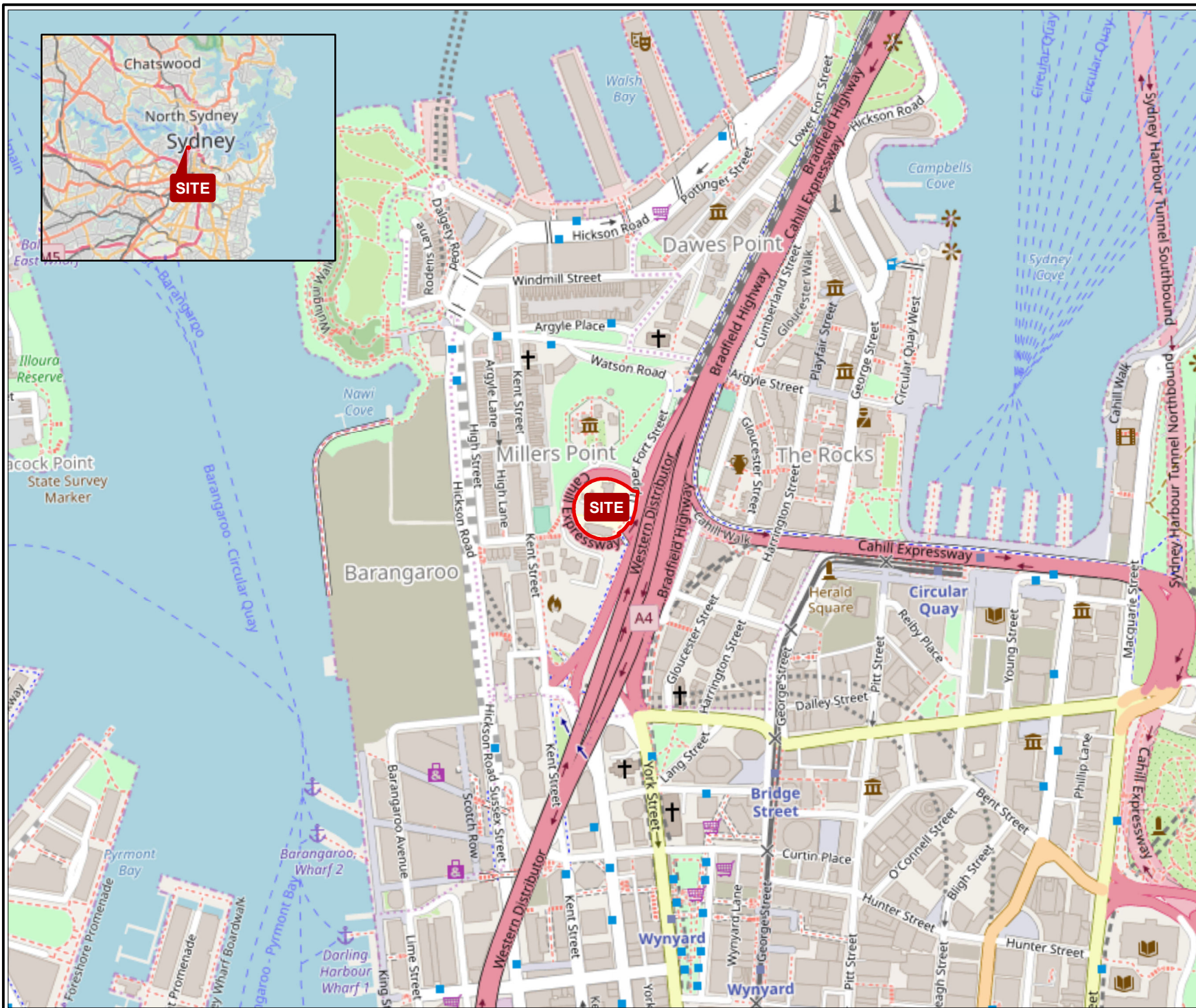
Sampling and chemical analysis of environmental media is based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the regulatory requirements.

Limited sampling and laboratory analyses were undertaken as part of the investigations undertaken, as described herein. Ground conditions between sampling locations and media may vary, and this should be considered when extrapolating between sampling points. Chemical analytes are based on the information detailed in the site history. Further chemicals or categories of chemicals may exist at the site, which were not identified in the site history and which may not be expected at the site.

Changes to the subsurface conditions may occur subsequent to the investigations described herein, through natural processes or through the intentional or accidental addition of contaminants. The conclusions and recommendations reached in this report are based on the information obtained at the time of the investigations.

This report does not provide a complete assessment of the environmental status of the site, and it is limited to the scope defined herein. Should information become available regarding conditions at the site including previously unknown sources of contamination, JBS&G reserves the right to review the report in the context of the additional information.

Figures



Legend:
 Approximate Site Boundary



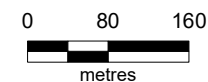
Job No: 56262

Client: School Infrastructure NSW

Version: R05 Rev 1 Date 28/01/2020

Drawn By: AV Checked By: RL

Scale 1:7,500



Coord. Sys. GDA 1994 MGA Zone 56

**Upper Fort Street, Observatory Hill
 Millers Point, NSW**

SITE LOCATION

FIGURE 1



Legend:

 Approximate Site Boundary



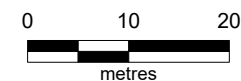
Job No: 56262

Client: School Infrastructure NSW

Version: R05 Rev 1 Date 28/01/2020

Drawn By: AV Checked By: RL

Scale 1:750



Coord. Sys. GDA 1994 MGA Zone 56

**Upper Fort Street, Observatory Hill
Millers Point, NSW**

SITE LAYOUT

FIGURE 2



Legend:

- Approximate Site Boundary
- Proposed Buildings
- Proposed Outdoor Space
- Proposed Basement 1 Level
- Proposed Tress
- Existing Trees to be Retained



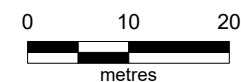
Job No: 56262

Client: School Infrastructure NSW

Version: R05 Rev 1 Date 28/01/2020

Drawn By: AS Checked By: DD

Scale 1:750



Coord. Sys. GDA 1994 MGA Zone 56

**Upper Fort Street, Observatory Hill
Millers Point, NSW**

**PROPOSED SITE LAYOUT
(GROUND FLOOR)**

FIGURE 3



Legend:

