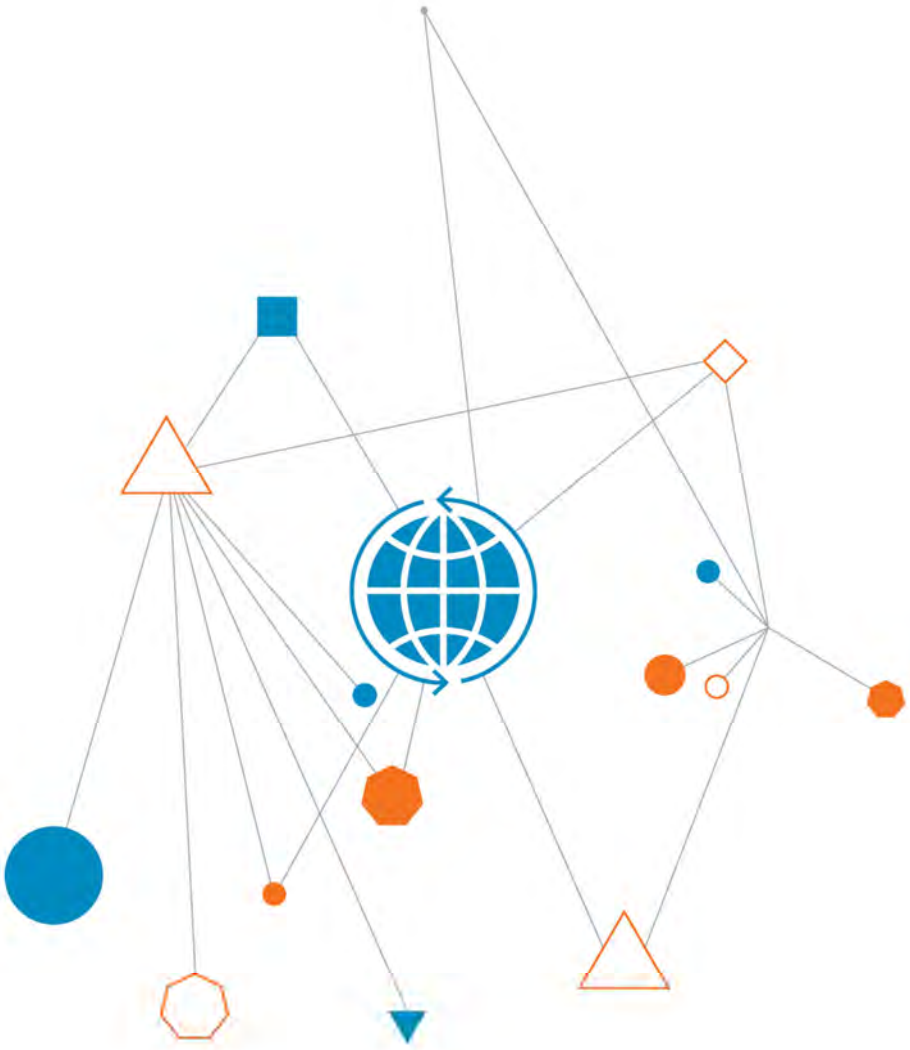
NSW Department of Education, School Infrastructure

Remedial Action Plan – Mosman High School

Military Road, Mosman, NSW

30 March 2021



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Remedial Action Plan – Mosman High School

Prepared for
NSW Department of Education, School Infrastructure

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Abbreviations

ACM	Asbestos Containing Material
AHD	Australian Height Datum
AEC	Area of environmental concern
ARCP	Asbestos Removal Control Plan
mBGL	metres Below Ground Level
CLM	Contaminated Land Management
COC	Chain of Custody
CoPC	Chemical of Potential Concern
DP	Deposited Plan
DQIs	Data quality indicators
DQOs	Data quality objectives
HIL	Health Investigation Level
HSL	Health Screening Level
LOR	Limit of reporting
LTEMP	Long Term Environmental Management Plan
NATA	National Association of Testing Authorities
NSW EPA	NSW Environment Protection Authority
PAH	Polycyclic Aromatic Hydrocarbons
RAP	Remedial action plan
SEPP	State Environmental Planning Policy
SOPs	Standard Operating Procedures
TEQ	Toxic equivalence quotient

1. Introduction

Coffey Services Australia Pty Ltd (Coffey) was engaged by Schools Infrastructure NSW (SINSW), a division of the Department of Education (DoE), to prepare a remedial action plan (RAP) in relation to the proposed redevelopment of Mosman High School located at Military Road, Mosman, NSW (the 'site'). The RAP has been prepared in accordance with Coffey's proposal dated 13 July 2020 (Coffey reference: Coffey_Variation VR-03_130720).

The location and boundaries of the school site are shown on the Location Plan in Figure 1 below and in the 'Figures' section. The proposed development is described in Section 3, and layout plans provided in Appendix A.

1.1. Background

SINSW will lodge a State Significant Development Application (SSDA) for the proposed Mosman High School upgrades in response to the Secretary's Environmental Assessment Requirements (SEARs).

Coffey has previously carried out a desktop study and limited site contamination assessment in support of the upgrades during late 2019 (Coffey Ref: SYDEN233510_R02_Rev3). This was carried out in conjunction with a geotechnical assessment that was reported separately (Coffey Ref: SYDGE233510-AB)). This assessment considered data from five boreholes drilled within the site in conjunction with the Coffey geotechnical investigation. Sampling locations were largely selected to target potential future building locations proposed together with addressing potential contamination identified during the desktop study.

Asbestos containing materials (ACM) in the form of cement bonded sheeting was observed on surface soils in the north eastern portion of the site. Anecdotal evidence also indicates ACM had previously been identified in areas surrounding Block D.

Based on the limited nature of the contamination assessment, it was concluded that the site can be made suitable for the proposed development in accordance with State Environment Planning Policy No. 55 – Remediation of Land (SEPP 55). It was recommended that:

- A programme of supplementary investigations is completed to address the uncertainty associated with the quality of fill within the site.
- A RAP was developed to mitigate potential risks from ACM in fill during site development, and a plan to manage unexpected finds of contamination. Given that existing buildings restrict the ability to complete further investigations within the site, it was recommended that the RAP outlines a scope for the supplementary investigations. The findings of these investigations shall be used to modify the RAP, if required.

1.1 Objectives

The overall objective of the RAP is to provide the framework for management of contamination that may be identified following additional assessment during development in order to make the site suitable for its intended use as a high school.

The purpose of this document is to outline a strategy to mitigate the potential risks associated with asbestos within the fill material. This document also presents the scope of supplementary investigations to assess the quality of fill within the site, and a procedure to manage unexpected finds encountered during the implementation of the proposed development.

1.2 Scope of Works

This RAP has been prepared in accordance with Guidelines for Consultants Reporting on Contaminated Land (NSW EPA, 2020). To achieve the objective of the RAP, the following activities were completed:

- Review of available investigation reports previously undertaken at the sites to describe the contamination issues that warrant remedial action. Identify data gaps and recommend a scope for supplementary investigations to reduce uncertainty associated with the quality of fill within the site.
- Selection of a preferred remediation and/or management methods from feasible remediation options.
- Outline procedures for the preferred remediation and/or management method.
- Outline of the procedures for validation, site control and occupational health and safety, as required for the remediation and/or management works.
- Review of the environmental measures to be undertaken during the remedial works to protect the health and safety of site works, persons using the school, the general public and the surrounding environment.
- Development of validation criteria and scope of the unexpected finds management plan.

2. Site Information

Mosman High School currently contains school buildings, demountable classrooms, multi court playing areas, car parking and bitumen-surfaced play areas. It is surrounded by Military Road to the east, Belmont Road to the north, Gladstone Avenue to the west and Avenue Road to the south.

The layout of the current school is shown in **Figure A** below Table 2.1. Additional information to describe the site, as obtained from the Coffey Site Assessment Report (Coffey 2019a) and Geotechnical Report (Coffey 2019b) are provided in Table 2.1 below.

Table 2.1: Site Information

Site Address:	Mosman High School, 745 Military Road, Mosman, NSW 2088
Approx. Total Land Area:	15,000 m^2
Title Identification Details:	Lot1 of DP1268793
Current Land Use:	High School
Historical Land Use:	Historical evidence indicates the grounds have been used as a school since at least 1930 which is the earliest historical aerial photograph obtained.
Adjoining Site Use:	North and South: Commercial properties, medium to high density residential housing. Mosman Oval is also located further to the north. West: Low to medium density residential housing. East: Military Road, Commercial properties, low to medium density residential further to the east.
Site Coordinates:	The approximate UTM Zone 56 H grid coordinates for the centre of the site are: 337475 m E, 6255448 m S
Topography	The site slopes towards from east to west/southwest. NSW Survey marks around the boundary of the site, indicates that ground elevations at the site

	range between RL 79 and 81 m AHD, with the regional topography sloping to the west to south west.
Buildings and Site Structures	Five permanent buildings (Blocks A to E) of varying age of construction are present at the site in addition to two demountables which are located in the southwest quadrant of the site. Two of these buildings are heritage listed – Block D located along the eastern boundary of the site and Block A located in the south-eastern corner of the site. Elevated walkways connect Blocks B, C, D, and E. Three surfaced multi-purpose courts are present on site, one of which is a covered outdoor learning area (COLA) located in the south-western corner of the site. The COLA appeared to be elevated and may underlain by some fill material.
Site Surfaces	The site was characterised by different types of ground surfaces including concrete, bitumen, garden beds and bare ground
Regional Geology	The Sydney 1:100,000 Geological Sheet 9130 indicates the site is underlain by Sandstone of the Wianamatta Group, characterised by medium to coarse grained quartz, sandstone, very minor shale and laminite lenses. The records in Appendix B illustrates the site location in relation to these geological units.
Soil Landscape	Reference to the Sydney Soil Landscape Series Sheet 9130 (4th edition) and associated report indicates the soil landscape of the site and its surrounds is classified as a Lambert/Gymea Erosional Landscape which comprises undulating to rolling rises and low hills on Hawkesbury Sandstone. These soils typically comprise loose, stony sandy loam, sandy clay loam, puggy clay, clayey sand, clay and friable sandstone. As the site is located at the crest of a ridge, the anticipated soil stratigraphy consists of sandy loam, sandy clay loam or clayey sand overlying weathered sandstone with a maximum soil depth of 1 m. The pH ranges from extremely acidic (pH 3.5) to slightly acidic (pH 6.0)
Acid Sulphate Soils	Reference to the ASRIS Atlas of Australian Sulfate Soils identified an “extremely low probability of occurrence of acid sulfate soils”.
Groundwater	A search of groundwater bores registered with NSW Office of Water revealed two registered groundwater bores located within 500 m of the site. Bores GW106880 and GW108738 are located 318 m and 352 m respectively to the south east of the site. Both bores were authorised for “household” purposes and extended to depths between 84 m and 107.9 m below ground level. It is expected groundwater follows the regional topography and flows towards Sydney Harbour to the south to south-west.
Site Contamination	Block A building contains ACM within the interior and exterior, which are deteriorating to the point that some roof tiles containing ACM have fallen off. Whilst no investigation of soil has been completed in areas where excavation is proposed, anecdotal evidence has indicated that ACM had been found in surface soils surrounding Block D. Whilst an inspection was carried out at this location with no ACM observed on the surface, the excavations proposed as part of the initial phase of site development have the potential to uncover ACM. Bonded ACM in good condition poses a low risk to health, although damage to such materials during excavation has the potential pose greater health risks. Bonded ACM that has been subject to excessive weathering (i.e. fibrous asbestos) and asbestos fines in soils may also be present within the soil and pose greater risks to health. One fragment of suspected ACM was identified by Coffey on the ground surface at the north-eastern corner of Building B at the base of a tree. This was notified to the school’s Ground Administrator (GA) and collected and disposed of by the GA. The fragment size appeared to be in good condition and was approximately 2 cm by 3 cm and rectangular in size.