- Approximate Site Boundary
- Approximate Trench Locations
- Test Pit Sample Locations



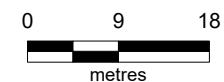
Job No: 56262

Client: School Infrastructure NSW

Version: R05 Rev 1 Date 28/01/2020

Drawn By: AV Checked By: RL

Scale 1:750



Coord. Sys. GDA 1994 MGA Zone 56

**Upper Fort Street, Observatory Hill
Millers Point, NSW**

**HISTORICAL SOIL SAMPLE
LOCATIONS (CURRENT LAYOUT)**

FIGURE 4A



Legend:

- ▬ Approximate Site Boundary
- ▬ Proposed Buildings
- ▬ Proposed Outdoor Space
- ▬ Proposed Basement 1 Level
- Proposed Trees
- Existing Trees to be Retained
- ▬ Approximate Trench Locations
- + Test Pit Sample Locations



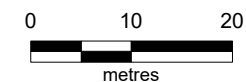
Job No: 56262

Client: School Infrastructure NSW

Version: R05 Rev 1 Date 28/01/2020

Drawn By: AV Checked By: RL

Scale 1:750

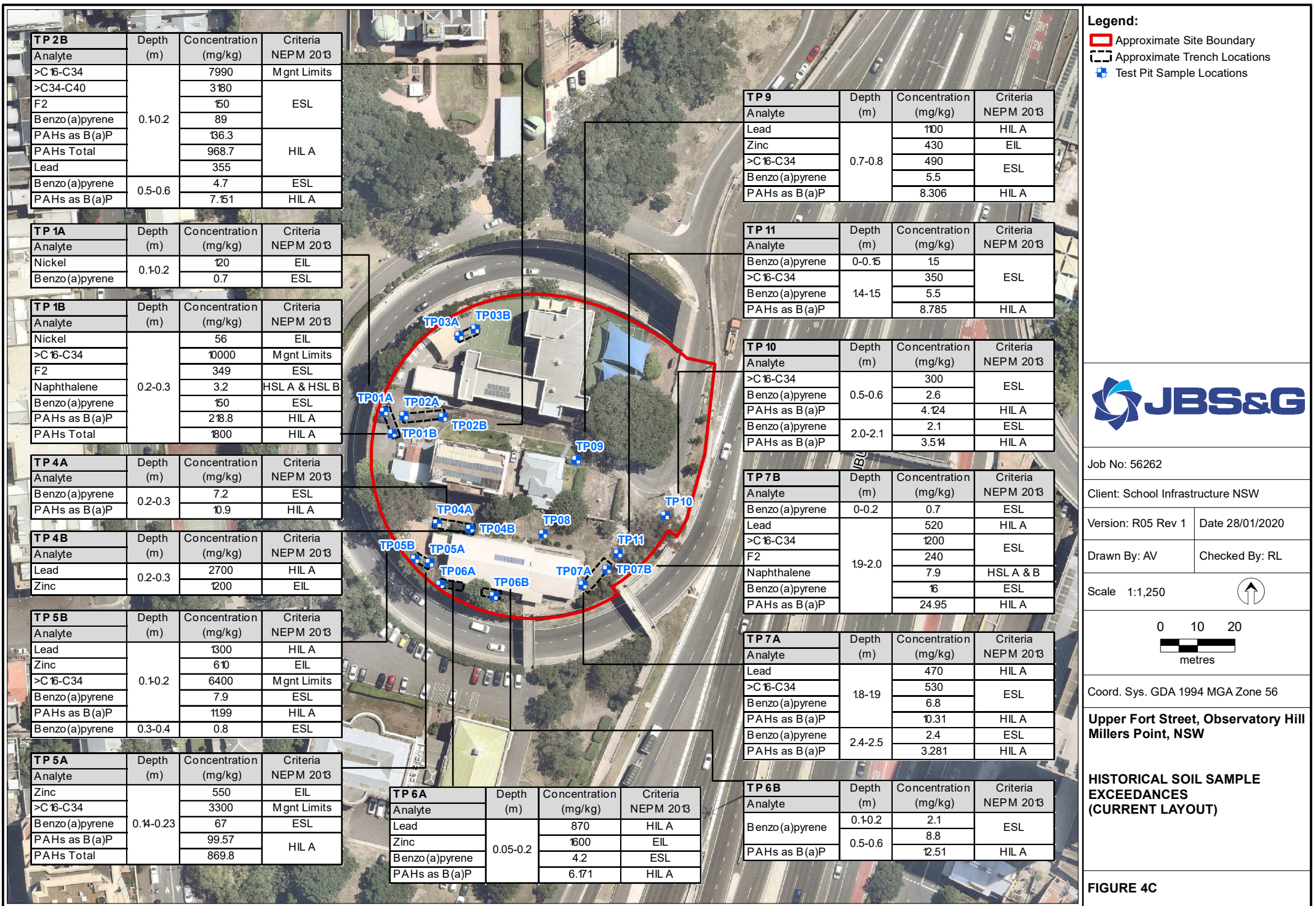


Coord. Sys. GDA 1994 MGA Zone 56