	The investigations completed also identified levels of carcinogenic Polycyclic Aromatic Hydrocarbons (PAH) and copper in soil at concentrations that exceeded generic health and ecological criteria, respectively. Coffey assessed that exposure pathways were incomplete, given: • Trees/landscaping will be established within clean, imported material. • Pavement will be maintained between Building A/B forecourt, preventing site occupants (i.e. students and teaching/support staff) from coming in contact with fill containing carcinogenic PAH. The investigations completed did not identify chemical contaminants in soil at concentrations that pose potentially unacceptable risks to construction workers, or workers conducting future maintenance works.

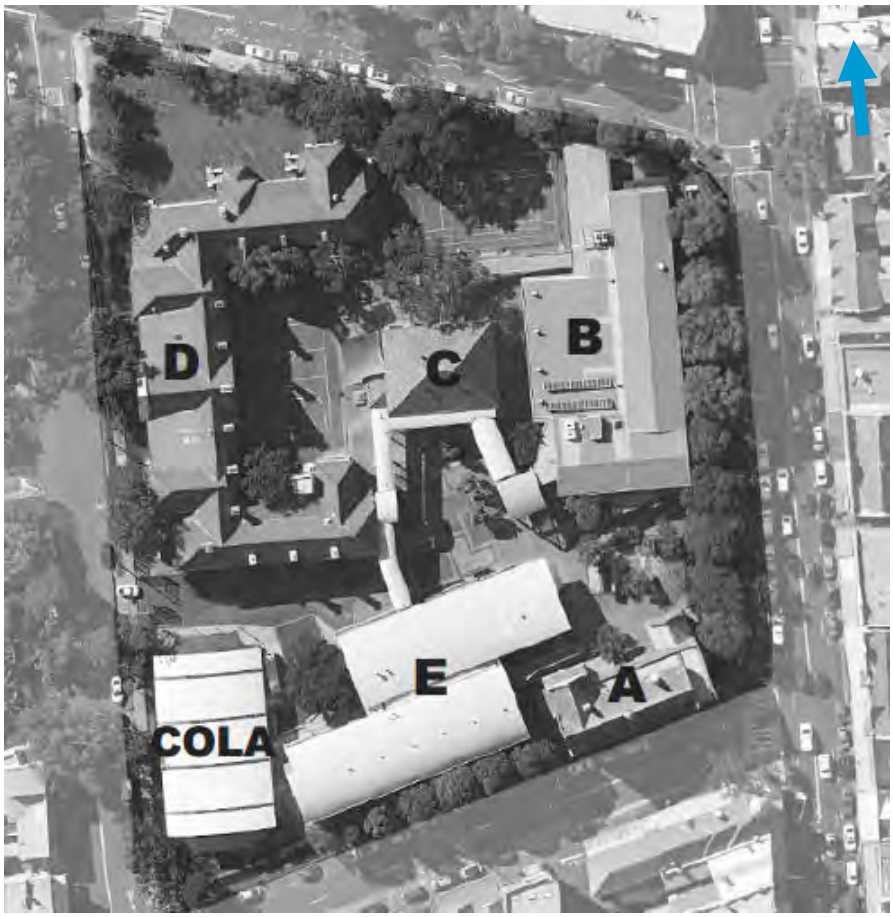


Figure A: Existing Building Layout (DJRD architects). Note, the blue arrow denotes north.

3. Proposed Development

The proposed development layout is described within the plans presented in Appendix A, and summarised below:

- Demolition of Building B, Building C and part Building E;
- Removal of existing sports court and surrounding retaining walls and nominated trees;

- Construction of a new part 3/ part 4 storey building plus lift overrun and net enclosure to rooftop multi-court (Building G) on the corner of Military Road and Belmont Road providing:
  - administration and staff facilities;
  - multipurpose gym/hall;
  - library;
  - canteen facilities;
  - general and senior learning units;
  - science learning unit;
  - health / PE and performing arts unit; and
  - learning and admin support unit.
- Associated landscaping works including new outdoor play areas, a rooftop play space and rooftop multi-purpose court; and
- Relocation of the main pedestrian entrance from Military Road to Belmont Road.

4. Conceptual Site Model

4.1. Asbestos Zone Characteristics

The primary source of contamination impact at the site is considered to be fibre cement fragments (or bonded ACM) which are greater than 7 mm in size and are present within soil fill material that have likely been deposited during the weathering of building materials containing asbestos or debris from poor building renovation/demolition practices in the past. In light of the limited investigations completed to date, it is assumed that all fill material has been impacted by ACM. Further investigation of fill material is proposed as part of the proposed development of the school.

While not previously identified, it cannot be ruled out that AF or FA may be present. The proposed assessment proposed will provide an indication of whether these forms of asbestos also require management and consideration in this RAP (or RAP addendum).

4.2. Contaminant Exposure Pathways

The primary exposure mechanisms applicable to the migration of contamination identified at the site include the inhalation of asbestos fibres.

The following transportation mechanisms are relevant to asbestos in fill:

- Wind-blown soils/dust containing asbestos fibres.
- Mechanical and chemical weathering of bonded ACM which may spread these materials and/or allowing asbestos fibres to become airborne.
- Surface water runoff may inadvertently expose fill material containing asbestos, and/or spread these materials along drainage routes.

4.3. Identification of Potential Receptors

The following potentially sensitive areas and possible receptors for the proposed site use have been considered:

- Workers associated with the planned redevelopment of the site.

- Current and future users of the site as a school. These receptors are assessed to be both adult workers/visitors and school students.
- Future maintenance workers involved in subsurface excavations.
- Occupants of adjoining land.

4.4. Source – Pathway – Receptor Relationships

The following paragraphs discuss the plausible pollutant linkages between the contamination sources and receptors identified in relation to the site.

The fragments of ACM visually identified during the initial contamination investigations were noted as non-friable asbestos and observed to be in relatively good condition and hence unlikely to release fibres in their current state. On this basis, bonded ACM (i.e. non-friable forms of asbestos) are considered to represent a low health risk to current site users, site visitors and users of adjoining land.

Bonded ACM has the potential to weather (i.e. deteriorate) by way of chemical and/or mechanical mechanisms, which may result in a greater likelihood for fibres to be released. Chemical weathering of cement used to bond asbestos fibres within a solid matrix can occur in acidic soils or where other chemical oxidants are present.

Mechanical weathering is associated with the breaking down of cement bonded asbestos fibres by physical forces, and could include the movement of vehicles and plant, excavation etc. These activities have the potential to degrade/deteriorate the bonding cement and increase the potential for asbestos fibres to be released. Mechanical weathering of bonded ACM through inadvertent vehicle movements for grounds maintenance, or during site redevelopment works, has the potential to pose an increased health risk to construction workers, current site users, users of adjoining land and ground workers. Furthermore, such works have the potential to spread bonded ACM over a wider area.

Bonded ACM that remains on-site following site development has the potential to pose unacceptable risks to future users, particularly where these materials remain exposed within shallow soils and are susceptible further weathering and deterioration.

4.5. Data Gaps & Uncertainty

The Site Contamination Assessment (Coffey, 2021a) acknowledges that limited investigation has been completed within the site. The following data gaps and uncertainties are noted:

- A thin layer of fill was detected in each borehole established within the site, directly beneath existing pavement or landscaping. Whilst observations made during field works suggest the site has not been subject to significant localised filling, there remains some uncertainty regarding the quality of fill material that is present at the site.

- Effluent from the chemistry lab reportedly discharges to a waste sump at the western end of Block E. Whilst BH03 was positioned in this area to check for indications of potential contamination arising from the sump, it is assessed that this information from this sampling point does not provide conclusive evidence on whether the sump has leaked, or not.

This document presents an approach to conduct supplementary investigations to address these data gaps/areas of uncertainty. If required, the findings of these investigations shall be used to modify the remediation strategy outlined herein.

5. Remedial Strategy

5.1. Remedial Goals

The goals for the proposed remediation works are:

a) Mitigate potential health risks posed by asbestos within fill materials across the site to an acceptable level, and

b) Make the site suitable for the continued use a school.

5.2. Remedial Policy

The preferred order of options for remediation, as stated in the NSW DEC 2006 is:

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

The guidance also notes that if remediation is likely to cause a greater adverse effect than leaving the site undisturbed, remediation should not proceed.

5.3. Remedial Options Appraisal

To achieve the remedial objectives, there are a number of remedial options considered to be appropriate, each with advantages and disadvantages. Remediation may comprise implementation of one or a combination of the remedial management measures described in Table 5.1.

The appropriateness of a particular option would vary depending on a range of factors including:

- Space available onsite during remediation and construction.
- Air quality, noise, and impact on adjacent site users.
- Nature and extent of contamination.
- Geological and hydrogeological conditions.
- Type(s) of contamination, including the impacted media.
- Human health and environmental risks (both during and post redevelopment).

The selection of feasible remedial techniques would also need to consider a range of issues including:

- The proposed development design.
- Effectiveness of remediation – will the solution meet the remedial objectives.
- Contractor experience with remedial technology.
- Sustainability – waste generation, stakeholder acceptance of the remedial solution etc.
- Cost effectiveness and acceptable timeframes.
- Long term liabilities and ongoing management requirements.

Table 5.1: Remedial Options Appraisal

Remedial Methodology	Description	Advantages	Disadvantages	Suitable
On-site mechanical treatment	May include excavation and multi-directional raking of soil, sieving and/or picking of fragments/foreign material.	Low cost, reduces the amount of soil requiring off-site disposal	Can only be used for ACM. Not effective for FA (if present) Lower confidence in achieving remedial objectives. Required space to complete raking effectively not available at all areas of the site. High labour costs and time consuming.	No
Excavation and Off-site Disposal	Excavate impacted materials. Transport directly to a licensed landfill facility. Re-instate site with clean validated fill material where required.	Effectively removes the contamination. Does not leave site legacy of contamination that requires management over longer term. Relatively fast method.	Higher CAPEX cost relative to other options associated with haulage and disposal of soil. Less environmentally sustainable approach relative to other feasible options.	Yes
Isolation and on-going Management	Isolation of asbestos impacted soils may be achieved by placement of a Cover Layer that separates future site users on the surface of the redeveloped site from asbestos impacted fill material below the Cover Layer. The Cover Layer may comprise landscaping, road or pavement construction materials of a specified form and thickness. On-site management may also comprise other physical barriers and associated institutional controls to restrict access to certain areas of the site	Potential to be incorporated into the design plans in some areas of the sites and also meet remedial objectives. Cost effective. Relatively fast method.	Long term management of capping layer required to maintain effectiveness of remediation, although can be readily integrated with existing management system to manage asbestos in buildings. Notification of contamination on land titles. Potential to pose constraint to future development.	Yes

5.4. Preferred Remedial Strategy

Given the thin layer of fill that is present across the site, the preferred remedial strategy shall comprise:

- Excavate to remove fill materials where this is required to facilitate the proposed development.
- Where fill will remain in-situ, complete further investigation to determine whether the fill is suitable to remain in-situ.
- If contaminant concentrations are reported above the validation criteria, the fill material shall be removed. The excavation void will be backfilled within clean imported material, if required to meet development formation levels.
- If the fill material contains contamination at concentrations above the remediation criteria, and cannot or will not be removed, the fill material will be isolated below a Cover Layer.
- Areas of existing pavement that will not be disturbed during the development will be utilised as Cover Layers to minimise exposure to fill materials.