**Upper Fort Street, Observatory Hill
Millers Point, NSW**

**HISTORICAL SOIL SAMPLE
LOCATIONS (PROPOSED LAYOUT)**

FIGURE 4B





- Legend:**
- Approximate Site Boundary
 - Buildings
 - Marker Layer Required



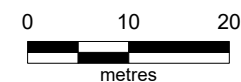
Job No: 56262

Client: School Infrastructure NSW

Version: R05 Rev 1 Date 28/01/2020

Drawn By: AS Checked By: DD

Scale 1:750



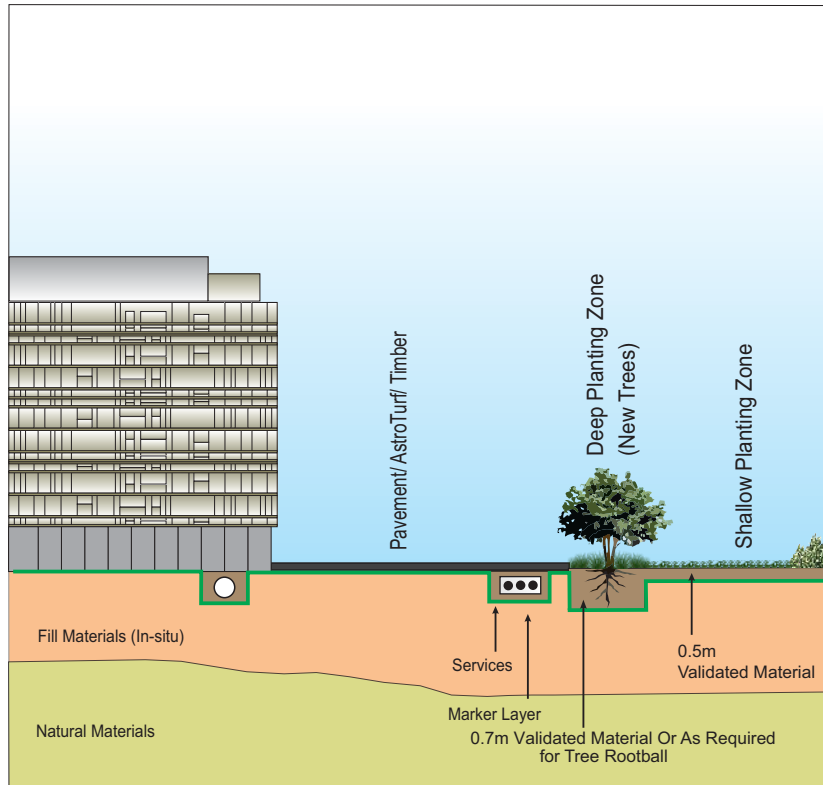
Coord. Sys. GDA 1994 MGA Zone 56

**Upper Fort Street, Observatory Hill
Millers Point, NSW**

MANAGEMENT AREAS

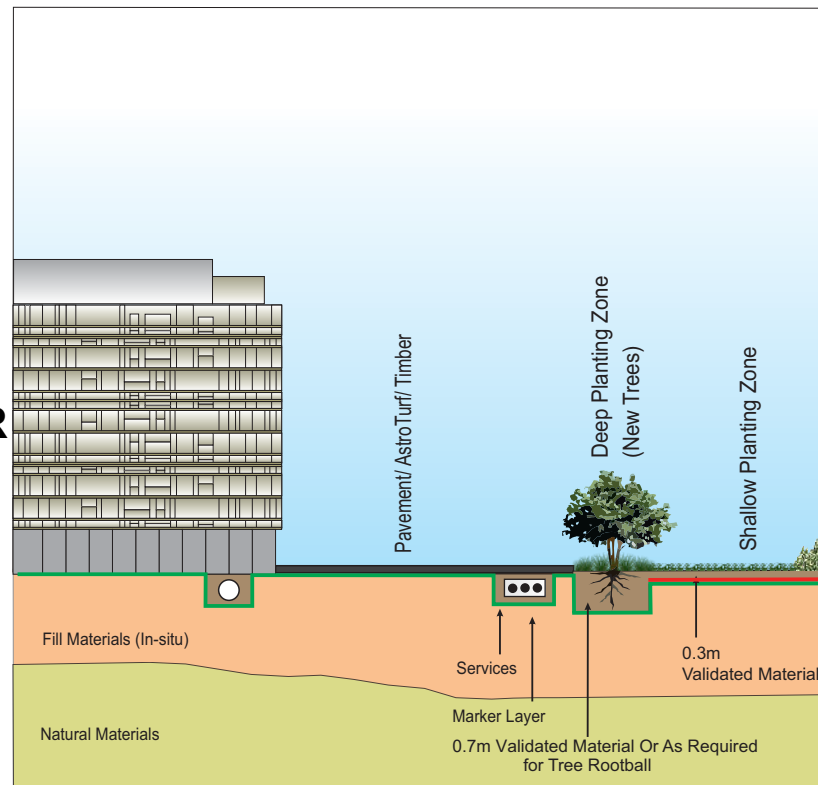
FIGURE 5

Capping Layer Layout with New Trees (0.5m Option)



OR

Capping Layer Layout with New Trees (0.3m Option)



NOTE: Schematic representation of capping requirements only. The diagram is not true to proposed site design features.

Legend:

- General Solid Waste Special
- Natural Materials
- Validated Materials
- Marker Layer
- Geogrid Layer



Job No: 56262

Client: School Infrastructure NSW

Version: R05 Rev 2

Date: 30/09/2019

Drawn By: AV

Checked By: DD

Not to Scale

**Upper Front Street, Observatory Hills
Millers Point, NSW**

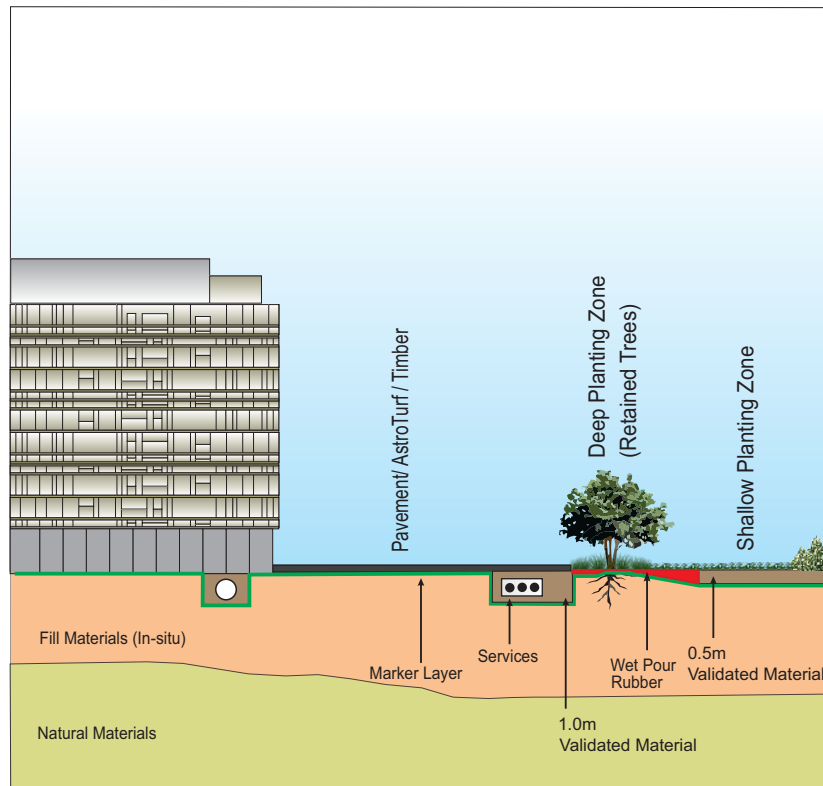
CAPPING LAYER ARRANGEMENTS

FIGURE 6A

Legend:

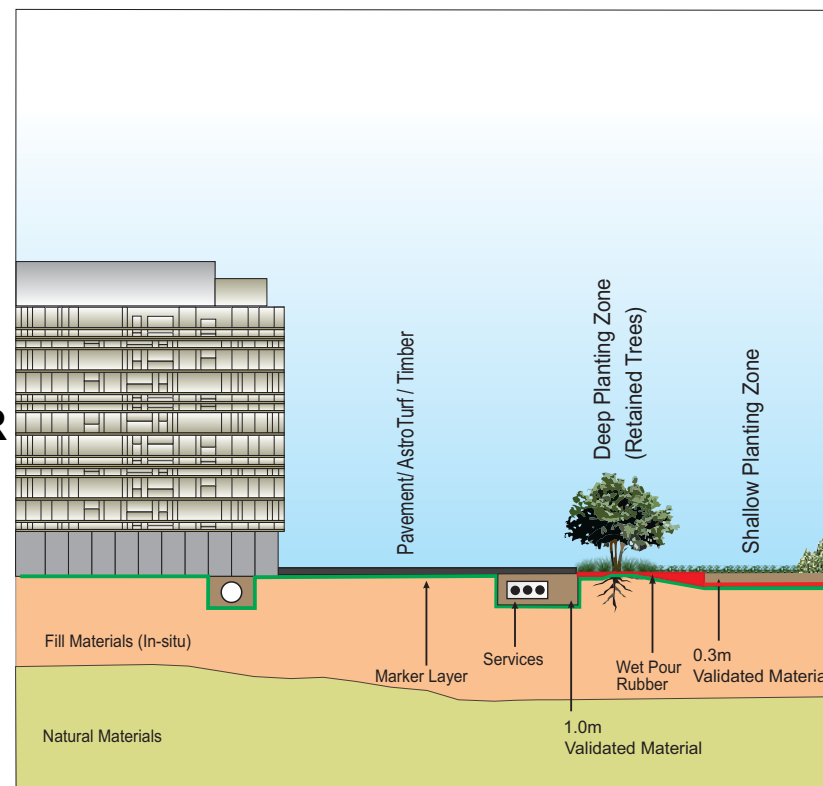
- General Solid Waste Special
- Natural Materials
- Validated Materials
- Wet Pour Rubber
- Marker Layer
- Geogrid Layer

Capping Layer Layout with New Trees (0.5m Option)



OR

Capping Layer Layout Retaining Trees (0.3m Option)



NOTE: Schematic representation of capping requirements only. The diagram is not true to proposed site design features.