5.5. Proposed Sequence of Works

5.5.1. Preliminaries

Prior to any works commencing on the site, notifications to third parties and obtaining any licences, approvals and permits may need to be undertaken. Further information regarding notifications, licenses, approvals and permits is presented in Section 10.

A licensed asbestos removalist will be engaged to manage the asbestos removal works. The remedial validation works will be undertaken by a Licensed Asbestos Assessor, an experienced hygienist, or an environmental consultant who is competent in the identification and assessment of asbestos within fill.

5.5.2. Site Establishment & Clearance

Prior to commencing demolition works, site establishment would be undertaken and which would include:

- Work area fencing, warning signage and temporary site facilities.
- Occupational health and safety controls.
- Environmental monitoring and controls.
- Preparing stockpiling areas (if required).
- Vehicular haul roads and transit routes onto and off the site.
- Location, isolation, relocation, protection and/or termination of services potentially affected by the remediation/redevelopment works, if any.
- Establishing contingency planning and controls to address unexpected finds.

5.5.3. Supplementary Investigations

Following removal of buildings and/or covering layers, a supplementary programme of investigation will be undertaken during pre-determined development hold points. The investigations will be

undertaken in areas where fill will be retained on site. The details of the proposed supplementary investigation are provided in Section 7.

The findings of the supplementary investigation shall be used to determine the lateral and vertical extent of remediation and need to modify this RAP.

5.5.4. Excavation to Remove Impacted Fill

Mechanical excavation is the preferred method of remediation to remove impacted fill material. These excavations should be undertaken under the direction of a competent environmental consultant and shall be progressed laterally and vertically in a systematic manner that allows soil conditions to be closely observed (e.g. to record the presence/absence of asbestos, and segregate fill material from natural soil). The extent of these excavations should be guided by site records and observations to confirm either:

i. the complete removal of fill material, or
ii. the depth that the excavation was terminated within fill.

The extent of the excavation and associated validation observations should be accurately recorded, along with validation observations, volumes of excavated impacted soil, photographs and validation sample locations (if any).

Areas subject to mechanical excavation that require reinstatement using imported fill materials shall be completed using material that is either:

- Virgin Excavated Natural Material (VENM),
- Excavated Natural Material (ENM) and subject to the specific requirements stipulated within the Excavated Natural Material Exemption (NSW OEH, 2012), or
- Other materials that comply with an appropriate Resource Recovery Exemption issued by the NSW EPA.

5.5.5. Retained Fill

Where impacted fill material cannot be removed from site, or will not be removed from site based on the development design, the contingent remedial strategy shall be to isolate this material below a constructed Cover Layer. The Cover Layer may comprise various forms including (but not limited to) a building slab, landscaping, access roads or pavement construction materials of a specified form and thickness.

Where this contingent remedial strategy is implemented, an addendum to this RAP will be required to describe the Cover Layer requirements and ensure these are coordinated with the design of the proposed development. Where impacted fill is retained on site below a Cover Layer, a Long-Term Environmental Management Plan (LTEMP) shall be prepared by a suitably qualified Environmental Consultant following the completing of site development activities which succinctly describes:

- A summary of the location, depth, nature and types of contamination encapsulated at the site.
- The assumptions on which exposure settings and risk management protocols are based.
- A long-term maintenance and monitoring/inspection programme to assess the quality and maintain the effectiveness of the existing covering layers.
- Details of cap construction and location.
- Identify entities responsible for the implementation of the LTEMP, and how this LTEMP fits within the existing framework to manage asbestos containing products within the school. Outline

controls to control potential health risks during future excavations and subsurface ground works that may penetrate the capping layer.

- An unexpected-finds protocol.

The LTEMP will be required to be recorded on the planning certificate issued under section 10.7 of the EP&A Act 1979 and/or a covenant registered on the title to land under section 88B of the Conveyancing Act 1919.

6. Validation Plan

6.1. Asbestos Validation Protocol

The removal of asbestos impacted fill shall be validated by either of the following methods:

A) Site Inspection – Excavation Terminates in Natural Soil/Bedrock

- Inspection of the excavation base confirms the excavation has been extended to the surface of natural soils or bedrock, as logged by a suitably qualified environmental consultant. A detailed field log shall be maintained by the consultant describing the location/depth of excavation, type/characteristics if natural soils encountered, and supported by a photographs to visually record conditions at the excavation boundary.

B) Site Inspection & Sampling – Excavation Terminates in Fill

- Where fill remains at the excavation base, the environmental consultant shall conduct a detailed inspection of the fill to check for visible ACM. The inspection shall be completed in a systematic manner on a 10m by 10m grid.
- Samples of fill shall then be collected on a regular sampling grid to support the validation assessment. The spacing of validation sampling locations shall be double the minimum sampling points per validation area, as recommended for site characterisation set out within Table A of the Sampling Design Guidelines (NSW EPA, 1995). Validation samples shall be collected at excavation base, and 0.5m depth intervals throughout the fill. Professional judgement shall be exercised by the environmental consultant when determining the sample depth intervals to enable a robust assessment to be prepared to evaluate whether fill is suitable to be retained on site.
- Sufficient material will be sampled for quantitative analysis of asbestos in soil, being 10L for sieving through a 7mm mesh to retain visible asbestos fines (AF) and a 500g sample from the material passing the 7mm mesh for microscopic analysis at a NATA accredited laboratory. This method is consistent with that recommended in Section 11 of Schedule B2 of the ASC NEPM. Validation results will be compared against remediation criteria listed below.
- Fill material would require removal or management where the corresponding validation results exceed the remediation criteria.

6.2. Asbestos Validation Criteria

The assessment of known and suspected asbestos contamination in soil is based on:

- *National Environment Protection (Assessment of Site Contamination) Measure 1999* (April 2013), NEPM 2013, Canberra; and
- *WA DoH 2009 Guidelines of the assessment and management of asbestos contaminated sites in Western Australia, WA Department of Health and Department of Environment and Conservation.*

Schedule B1, Section 4 of NEPM (2013) provides guidance on the assessment of both friable and non-friable forms of asbestos in soil. This guidance is also based on the WA DoH (2009) Guidelines that presented risk-based screening levels for asbestos in soil under various land use scenarios.

The adopted health screening levels for asbestos in soil under the HIL C land use scenario, which is considered applicable given the continued use of the site as a secondary school, is shown in Table 6.1.

Table 6.1: Health Screening Levels for Asbestos contamination in soil (NEPC 2013)

Form of Asbestos	Health Screening Level
Bonded ACM (% w/w)	0.02% w/w
FA and AF (% w/w)	0.001% w/w
All forms of Asbestos	No visible evidence for surface soil (top 10cm)

6.3. Imported Fill Criteria

It is understood that imported fill material is required for use on-site for use as cover layers - materials imported to site must be either:

- Virgin Excavated Natural Material (VENM), or
- Excavated Natural Material (ENM) and subject to the specific requirements stipulated within the Excavated Natural Material Exemption (NSW OEH, 2012); or
- Materials covered by a Resource Recovery Exemption Order issued by the EPA.

The environmental consultant shall review documentation from the appointed contractor describing the quality of the material. Following their review, the environmental consultant will advise the contractor of the suitability of the material (from a contamination perspective) for importation to the site, or recommend confirmatory sampling to assess the suitability of the material.

Where confirmatory sampling is recommended, the following fill sampling plan will be implemented:

- A visual inspection of the source site and the proposed fill material (must be exposed); and
- Collection and laboratory analysis of the minimum number of samples of the fill material per source, as required by the Sample Design Guidelines (NSW EPA; 1995) or Excavated Natural Material Exemption (NSW OEH, 2012), whichever is greater.

Where ENM is imported to site as fill the Generator must provide a written statement of compliance that this material complies with relevant conditions of the ENM general exemption and shall provide a copy of the relevant sampling plan and test results for the imported ENM.

The source site, volume, associated chemical test certificates and placement locations of the imported fill material will be tracked by the appointed contractor. These records will be presented within the Validation Report.

It is noted that other non-contamination related criteria may also need to be met (e.g. engineering or geotechnical requirements) although such issues are considered beyond the scope of this document.

The soil, aggregate and mulch shall be visually inspected during importation by an Environmental Consultant to check that it is consistent with that described in the source documentation, and for the presence of potential contamination.

6.3.1. Laboratory Analysis

Material imported to site will be analysed by ISO/IEC 17025 certified laboratories with NATA accredited methods for the analytes outlined in Table 6.2. The analytical suite would be determined by the environmental consultant based on the source and characteristics of the material.

Table 6.2: Proposed Laboratory Analysis

Type	Rate	Analysis
VENM	1/100m^3 with a minimum of 3 samples per source	Source dependant although may include TRH, BTEX, PAH, OCP, OPP, PCB, metals and asbestos
ENM	As per Table 1 of the NSW EPA current Excavated Natural Material Order 2014	As per Table 4 of the NSW EPA current Excavated Natural Material Order 2014 (metals, electrical conductivity, pH, TRH, BTEX, PAHs, metals, foreign materials), OCP, OPP, PCB and asbestos.

TRH: Total recoverable hydrocarbons
BTEX: Benzene, toluene, ethylbenzene and xylene
PAH: Polycyclic aromatic hydrocarbons
OCP/OCP: Organochlorine pesticides/ organophosphate pesticides
PCB: Polychlorinated biphenyls
Metals: arsenic, cadmium, chromium, lead, nickel, zinc, mercury and copper

6.4. Re-use of Site Won Natural Material On-site

Site won material, which has been visually and chemically assessed as VENM may be re-used on-site.

These materials will be visually screened for ACM as part of the validation process and assessed to demonstrate that they are suitable for use within the site.

Where ACM are observed, this soil would be segregated in an appropriately controlled manner with underlying soil requiring further visual assessment.

7. Supplementary Investigation

7.1. Purpose of Supplementary Investigation

The purpose of the supplementary investigation is to further characterise fill within the site to determine whether these materials are suitable to be retained on site. Where fill is identified that poses potentially unacceptable risks to human health or the environment, remediation shall be implemented to mitigate the risks identified.