Job No: 56262

Client: School Infrastructure NSW

Version: R05 Rev 2

Date: 30/09/2019

Drawn By: AV

Checked By: DD

Not to Scale

Upper Front Street, Observatory Hills
Millers Point, NSW

CAPPING LAYER ARRANGEMENTS

FIGURE 6B

Appendix A Summary Tables

Table A: Soil Analytical Data
Project Number: 56262
Project Name: SI FSPS

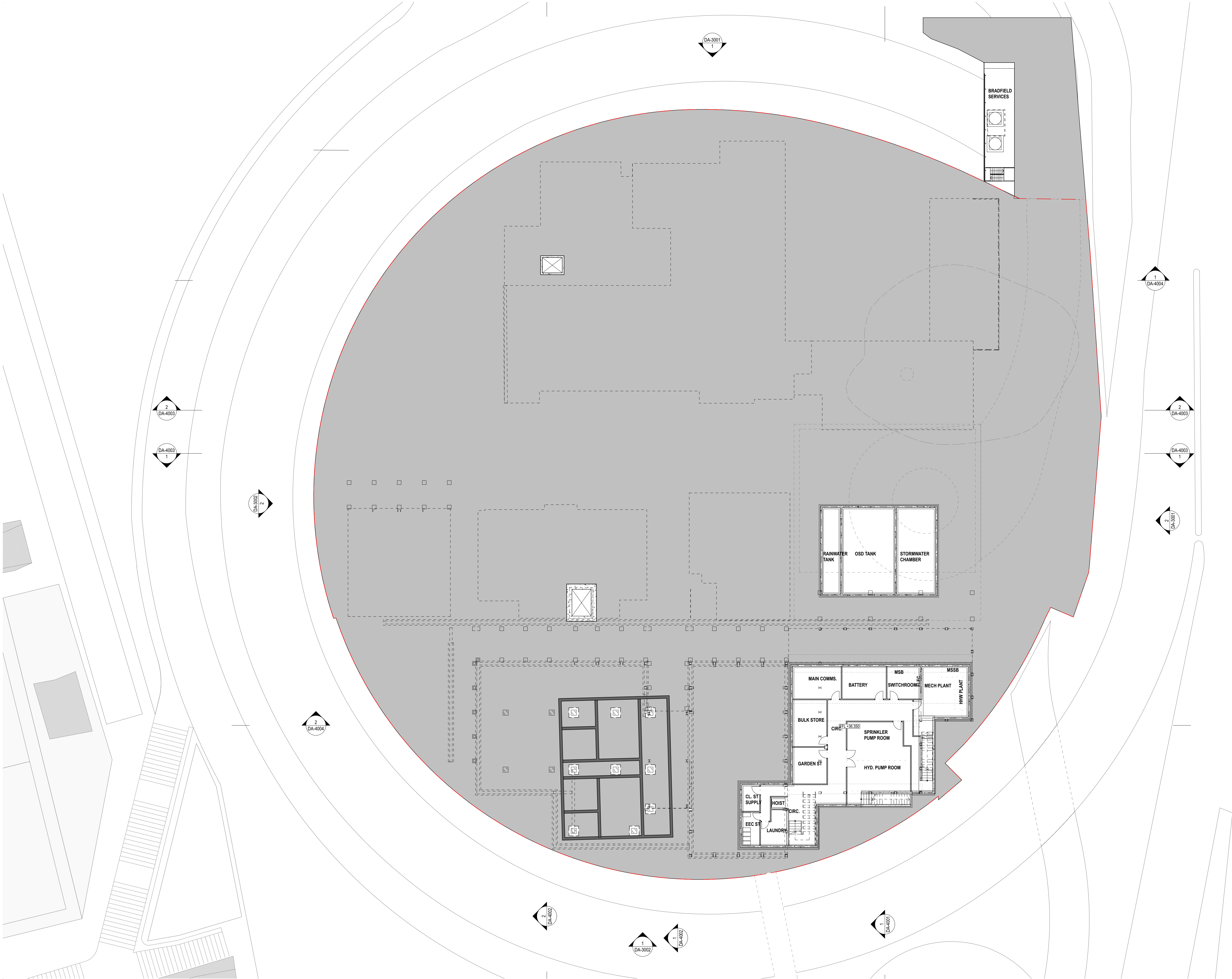




	Metals & Metalloids								TRHs (NEPC 2013)								BTEXN								Polycyclic Aromatic Hydrocarbons																	
	Arsenic (Total)	Cadmium	Chromium (Total)	Copper	Lead	Mercury (Inorganic)	Nickel	Zinc	>C10-C16 Fraction	>C16-C34 Fraction	>C34-C40 Fraction	>C10-C40 Fraction (Total)	>C10-C16 less Naphthalene (F2)	C6-C10 Fraction	C6-C10 less BTEX (F1)	Benzene	BTEX (Total)	Ethylbenzene	Toluene	Xylene (o)	Xylene (m & p)	Xylene (Total)	Naphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benz[a]anthracene	Benz[a]pyrene	Benz[b]fluoranthene	Benz[k]fluoranthene	Chrysene	Carcinogenic PAHs as B[a]P TEQ	Dibenz[a,h]anthracene	Fluoranthene	Fluorene	Indeno[1,2,3-c,d]pyrene	Phenanthrene	PAHs (Total)	Pyrene			
EQL	2	0.4	2	5	5	0.1	2	5	50	100	100	50	50	10	10	0.1		0.1	0.1	0.1	0.2	0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
NEPC 2013 EIL, EILs Aged Sediment (Site Specific)	100		415	441	1325		36	426														170						0.7														
NEPM 2013 ESL Urban Residential and Public Open Space, Coarse Soil										300	2800		120		180	50		70	85			105							0.7													
NEPM 2013 HSL Asbestos in Soil - Bonded ACM - Residential - HSL A																																										
NEPM 2013 HSL Asbestos in Soil - FA & AF - HSL																																										
NEPM 2013 Mngt Limits - Residential, Parkland and Public Open Space, Coarse									1000	2500	10000			700																												
NEPM 2013 Soil HIL A	100	20	100	6000	300	40	400	7400																									3							300		
NEPM 2013 Soil HSL A & HSL B for Vapour Intrusion - Sand 0 to <1m													110		45	0.5		55	160			40	3																			