This section outlines the Data Quality Objectives for the supplementary investigations to be completed. The seven-step DQO process adopted for this assessment is provided below:

Table 7.1: Data Quality Objectives

1. State the problem	An initial programme of investigation has identified a thin layer of fill within the site. Site observations identified ACM in surface soil, and anecdotal evidence suggests

	ACM may be present in fill elsewhere on site. Limited sampling has also identified carcinogenic PAH and copper in fill in two samples. Further investigation is needed to characterise fill conditions on site and determine whether these materials are suitable to be retained on site.
2. Identify the decision	The key decisions include: • Is the investigation data of sufficient quality to assess the key problem above? • Does the impacted soil require remediation to mitigate health/environmental risks? • Is the remediation strategy outlined within Section 5 adequate to mitigate the potential risks identified? • Is it possible to conduct sufficient investigation within the site to adequately characterise fill?
3. Identify inputs to the decision	The primary inputs to assessing the above include: • Data presented in previous investigations undertaken at the site. • Field observations and data. • Laboratory analytical results. • Sampling methods and QA/QC protocols. • Relevant legislation and regulatory guidelines. • Development staging and site access.
4. Define the boundaries of the study	The lateral boundary for the investigation is the current boundary of the Mosman High School, as shown on Figure 1. Vertically, the study boundary is defined as the surface of the sandstone bedrock.
5. Develop a decision rule	The following decision rules will apply: • If field and laboratory data meet the data quality indicators, the data will be considered directly usable for the assessment. • Where contaminant concentrations for each sample are below the adopted investigation levels, no further assessment/remediation is required with respect to that chemical/media/area. • Where contaminant concentrations are reported to exceed the adopted investigation levels, then the following additional steps will be undertaken: - Where data sets are sufficiently populated, statistical analysis shall be used in the assessment of risk. Where the 95% UCL can be calculated the 95% UCLs are to be less than the health based assessment criteria and no individual results in the data set are to be greater than 250% of the assessment criteria; and the standard deviation of the data set is to be within 50% of the assessment criteria. - Consider the result in the context of the current CSM to evaluate whether there are plausible pollutant linkages. - If there are plausible pollutant linkages, evaluate whether the remediation strategy outlined within Section 5 is sufficient to mitigate this potential risk. If it is not considered sufficient, recommend that a RAP Addendum is prepared to address the additional risk.

	• If the scope of investigation outlined within Section 7.2 and illustrated on Figure 2 has been completed, then it would be considered that sufficient sampling been conducted to characterise fill.
6. Acceptable limits on decision error	The acceptable limit on decision errors is a 5% probability of a false negative (i.e. assessing that the average concentrations of COPC in are less than the assessment criteria when they are actually greater than the assessment criteria). Where data sets are sufficiently populated the 95% UCL of the arithmetic mean will be used to calculate this probability and the 95% UCLs are to be less than the assessment criteria.
7. Optimise the design for obtaining data	Based on the previous Steps 1 to 6 of the DQO process, the optimal design for obtaining the required data is presented in the following sections.

7.2. Sampling and Analytical Plan

The scope of the proposed investigation and associated analytical plan is outlined within Table 7.2. The indicative sampling locations are shown on Figure 2.

Table 7.2: Summary of test pits and analytical plan

Investigation Sampling Plan	Analytical Plan
Soil sampling	Excavate 25 test pits positioned on a combination of a systematic sampling grid and positions targeting (i) the waste sump and (ii) areas where anecdotal evidence indicated ACM may exist. The actual locations of the test pits shall be positioned considering constraints associated with site access and development staging. Each test pit shall be excavated to a target depth of 0.3m into natural soil, or refusal on bedrock. Soil conditions shall be recorded on a field log in accordance with the Universal Soil Classification System (USCS). Each log shall also record visual/olfactory indications of potential contamination and soil headspace measurements using a calibrated Photoionisation Detector (PID) with a 10.6eV lamp. Soil samples shall be collected for laboratory analysis at the surface, and regular 0.5m intervals thereafter. Each sample shall be collected directly from the centre of the excavator bucket using a clean pair of nitrile gloves. Samples collected for chemical analysis shall be placed within a clean glass sample jar with Teflon-lined lid supplied by the laboratory. Bulk (10L) samples of fill shall be collected for quantitative estimation of asbestos in soil as per the procedure outline within the ASC NEPM (NEPC, 2013). A 500ml subsample of sieved fill shall be submitted for asbestos analysis. Samples will be stored in ice-chilled, insulated containers while on site and in transit to the laboratory. Soil samples will be submitted under Chain of Custody (COC) to the NATA accredited laboratory Eurofins MGT (primary samples) and ALS Environmental (secondary samples). Selected samples shall be analysed for the Contaminants of Potential Concern identified within the Site Contamination Assessment (Coffey, 2021a), which includes heavy metals, TRH, PAH, BTEX, OCP/OPP, PCB and asbestos.

	Non-disposable sampling equipment will be decontaminated using non-phosphate detergent solution (e.g. Decon90) to minimise the potential for cross-contamination between sampling locations.

7.3. Quality Assurance and Quality Control (QA/QC)

7.3.1. Field Quality Assurance and Quality Control

Fieldwork will be undertaken by experienced and appropriately qualified engineers/scientists from Coffey who are competent in completing investigations at potentially contaminated sites. Field procedures will be consistent with good industry practices based on the guidance provided within the relevant sections of the ASC NEPM (NEPC, 2013) and the Australian Standard AS4482 Guide to Investigation and Sampling of Sites with Potentially Contaminated Soil (Parts 1 and 2).

Samples will be collected in clean containers provided by the laboratory. Samples will be kept in ice-chilled insulated containers after sampling, during transit and storage. Samples will be collected and handled using clean, disposal nitrile gloves where applicable.

Samples will be transported from the site to the laboratory with chain of custody documentation. The laboratory shall record the condition of the samples on receipt and report this information with the laboratory results.

The PID shall be calibrated using 100ppm isobutylene gas in accordance with manufacturer's recommendations. Calibration shall also include a fresh air calibration at the commencement of the investigation.

7.3.2. Field Quality Control Samples

The following quality control (QC) samples will be collected in the field:

- Inter-laboratory duplicate samples will be collected and analysed at the rate of not less than a total of 5% of primary samples. Intra-laboratory duplicate samples (triplicates) will be submitted and analysed by a secondary laboratory at a rate of 5% of the primary samples.
- Where reusable equipment is utilised, equipment rinsate blank samples will be collected and analysed per batch.
- Trip blank and trip spike samples will be included and analysed at a rate of one sample each per sample batch.

7.3.3. Laboratory Quality Assurance and Quality Control

Laboratory QA/QC will include the following:

- The laboratory analysis of samples will be undertaken by Eurofins MGT and ALS Laboratory. Both laboratories hold NATA accredited analytical methods for the analyses to be undertaken.
- The NATA accredited laboratories will implement quality controls conforming to the Schedule B3, Guideline on Laboratory Analysis of Potentially Contaminated Soils, in the ASC NEPM (NEPC, 2013)
- The laboratory will use method blanks, spike samples, duplicate spikes, matrix spikes and duplicates and surrogate compounds to assess laboratory quality control.

The laboratory will report results of quality assurance and quality control samples as part of their analytical certificates.

7.3.4. Data Quality Indicators (DQI)

Specific indicators for field and laboratory QC samples are shown in Table 7.3

Table 7.3: Data Quality Indicators

Type of Quality Control Sample	Analytical Plan
Duplicate / Triplicate Samples	Relative Percentage Difference (RPD) within: • 50% (where the average concentration is 10-20 x laboratory LOR); • 30% (where the average concentration is > 20 x laboratory LOR);
Trip Spike	• 60% - 140% for organics (or as per laboratory's control limits)
Trip Blanks	Analytes not detected
Rinsate Blanks	Analytes not detected

7.3.5. Data Useability Assessment

Data useability assessment will be undertaken in general accordance with Appendix C of Schedule B2 and Schedule B3 of the ASC NEPM (NEPM, 2013). The assessment will generally consider:

- Completeness – a measure of the amount of useable data (expressed as %) from a data collection activity; were samples collected from specified locations;
- Comparability – the confidence (expressed qualitatively) that data may be considered to be equivalent for the sampling and analytical event;
- Representativeness – the confidence (expressed qualitatively) that data are representative of the range of soil present within the investigation area;
- Precision – a quantitative measure of the variability (or reproducibility) of data;
- Accuracy – a quantitative measure of the closeness of reported data to the true value;

7.4. Assessment Criteria

Soil investigation levels were selected guidance provided within the following publication endorsed by the NSW EPA:

- NEPC (2013); National Environment Protection (Assessment of Site Contamination) Measure 1999
- Freibel, Nadebaum (2011); CRC Care Technical Report No. 10: Health Screening Levels for Petroleum Hydrocarbons in Soil and Groundwater

The adopted health investigation levels in soil shall be Recreational C (HIL C) criteria which is considered appropriate for secondary schools. Similarly the ecological investigation levels for urban residential/public open space shall be adopted for this assessment.

7.5. Supplementary Site Contamination Assessment Report

The field and laboratory records from the supplementary investigation shall be collated and presented within a supplementary site contamination assessment report prepared in general accordance with the relevant sections of NSW EPA Guidelines for Consultants Reporting on Contaminated Land (NSW EPA, 2020). Specifically, this report shall present:

- A revised Conceptual Site Model that considers the field and laboratory data collated from the supplementary investigation.
- A discussion on the potential risks the fill poses to human health and the environment if this material is retained on site as part of the proposed development.
- Recommendations to modify the RAP, where potentially unacceptable risks are identified (if any).

8. Data Gaps, Uncertainties & Contingency Planning

8.1. Data Gaps and Uncertainties

The site has been subject to limited geotechnical and contamination investigations to characterise ground conditions within the site. Following the review of the available site history information and investigation data, the following potential data gaps and uncertainties have been identified:

- The presence and/or distribution of ACM within fill has not been able to be established.
- Potentially unidentified contamination between investigation positions, or in areas where limited investigation data is currently available, or constraints have prevented access for appropriate assessment (e.g. building footprints, limitations in investigation methods such as reliance on boreholes for sampling, etc.).
- Uncertainties associated with historic asbestos management practices.

The above data gaps and uncertainties have been used to develop the Unexpected Finds Protocol presented in the following Sections.

8.2. Unexpected Finds Contingency Plan

8.2.1. Management of Unexpected Finds

Should unexpected contamination or aesthetically unacceptable material be encountered during the demolition, excavation or the remediation activities, works will stop in the affected part of the site. This area will be isolated to minimise potential for disturbance to the affected soils. The sub-contractors on-site, the appointed Principal Contractor (PC) and SINSW will be notified of the unexpected find and a suitably qualified environmental consultant engaged to attend site to assess the find.

Due to the potential variability in both the nature and extent of an unexpected find, it is not considered reasonable to define specific remedial strategies for contamination associated with the unexpected find.

8.2.2. Unexpected Finds Procedure

Should an unexpected actual or suspected contamination be encountered during the remediation or site redevelopment works, the following procedure applies:

1. Stop work in the potentially hazardous area as soon as it is safe to do so and move to the upwind side of the area, or away from the area.
2. Assess the potential immediate risk to human health posed by the unexpected find and assess if evacuation or emergency services need to be contacted.
3. Delineate an exclusion zone around the affected area using fencing and/or appropriate barriers and signage. Additional control measures may be required for odours and/or volatile compounds.
4. Contact the appointed environmental consultant for advice and request a site visit to undertake an assessment of the unexpected find.
5. The environmental consultant will assess the unexpected find and provide advice regarding:

a) Preliminary assessment of the contamination and need for immediate management controls;

b) What further assessment and/or remediation works are required and how such works are to be undertaken in accordance with contaminated site regulations and guidelines;

c) Preparation of an addendum to the remediation action plan (if necessary) or provide clean up advice;

d) Remediation works required (where applicable);

e) Validation works required following remediation works (if applicable).