Field ID	Sampled Date	Lab Report Number																																									
TP1A_0.1-0.2	11/07/2019	665365	63	<0.4	19	57	43	0.1	120	180	<50	<100	<100	<100	<50	<20	<20	<0.1	-	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<0.5	<0.5	<0.5	0.6	0.7	0.5	<0.5	0.5	0.7	1.145	<0.5	1.2	<0.5	<0.5	<0.5	5.5	1.3	
TP1A_0.3-0.38	11/07/2019	667580	-	-	-	-	-	25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
TP1B_0.2-0.3	11/07/2019	665365	46	<0.4	19	52	76	0.2	56	180	350	10,000	1700	12,050	349	<20	<20	<0.1	-	<0.1	<0.1	<0.1	<0.2	<0.3	3.2	3.4	31	50	170	150	120	44	130	150	218.8	19	310	10	59	230	1800	320	
TP1B_0.2-0.3	11/07/2019	667580	-	-	-	-	-	-	-	-	270	6800	620	7690	267	<20	<20	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP1B_0.4-0.5	11/07/2019	665365	7.6	<0.4	17	29	25	<0.1	5.5	43	<50	160	<100	160	<50	<20	<20	<0.1	-	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
TP1B_0.6-0.7	11/07/2019	665365	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
TP01B_FRAG01	11/07/2019	665365	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
TP01B_FRAG02	11/07/2019	665365	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
TP2A_0.05-0.2	11/07/2019	665365	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
TP2A_0.2-0.3	11/07/2019	665365	27	<0.4	16	10	14	<0.1	6.2	43	<50	<100	<100	<100	<50	<20	<20	<0.1	-	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	<0.5	0.855	<0.5	1	<0.5	<0.5	<0.5	<0.5	2.4	0.9
TP02B_0.1-0.2	11/07/2019	665365	3	<0.4	9	100	74	0.2	16	83	150	5700	1600	7450	150	<20	<20	<0.1	-	<0.1	<0.1	<0.1	<0.2	<0.3	0.8	1	10	18	91	89	73	38	68	82	136.3	18	170	2.9	49	68	968.7	190	
QA01	16/07/2019	E51922101	<5	<1	10	116	355	0.2	24	105	<50	7990	3180	11,200	<50	<10	<10	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<1	<4	13.2	25.6	93.6	76.8	114	49	38.1	82	117.9	11.4	192	<4	37.8	73.6	-	202		
QC01	11/07/2019	665365	3.4	<0.4	10	120	180	0.2	23	120	<50	7100	2400	9500	<50	<20	<20	<0.1	-	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<0.5	6.5	12	77	76	56	30	57	63	114	14	130	<0.5	41	41	743.5	140	
TP2B_0.5-0.6	11/07/2019	667580	-	-	-	-	-	-	-	-	<50	150	<100	150	<50	<20	<20	-	-	-	-	-	-	-	<0.5	<0.5	0.7	1.3	4.2	4.7	2.9	2.6	3.8	4.5	7.151	1.1	8.5	0.6	1.9	3.3	49	8.9	
TP3A_0.3-0.4	11/07/2019	665365	2.5	<0.4	8.6	16	49	<0.1	<5	18	<50	<100	<100	<100	<50	<20	<20	<0.1	-	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.21	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
TP3A_0.6-0.65	11/07/2019	665365	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
TP3B_0.15-0.2	11/07/2019	665365	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	<0.1	<0.1	<0.1	<0.2	<0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
TP3B_0.3-0.4	11/07/2019	665365	3	<0.4	8.2	<5	<5	<0.1	<5	<5	<50	<100	<100	<100	<50	<20	<20	<0.1	-	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.21	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
TP4A_0.0-0.1	11/07/2019	665365	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
TP4A_0.2-0.3	11/07/2019	665365	6.5	<0.4	16	25	210	0.4	<5	260	<50	<100	<100	<100	<50	<20	<20	<0.1	-	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<0.5	1.3	2.8	8.8	7.2	5.3	3.3	6.1	6.9	10.93	1.3	17	0.6	3.1	12	92.7	17	
TP4A_0.4-0.5	11/07/2019	667580	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.21	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
TP4B_0.0-0.1	11/07/2019	665365	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
TP4B_0.0-0.1	11/07/2019	667580	-	-	-	-	91	-	-	140	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
TP4B_0.2-0.3	11/07/2019	665365	3.7	0.4	10	19	2700	1	<5	1200	<50	<100	<100	<100	<50	<20	<20	<0.1	-	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.21	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
TP4B_0.5-0.6	11/07/2019	667580	-	-	-	-	8.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
TP5A_0.14-0.23	11/07/2019	665365	2.9	<0.4	6.1	140	130	0.2	9.8	550	<50	3300	580	3880	<50	<20	<20	<0.1	-	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	1.9	5.3	38	82	67	58	25	56	72	99.57	9.6	170	3	24	98	869.8	160	
TP5A_0.3-0.4	11/07/2019	665365	2.1	<0.4	12	<5	8.3	<0.1	<5	43	<50	<100	<100	<100	<50	<20	<20	<0.1	-	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.21	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			
TP5B_0.1-0.2	11/07/2019	665365	5.3	0.6	13	43	1300	0.4	9.9	610	<50	6400	1900	8300	<50	<20	<20	<0.1	-	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<0.5	0.7	1.3	8.6	7.9	6.3	3.2	6.6	6.7	11.99	1.4	16	<0.5	4.4	5.8	84.9	16	
TP5B_0.3-0.4	11/07/2019	667580	-	-	-	-	190	-	-	-	<50	<100	<100	<100	<50	<20	<20	-	-	-	-	-	-	<0.5	<0.5	<0.5	0.7	0.6	0.8	0.6	<0.5	0.8	0.8	1.286	<0.5	1.3	<0.5	<0.5	0.7	7.6	1.3		
TP6A_0.05-0.2	11/07/2019	665759	5.3	0.5	21	27	870	1.8	7.9	1600	<50	250	<100	250	<50	<20	<20	<0.1	-	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<0.5	1.1	1.5	4.3	4.2	5.1	2.7	2.3	3.4	6.171	<0.5	8.9	<0.5	4.9	7.5	53.7	7.8	
TP6B_0.1-0.2	11/07/2019	665759	5.7	<0.4	10	58	58	<0.1	5.8	65	-	-	-	-	-	-	-	<0.1	-	<0.1	<0.1	<0.1	<0.2	<0.3	<0.5	<0.5	<0.5	0.5	1.4	2.1	1.2	1.5	1.6	2.928	<0.5	1.6	<0.5	1.4	0.5	13.8	18		
TP6B_0.5-0.6	11/07/2019	669214	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	0.8	0.8	5.9	8.8	5.5	6.3	6.3	6.2	12.51	1.2	9.4	<0.5	6.1	2.8	70.1	10		
TP6B_1.0-1.1	11/07/2019	665759	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
TP07A_0.0-0.5	16/07/2019	666306	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
TP7A_0.4-0.5	11/07/2019	669214	2.2	<0.4	8.6	7	21	1.1	<5	26	<50	<100	<100	<100	<50	<20	<20	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.21	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
TP7A_1.8-1.9	16/07/2019	666306	5.9	<0.4	18	36	470	0.6	<5	240	<50	530	170	700	<50	<20	<20	<0.1	-	<0.1	<0.1	<0.1	<0.2	<0.3	0.5	<0.5	0.8	2.3	6.3	6.8	4.2	3.9	5.2	6.2	10.31	1.5	12	0.8	3.4	7.3	72.2	11	
TP7A_2.4-2.5	16/07/2019	665759	-	-	-	-	9.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	0.5	2	2.4	1.3	0.9	1.9	2.2	3.281	<0.5	3.2	<0.5	0.8	<0.5	19	4.3		
TP7B_0.0-0.2	16/07/2019	666306	2.8	<0.4	7.7	18	120	0.1	<5	130	<50	160	<100	160	<50	<20	<20	<0.1	-	<0.1	<0.1	<0.1	<0.2	<0.3</																			

Appendix B Proposed Redevelopment Plans



GENERAL NOTES

- ALL DIMENSIONS AND EXISTING CONDITIONS SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR BEFORE PROCEEDING WITH THE WORK.
- ALL LEVELS RELATIVE TO 'AUSTRALIAN HEIGHT DATUM'.
- DO NOT SCALE DRAWINGS.
- USE FIGURED DIMENSIONS ONLY.

legend

— · — · — SITE BOUNDARY

NOTE:

- FURNITURE SHOWN INDICATIVELY. SUBJECT TO FURTHER CONSULTATION AND COORDINATION

— · — FUTURE SCOPE

— · — COLD SHELL

COLD SHELL Inclusions:

- Envelope and superstructure including structural floors and walls, facades, roofs, etc.
- Essential circulation elements including required stairs, lifts, fire isolated passages, etc.
- Irreversible fire isolation measures to services and detection, sprinklering, to facilitate minimum egress requirements, etc.
- Essential services infrastructure including in- ground and/or encased trunking pathways and risers to facilitate future briefed functions.
- Section J NCC requirements where not subject to future alteration due to fitout requirements.