6. Works are not to recommence in the affected area until appropriate advice has been obtained from the environmental consultant.

7. If it is deemed safe to do so by the Site Superintendent, works may resume in the affected area.

9. Site Management for Remediation Works

Contractors must undertake a review of their appointed works/task with respect to the likelihood of encountering asbestos in that area. It is the responsibility of the contractor to assess the potential risk of encountering asbestos while completing the works/task and develop and adopt appropriate controls to mitigate the risks posed to the constructions workers, students, school staff and surrounding community in completing their works.

In scenarios where there is the potential to encounter asbestos while undertaking earthworks, it is Coffey's recommendation that a conservative approach be adopted when implementing controls and that the controls be commensurate with those provided below and in accordance with the applicable legislation and Code of Practices.

A work health, safety and environment document shall be prepared prior to commencing works at the site, which should cover the following aspects as a minimum:

- Responsibilities for implementation and monitoring the effectiveness of controls implemented during the works.
- Community consultation protocols.
- Site Inductions & toolbox talks outlining the contaminants of concern that may be encountered at the site and the adopted management controls for the site.
- Site access control.
- Fencing and barricading.
- Signage.
- Soil management.
- Dust control.
- Noise control.
- Personal protective equipment and respiratory protective equipment.
- Decontamination procedures.
- Air monitoring.
- Water management.

- Hours of operation.
- Emergency preparedness and response plans.

10. Regulatory, Notification, Licence and Approval Requirements

10.1. Regulatory

The remediation works will be undertaken in accordance with, but not limited to, all relevant sections of:

- Work Health and Safety Act 2011;
- Work Health and Safety Regulations 2017;
- Protection of the Environment Operations Act 1997 and associated Regulations;
- Contaminated Land Management Act 1997;
- Environment Planning and Assessment Act 1979

Relevant guidelines made or approved by the NSW EPA under Section 105 of the Contaminated Land Management Act 1997 including:

- NEPC (2013) National Environment Protection (Assessment of Site Contamination) Amendment Measure (ASC NEPM) (No. 1) 1999, as registered 2013, and associated Schedule B guidelines.
- NSW EPA (2014) 'Waste Classification Guidelines'
- NSW DEC (2006); Guidelines for the NSW Site Auditor Scheme, 2nd edition
- NSW EPA (2020); Guidelines for Consultants Reporting on Contaminated Land
- NSW EPA (2015); Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997

The following additional guidelines apply to the management of contamination within the site:

- DUAP/EPA (1998); Managing Land Contamination: State Environmental Planning Policy No 55 Remediation of Land.Safe Work NSW (2019); How to Manage and Control Asbestos in the Workplace Code of Practice;
- Safe Work NSW (2019) How to Safely Remove Asbestos Code of Practice;

This RAP has been prepared having regard to the above regulations and guidance documentation.

10.2. Environment Planning & Assessment Act / SEPP55

As SINSW intend to lodge a State Significant Development Application (SSDA) to implement the proposed development, the remediation works are classified as Category 1 Remediation Works as per the definitions provided within SEPP55 and will require consent under the Environment Planning and Assessment Act 1979. As remedial works will be impacted as part of site development works, it is assessed that the remediation development consent conditions could be readily integrated as part of the overall consent for the development. The remediation works would be completed in accordance with the relevant development consent conditions.

The approach to manage soil material potentially impacted by asbestos is relatively straightforward and will rely on either the removal of the impacted materials, or using existing/proposed surfaces to cover the impacted material. The actual scope of remediation will depend on the findings of a supplementary programme of investigation that will be completed as 'early works' once areas of the site become available to complete these investigations efficiently with minimal disruption to existing school users.

10.3. Protection of the Environment Operations Act 1997

All emissions from the remediation works must be maintained below applicable thresholds. Site specific environmental management plans, as prepared by contractors implementing the development and remediation works must establish effective controls and monitoring criteria to assess compliance with these aspects.

The remediation works are not anticipated to trigger licensing under the Protection of the Environment Operation Act 1997 given the site covers an area less than 3ha, and does not propose the handling of 30,000m^3 of contaminated soil.

The Protection of the Environment Operations (Waste) Regulation 2014 requires that wastes generated from the remediation works must be stored in an environmentally safe manner, and vehicles used to transport waste from the site are covered. This regulation also details additional tracking requirements for vehicles carrying Special (Asbestos) waste.

10.4. SafeWork NSW

10.4.1. Asbestos Removal Licence

The remedial and/or earthworks contractor will be required to hold a minimum Class B Asbestos Removal Licence[1].

10.4.2. Asbestos Notification

The engaged remedial or earthworks contractor will be required to prepare an Asbestos Removal Control Plan (ARCP) for asbestos remediation works. The engaged remedial contractor will subsequently be required to submit the ARCP together with this RAP to SafeWork NSW and obtain the necessary NSW WorkCover Permit prior to commencement of remedial work (5 days notification required).

[1] Subject to change following completion of the asbestos in soils assessment.

11. Waste Classification

11.1. Waste Classification Criteria

The waste material generated as part of the remediation and site redevelopment works will be assessed in accordance with Waste Classification Guidelines (NSW EPA, 2014).

11.2. Waste Classification Procedure

Soil sampling for waste classification purposes can be undertaken via an in-situ or stockpile assessment. The material will be assessed by a suitably qualified environmental consultant prior to removal and disposal offsite. Waste classification assessments would include:

- inspection of the in-situ assessment area or stockpiled material and review of a relevant photographic record; and
- collection and laboratory analysis of spatially representative samples of the soil material.

Samples collected of waste soil will be analysed for a broad range of COPC consistent with the site history and informed by data presented from previous environmental site assessments. It should be noted that the sampling frequency and analytical schedule may need to be adjusted on a “case by case” basis, depending on factors such as:

- the volume of the material;
- the homogeneity of the material;
- investigation and laboratory analytical records relating to the material; and
- the visual assessment of the material.

The underlying natural soil may be classified as VENM provided that additional confirmatory sampling is undertaken, and that natural soil can be segregated from overlying fill material.

11.3. Waste Classification Reporting

The environmental consultant will prepare a letter, advising the classification of the waste. These reports will be provided within the Validation Report.

11.4. Waste Tracking

The source location, volume, classification and destination of waste material removed from site will be tracked by the appointed contractor. The contractor shall maintain a material tracking register along with consignment dockets confirming receipt of the material at the disposal facility. These records shall be presented within the validation report.

In addition to the above, as required by the NSW EPA, materials requiring off-site disposal which have been pre-classified as ‘Special Waste – Asbestos Waste’ must be registered with the NSW EPA using the online Waste Locate service by the disposal contractor.

12. Validation Report

The validation report aims to provide an independent verification that remedial goals associated with site works have been met and the site is suitable for its ongoing or future uses. The validation report should be prepared by a suitably qualified and experienced environmental consultant.

At the completion of remediation and validation works, a validation report will be prepared in general accordance with the relevant sections of NSW EPA Guidelines for Consultants Reporting on Contaminated Land (NSW EPA, 2020) and other relevant guidance documentation. Staged validation reports may be prepared, where the development has been implemented in a staged manner.

The validation report will include:

- Executive summary
- Scope of work
- Site identification, description of the site and surrounding environment
- Summary of site history
- Summary of ground conditions and contamination issues requiring remediation
- Remediation activities undertaken (including extent and observations of excavation/s, waste documentation and imported fill documentation & details of any capping works (if undertaken))
- Validation sampling and analysis plan (including Methodology)
- Field and laboratory data, and data validation assessment
- Validation assessment
- Ongoing site management requirements
- Conclusions and recommendations
- Figures and photographs

13. Conclusion

The recommended strategy to mitigate risks from asbestos impacted fill is excavation and off-site disposal, with provisions for minor areas of the site to remain undisturbed or subject to encapsulation. Based on the implementation of this RAP, Coffey considers that potential risks from asbestos contamination can be successfully mitigated such that the site can be made suitable for the proposed redevelopments in accordance with SEPP55. Where asbestos impacted fill is retained on site below a Cover Layer, implementation of an Environmental Management Plan would be required to ensure the site remains suitable for its intended use.

This document presents the basis for completing a programme of supplementary investigation to reduce uncertainties associated with the quality of fill material within the site. These investigations must be conducted in advance of the remediation works. The outcome of these investigations shall be used to determine whether modification to this RAP is required.

14. References

- Work Health and Safety Act 2011.
- Work Health and Safety Regulations 2017.
- Australian Standard AS 4482 (2005): Guide to the Investigation and Sampling of Sites with Potentially Contaminated Soils (Parts 1 and 2).
- Australian Standard AS 4964 (2004); Method for the qualitative identification of asbestos in bulk samples.
- Safe Work NSW How to Manage and Control Asbestos in the Workplace Code of Practice 2019.
- Safe Work NSW How to Safely Remove Asbestos Code of Practice 2019.
- Contaminated Land Management Act 1997.
- DUAP/EPA (1998) Managing Land Contamination: State Environmental Planning Policy No 55 Remediation of Land.
- Geological Survey of New South Wales (1983); Geological Series Sheet 9130 - Sydney (1st Edition; Scale 1:100 000).
- Protection of the Environment Operations Act 1997 and associated Regulations.
- NEPC (2013) National Environment Protection (Assessment of Site Contamination) Amendment Measure (ASC NEPM) (No. 1) 1999, as registered 2013, and associated Schedule B guidelines.
- Western Australia, Department of Health Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia (WA DOH, 2009).
- NSW DEC (2006); Guidelines for the NSW Site Auditor Scheme (2nd edition).
- NSW EPA (1995); Sample Design Guidelines.
- NSW EPA (2014) Waste Classification Guidelines.
- NSW EPA (2015); Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997.
- NSW OEH (2012); Excavated Natural Material Exemption.
- NSW EPA, Guidelines for Consultants Reporting on Contaminated Land, 2020 (NSW EPA 2020).
- WA Dept. of Health (June 2011); Recommended Procedures for Laboratory Analysis of Asbestos in Soil.
- Coffey (2021a); Mosman High School: Site Contamination Assessment (Ref: SYDGE233510-R02 Rev.3)
- Coffey (2021b); Mosman High School, Geotechnical Investigation Report (Ref: SYDGE233510-AD, Rev. 1)

Important Information about your Coffey Environmental Report

Important information about your **Coffey** Environmental Report

Introduction

This report has been prepared by Coffey for you, as Coffey's client, in accordance with our agreed purpose, scope, schedule and budget.

The report has been prepared using accepted procedures and practices of the consulting profession at the time it was prepared, and the opinions, recommendations and conclusions set out in the report are made in accordance with generally accepted principles and practices of that profession.

The report is based on information gained from environmental conditions (including assessment of some or all of soil, groundwater, vapour and surface water) and supplemented by reported data of the local area and professional experience. Assessment has been scoped with consideration to industry standards, regulations, guidelines and your specific requirements, including budget and timing. The characterisation of site conditions is an interpretation of information collected during assessment, in accordance with industry practice,

This interpretation is not a complete description of all material on or in the vicinity of the site, due to the inherent variation in spatial and temporal patterns of contaminant presence and impact in the natural environment. Coffey may have also relied on data and other information provided by you and other qualified individuals in preparing this report. Coffey has not verified the accuracy or completeness of such data or information except as otherwise stated in the report. For these reasons the report must be regarded as interpretative, in accordance with industry standards and practice, rather than being a definitive record.

Your report has been written for a specific purpose

Your report has been developed for a specific purpose as agreed by us and applies only to the site or area investigated. Unless otherwise stated in the report, this report cannot be applied to an adjacent site or area, nor can it be used when the nature of the specific purpose changes from that which we agreed.

For each purpose, a tailored approach to the assessment of potential soil and groundwater contamination is required. In most cases, a key objective is to identify, and if possible quantify, risks that both recognised and potential contamination pose in the context of the agreed purpose. Such risks may be financial (for example, clean up costs or constraints on site use) and/or physical (for example, potential health risks to users of the site or the general public).

Limitations of the Report

The work was conducted, and the report has been prepared, in response to an agreed purpose and scope, within time and budgetary constraints, and in reliance on certain data and information made available to Coffey.

The analyses, evaluations, opinions and conclusions presented in this report are based on that purpose and scope, requirements, data or information, and they could change if such requirements or data are inaccurate or incomplete.

This report is valid as of the date of preparation. The condition of the site (including subsurface conditions) and extent or nature of contamination or other environmental hazards can change over time, as a result of either natural processes or human influence. Coffey should be kept appraised of any such events and should be consulted for further investigations if any changes are noted, particularly during construction activities where excavations often reveal subsurface conditions.

In addition, advancements in professional practice regarding contaminated land and changes in applicable statues and/or guidelines may affect the validity of this report. Consequently, the currency of conclusions and recommendations in this report should be verified if you propose to use this report more than 6 months after its date of issue.

The report does not include the evaluation or assessment of potential geotechnical engineering constraints of the site.

Interpretation of factual data

Environmental site assessments identify actual conditions only at those points where samples are taken and on the date collected. Data derived from indirect field measurements, and sometimes other reports on the site, are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact with respect to the report purpose and recommended actions.

Variations in soil and groundwater conditions may occur between test or sample locations and actual conditions may differ from those inferred to exist. No environmental assessment program, no matter how comprehensive, can reveal all subsurface details and anomalies. Similarly, no professional, no matter how well qualified, can reveal what is hidden by earth, rock or changed through time.

The actual interface between different materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but

steps can be taken to reduce the impact of unexpected conditions.

For this reason, parties involved with land acquisition, management and/or redevelopment should retain the services of a suitably qualified and experienced environmental consultant through the development and use of the site to identify variances, conduct additional tests if required, and recommend solutions to unexpected conditions or other unrecognised features encountered on site. Coffey would be pleased to assist with any investigation or advice in such circumstances.

Recommendations in this report

This report assumes, in accordance with industry practice, that the site conditions recognised through discrete sampling are representative of actual conditions throughout the investigation area. Recommendations are based on the resulting interpretation.

Should further data be obtained that differs from the data on which the report recommendations are based (such as through excavation or other additional assessment), then the recommendations would need to be reviewed and may need to be revised.

Report for benefit of client

Unless otherwise agreed between us, the report has been prepared for your benefit and no other party. Other parties should not rely upon the report or the accuracy or completeness of any recommendation and should make their own enquiries and obtain independent advice in relation to such matters.

Coffey assumes no responsibility and will not be liable to any other person or organisation for, or in relation to, any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report.

To avoid misuse of the information presented in your report, we recommend that Coffey be consulted before the report is provided to another party who may not be familiar with the background and the purpose of the report. In particular, an environmental disclosure report for a property vendor may not be suitable for satisfying the needs of that property's purchaser. This report should not be applied for any purpose other than that stated in the report.

Interpretation by other professionals

Costly problems can occur when other professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, a suitably qualified and experienced environmental consultant should be retained to explain the implications of the report to other professionals referring to the report and then review plans and specifications produced to see how other professionals have incorporated the report findings.

Given Coffey prepared the report and has familiarity with the site, Coffey is well placed to provide such assistance. If another party is engaged to interpret the recommendations of the report, there is a risk that the contents of the report may be misinterpreted and Coffey disowns any responsibility for such misinterpretation.

Data should not be separated from the report

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way. Logs, figures, laboratory data, drawings, etc. are customarily included in our reports and are developed by scientists or engineers based on their interpretation of field logs, field testing and laboratory evaluation of samples. This information should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

This report should be reproduced in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties.

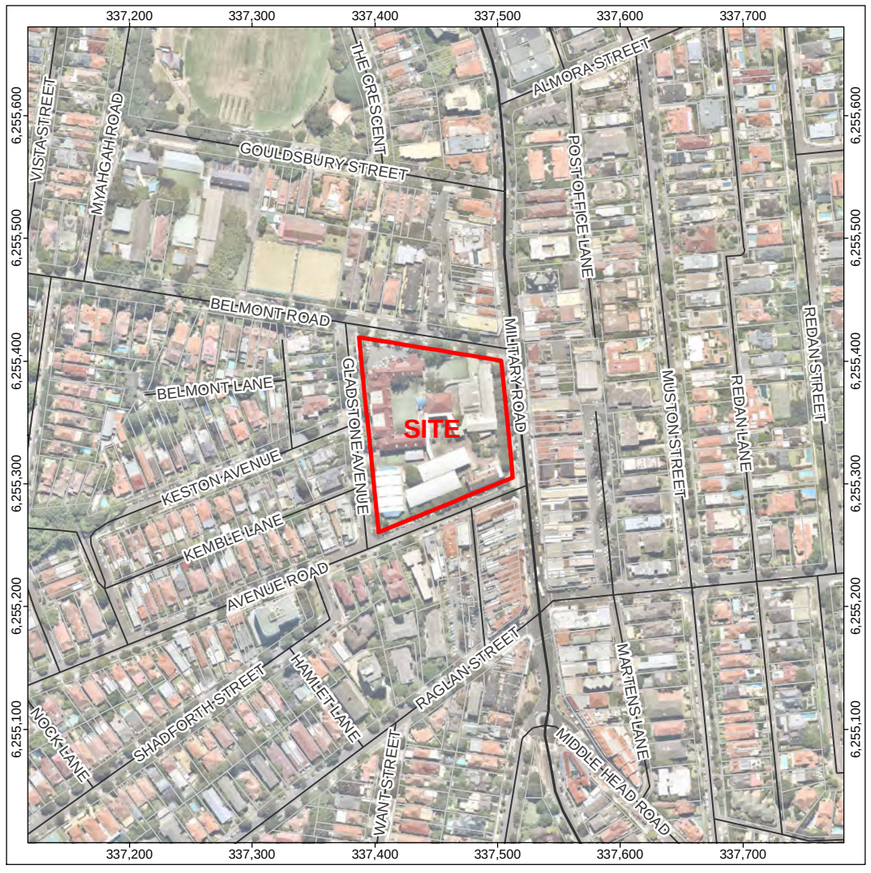
Responsibility

Environmental reporting relies on interpretation of factual information using professional judgement and opinion and has a level of uncertainty attached to it, which is much less exact than other design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. As noted earlier, the recommendations and findings set out in this report should only be regarded as interpretive and should not be taken as accurate and complete information about all environmental media at all depths and locations across the site.

Figures

GENERAL AREA MAP

REGIONAL AREA MAP © ArcGIS Online



LOCAL AREA MAP © Nearmap (capture date 22-10-2019)

LEGEND

- Major road
- Minor road
- Railway
- Watercourse
- Cadastre
- Site boundary

SCALE 1:50,000 (A3) 0 0.5 1 1.5 2 KILOMETRES

SCALE 1:5,000 (A3) 0 50 100 150 200 METRES

SOURCE:
Site boundary from Coffey.
Cadastre, roads, rail and watercourses from NSW LPI.

MXD ref: SYDEN233510_R01_GIS001_v0.2

revision	no.	description	drawn	approved	date
	A	ORIGINAL ISSUE	GH	ML	30.03.21

Projection: GDA 1994 MGA Zone 56

drawn	GH
approved	ML
date	30.03.2021
scale	AS SHOWN
original size	A3

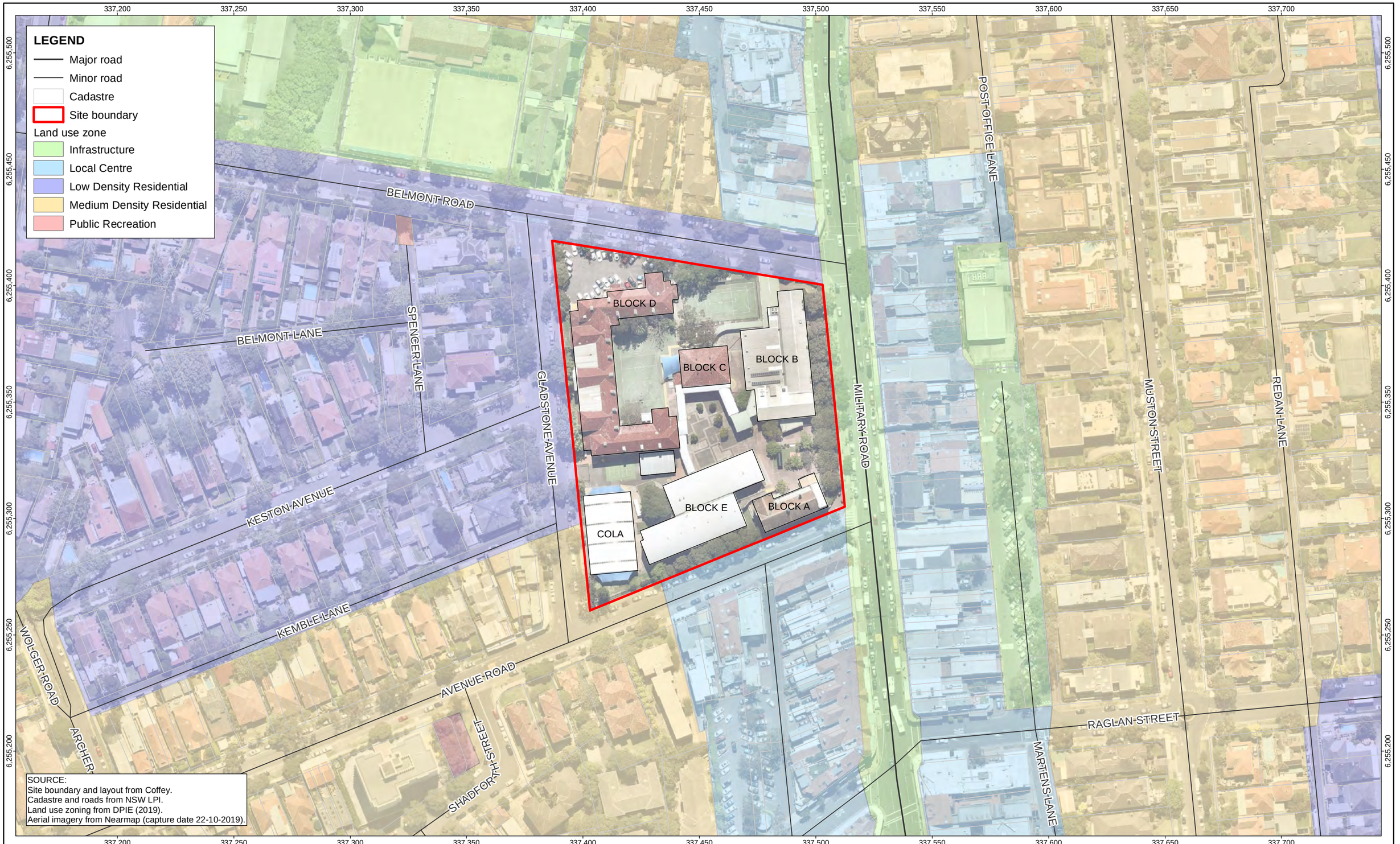
coffey
A TETRA TECH COMPANY

client: DEPARTMENT OF EDUCATION: SCHOOL INFRASTRUCTURE NSW

project: GEOTECHNICAL AND CONTAMINATION ASSESSMENT
MOSMAN HIGH SCHOOL
745 MILITARY ROAD, MOSMAN, NSW

title: SITE LOCALITY

project no: 754-SYDEN233510-R01 | figure no: FIGURE 1 | rev: A



SOURCE:
Site boundary and layout from Coffey.
Cadastre and roads from NSW LPI.
Land use zoning from DPIE (2019).
Aerial imagery from Nearmap (capture date 22-10-2019).