COLD SHELL Exclusions:

- All internal non-essential walls, suspended ceilings, linings and finishes.
- All Fitout, Furnishings and Equipment (FFE), lights, hydraulic fixtures, ICT, etc.
- Services from trunk reticulation paths to FFE installations
- Essential life safety measures to satisfy fitout requirements.

SSDA	01	6/12/19	State Significance Development Application	DB	DB
rev	date	name		by	chk

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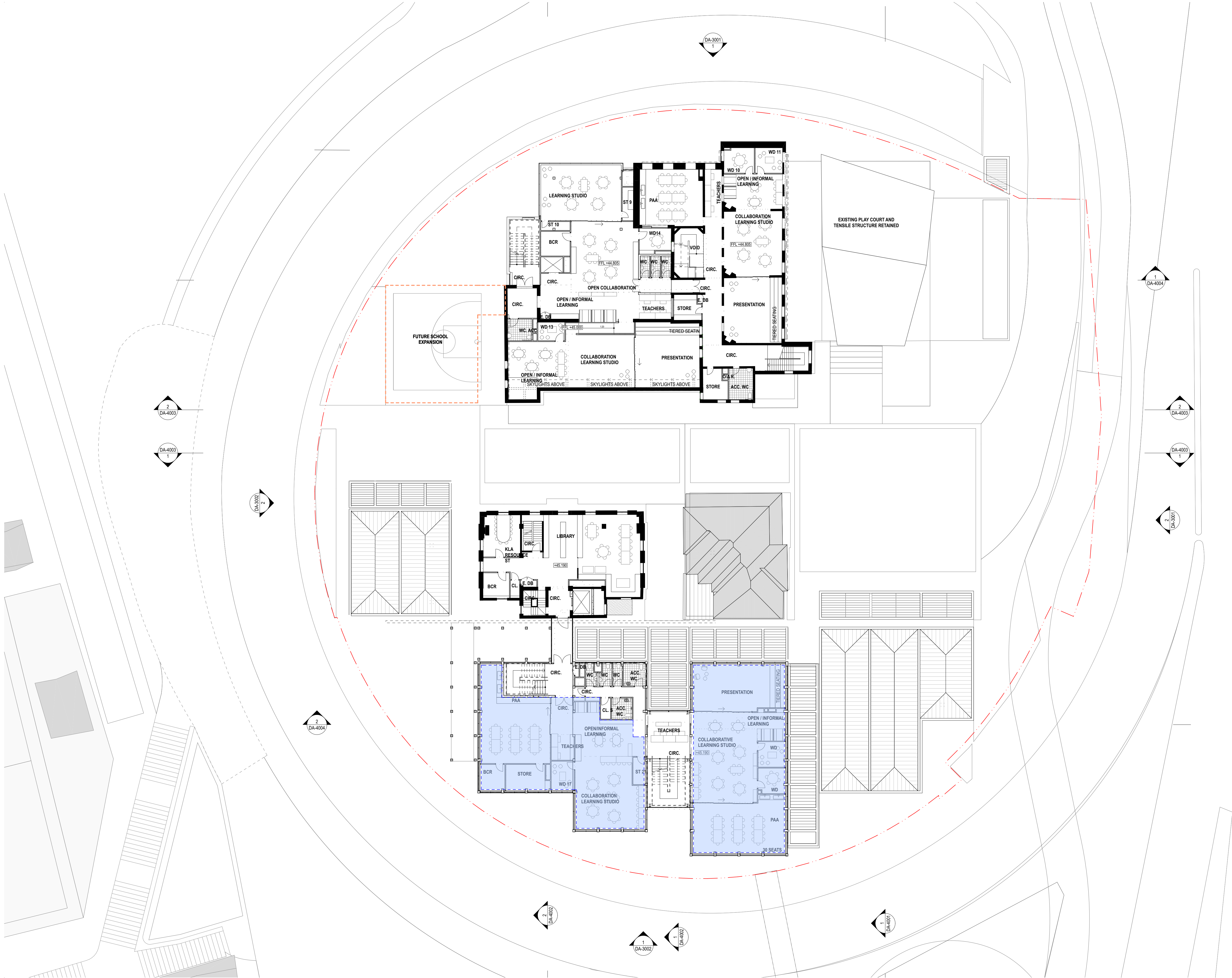


project:
Fort Street Public School
Observatory Hill
Sydney NSW 2000

title:
General Arrangement Plans
Proposed Plan - Lower Ground 1

scale	1:200 @ A1	first issued	23/9/19
project code	sheet no.	revision	
FSS	DA-2001	SSDA.01	

State Significance Development Application



GENERAL NOTES

- ALL DIMENSIONS AND EXISTING CONDITIONS SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR BEFORE PROCEEDING WITH THE WORK.
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- DO NOT SCALE DRAWINGS.
- USE FIGURED DIMENSIONS ONLY.

legend

— SITE BOUNDARY

NOTE:

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— FUTURE SCOPE

— COLD SHELL

COLD SHELL Inclusions:

- Envelope and superstructure including structural floors and walls, facades, roofs, etc.
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- Services from trunk reticulation paths to FFE installations
- Essential life safety measures to satisfy fitout requirements.

SSDA	01	6/12/19	State Significance Development Application	DB	DB
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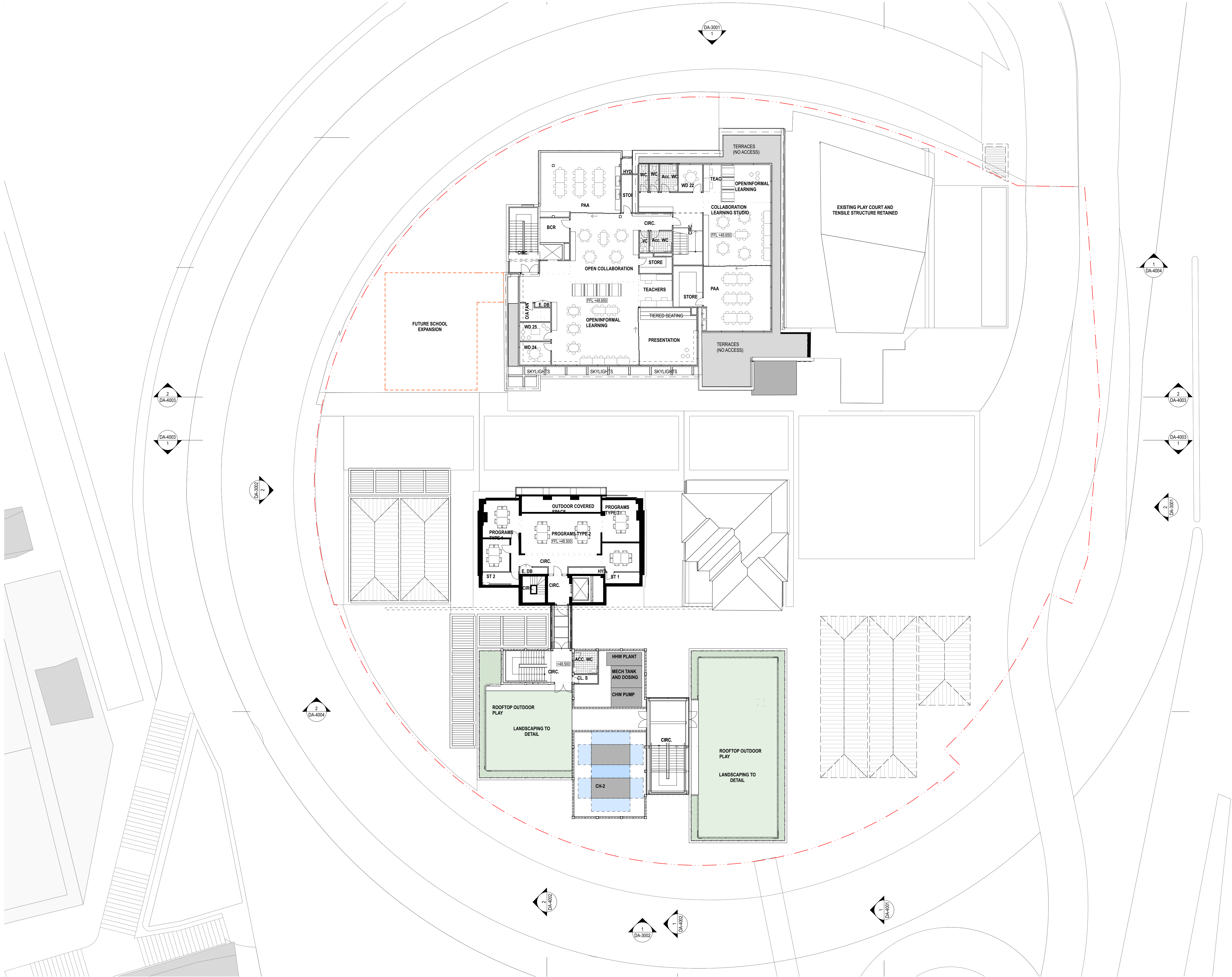


project
Fort Street Public School
Observatory Hill
Sydney NSW 2000

title
General Arrangement Plans
Proposed Plan - Level 1

scale	1:200 @ A1	first issued	23/9/19
project code	FSS	sheet no.	revision
		DA-2003	SSDA.01

State Significance Development Application



GENERAL NOTES

- ALL DIMENSIONS AND EXISTING CONDITIONS SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR BEFORE PROCEEDING WITH THE WORK.
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- DO NOT SCALE DRAWINGS.
- USE FIGURED DIMENSIONS ONLY.

legend

- SITE BOUNDARY

NOTE:

- FURNITURE SHOWN INDICATIVELY. SUBJECT TO FURTHER CONSULTATION AND COORDINATION

FUTURE SCOPE

COLD SHELL

COLD SHELL Inclusions:

- Envelope and superstructure including structural floors and walls, facades, roofs, etc.
- Essential circulation elements including required stairs, lifts, fire isolated passages, etc.
- Irreversible fire isolation measures to services and detection, sprinklering, to facilitate minimum egress requirements, etc.
- Essential services infrastructure including in-ground and/or encased trunking pathways and risers to facilitate future briefed functions.
- Section J NCC requirements where not subject to future alteration due to fitout requirements.

COLD SHELL Exclusions:

- All internal non-essential walls, suspended ceilings, linings and finishes.
- All Fitout, Furnishings and Equipment (FFE), lights, hydraulic fixtures, ICT, etc.
- Services from trunk reticulation paths to FFE installations
- Essential life safety measures to satisfy fitout requirements.

SSDA	01	6/12/19	State Significance Development Application	DB	DB
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project
Fort Street Public School
Observatory Hill
Sydney NSW 2000

title
General Arrangement Plans
Proposed Plan - Level 2

scale 1:200 @ A1 first issued 23/9/19

project code FSS sheet no. DA-2004 revision SSDA.01

State Significance Development Application

scale	1:200 @ A1	first issued	23/9/19
project code	sheet no.	revision	
FSS	DA-2005	SSDA.01	

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A	Daniel Denaro	Matthew Bennett	Matthew Bennett	Draft for client review.	30/09/2019
0	Daniel Denaro	Matthew Bennett	Matthew Bennett	Draft for client review.	14/10/2019
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