revision no.	description	drawn	approved	date
A	ORIGINAL ISSUE	GH	ML	30.03.21

N

SCALE 1:1,500 (A3) METRES (0, 15, 30, 45, 60)

Projection: GDA 1994 MGA Zone 56

drawn	GH
approved	ML
date	30.03.2021
scale	AS SHOWN
original size	A3

coffey
A TETRA TECH COMPANY

client: DEPARTMENT OF EDUCATION: SCHOOL INFRASTRUCTURE NSW

project: GEOTECHNICAL AND CONTAMINATION ASSESSMENT
MOSMAN HIGH SCHOOL
745 MILITARY ROAD, MOSMAN, NSW

title: SITE LAYOUT AND SURROUNDING LAND USES

project no: 754-SYDEN233510-R01 | figure no: FIGURE 2 | rev: A

MXD ref: SYDEN233510_R01_GIS002_v0.2

SOURCE:
Site boundary, layout and features, and borehole locations from Coffey.
Cadastre and roads from NSW LPI.
Aerial imagery from Nearmap (capture date 22-10-2019).

MXD ref: SYDEN233510_R01_GIS003_v0_3

revision	no.	description	drawn	approved	date
	A	ORIGINAL ISSUE	GH	ML	30.03.21

0 7.5 15 22.5 30
SCALE 1:750 (A3) METRES

Projection: GDA 1994 MGA Zone 56

drawn	GH
approved	ML
date	30.03.2021
scale	AS SHOWN
original size	A3

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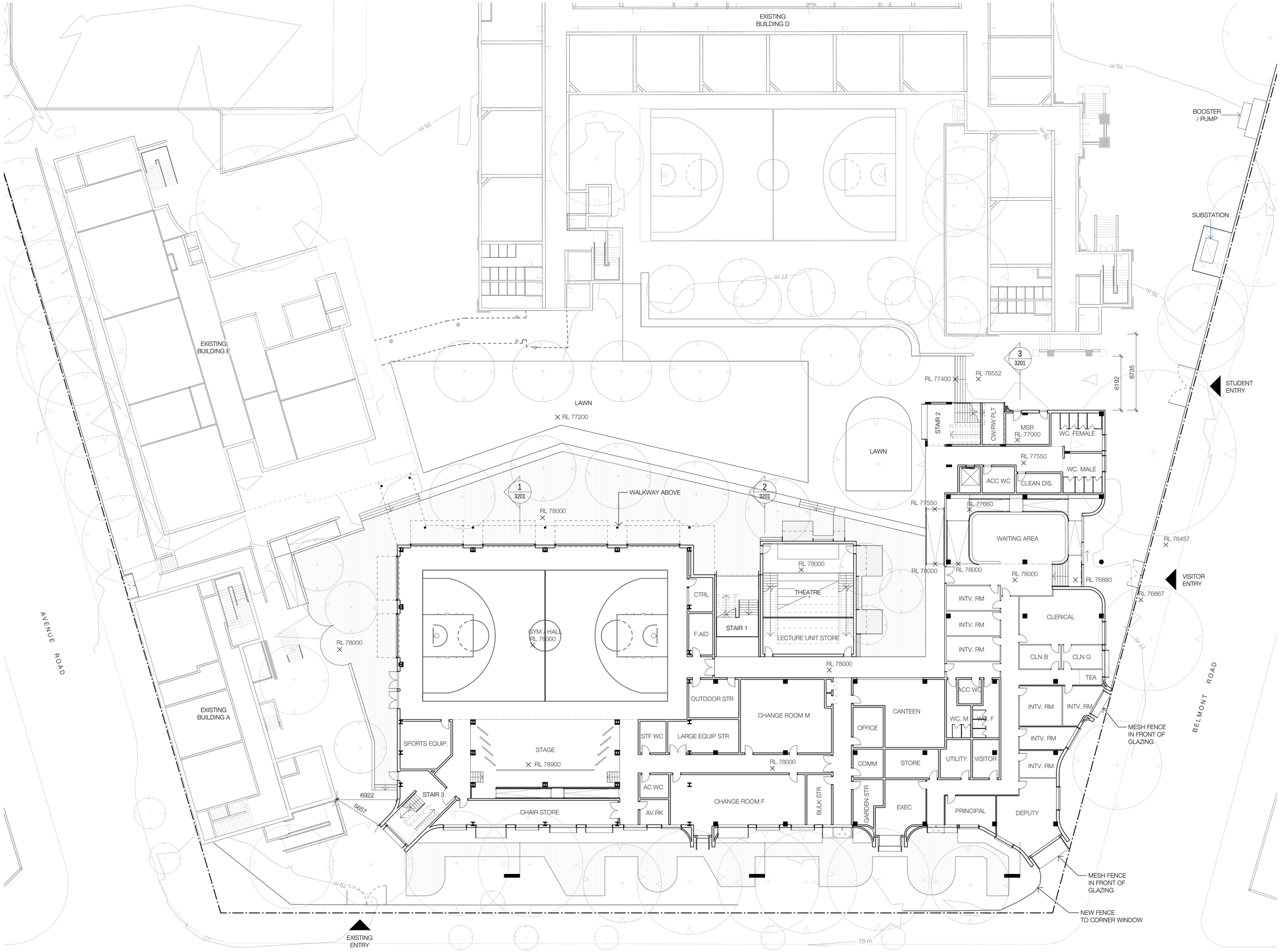
client: DEPARTMENT OF EDUCATION: SCHOOL INFRASTRUCTURE NSW

project: GEOTECHNICAL AND CONTAMINATION ASSESSMENT
MOSMAN HIGH SCHOOL
745 MILITARY ROAD, MOSMAN, NSW

title: SAMPLING LOCATION PLAN

project no: 754-SYDEN233510-R01 | figure no: FIGURE 3 | rev: A

Appendix A - Proposed Development Design Plans



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Sheet size
A1

Scale
1 : 200

Sheet title
GROUND FLOOR PLAN

Sheet number
DA-2201

Revision

Status
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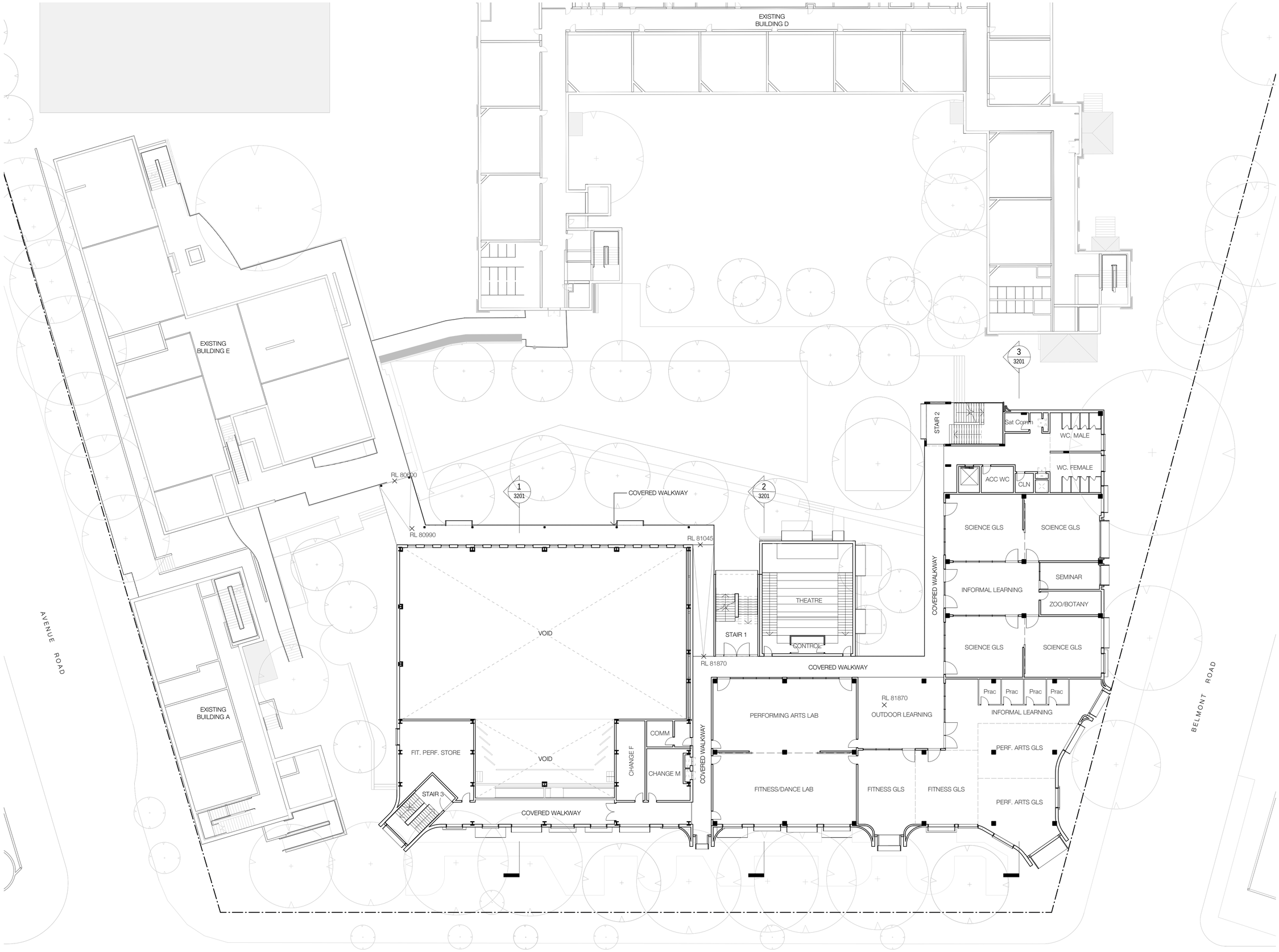

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Sheet title
LEVEL 1 FLOOR PLAN

Sheet number
DA-2202

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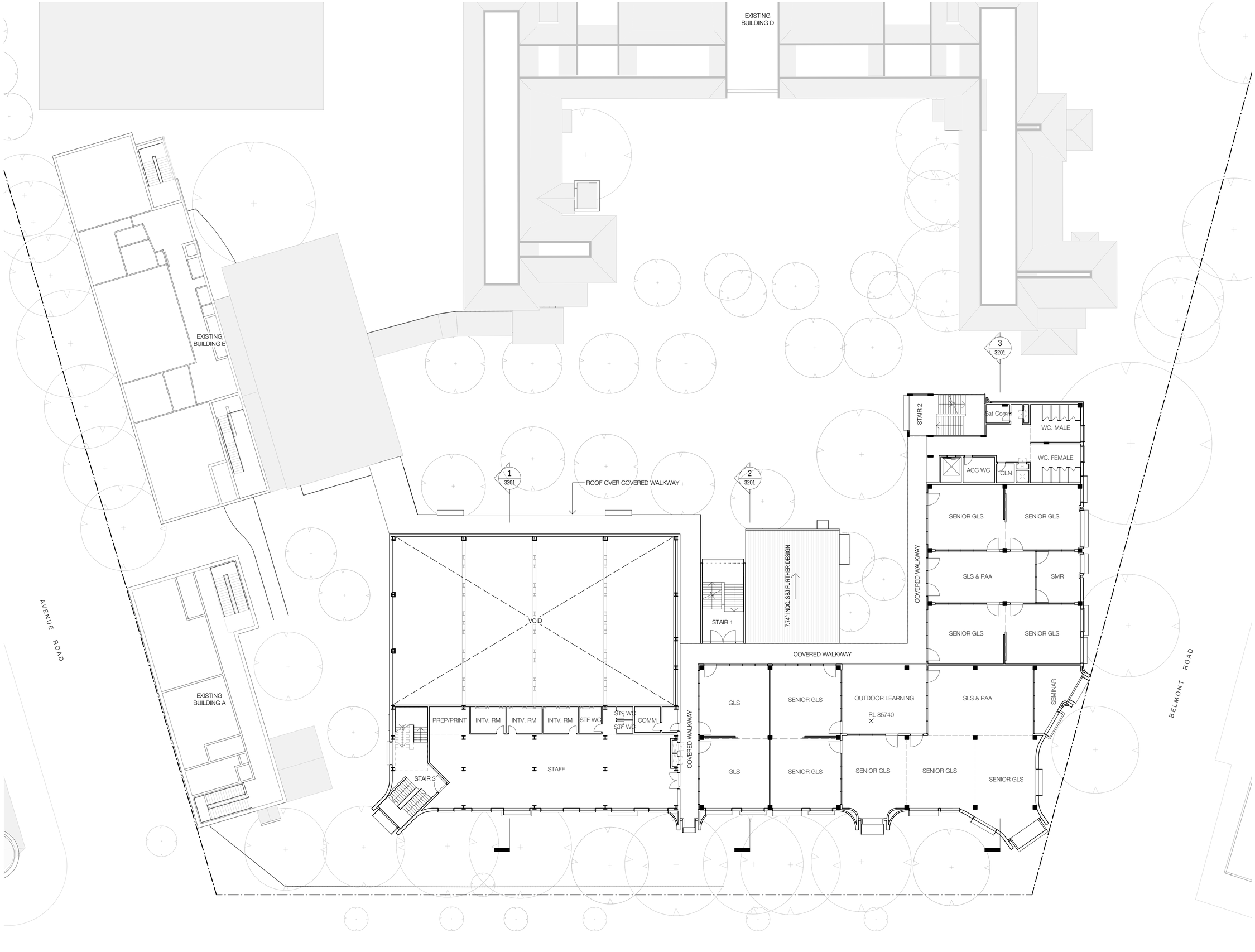

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Sheet title
LEVEL 2 FLOOR PLAN

Sheet number
DA-2203

Revision

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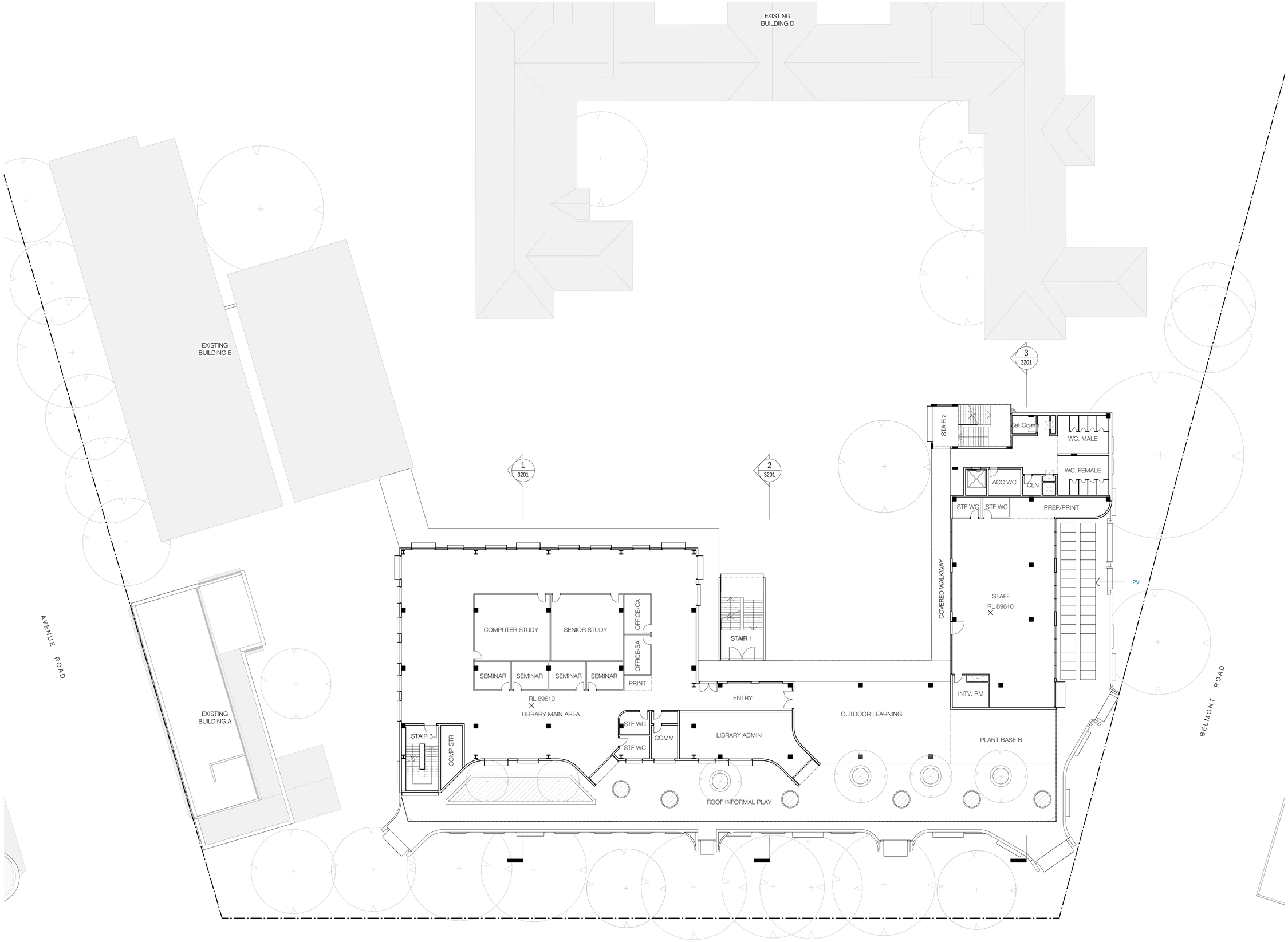

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Sheet title
LEVEL 3 FLOOR PLAN

Sheet number
DA-2204

Revision

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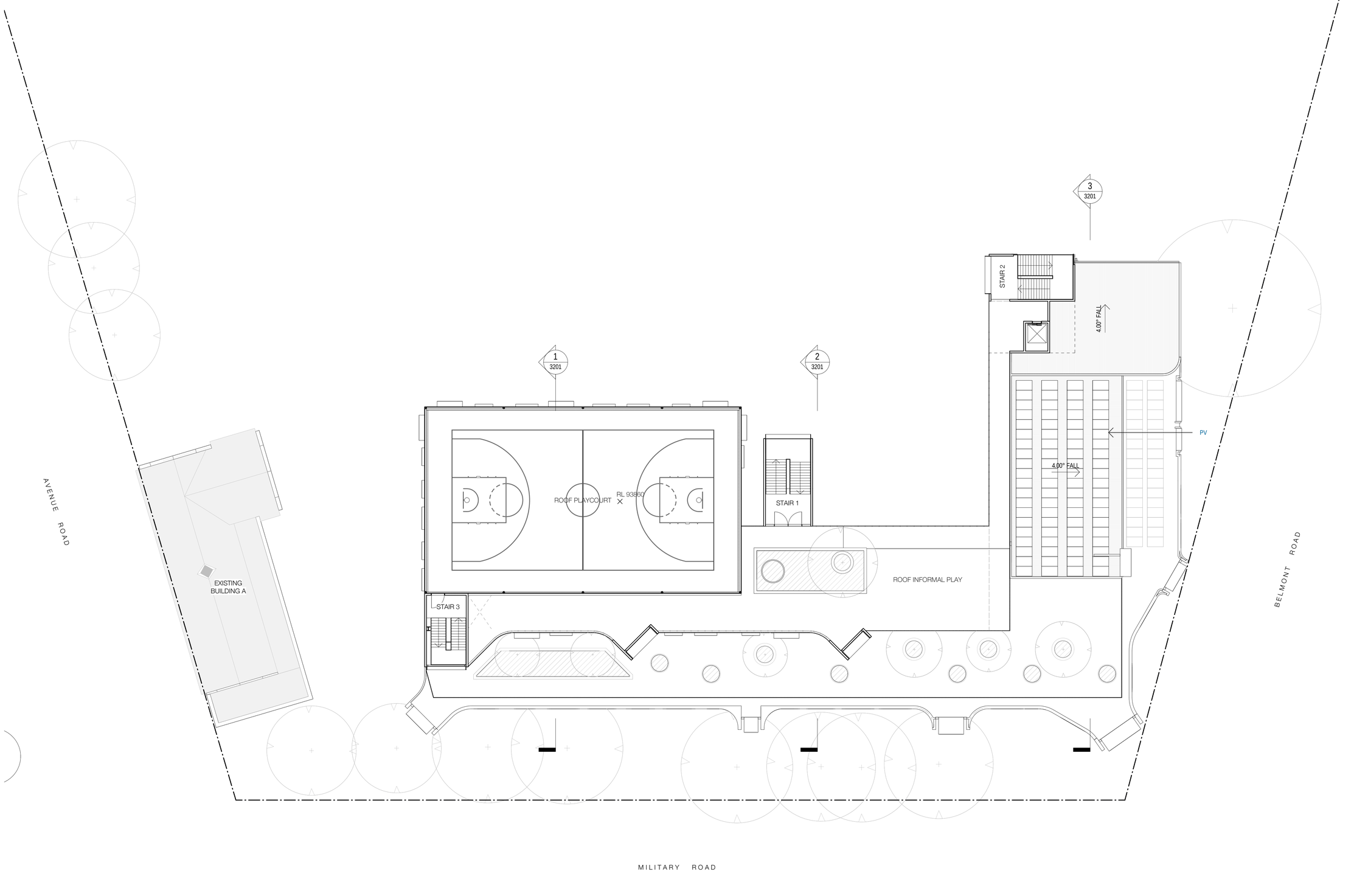

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A1

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1 : 200

Sheet title
LEVEL 4 FLOOR PLAN

Sheet number
DA-2205

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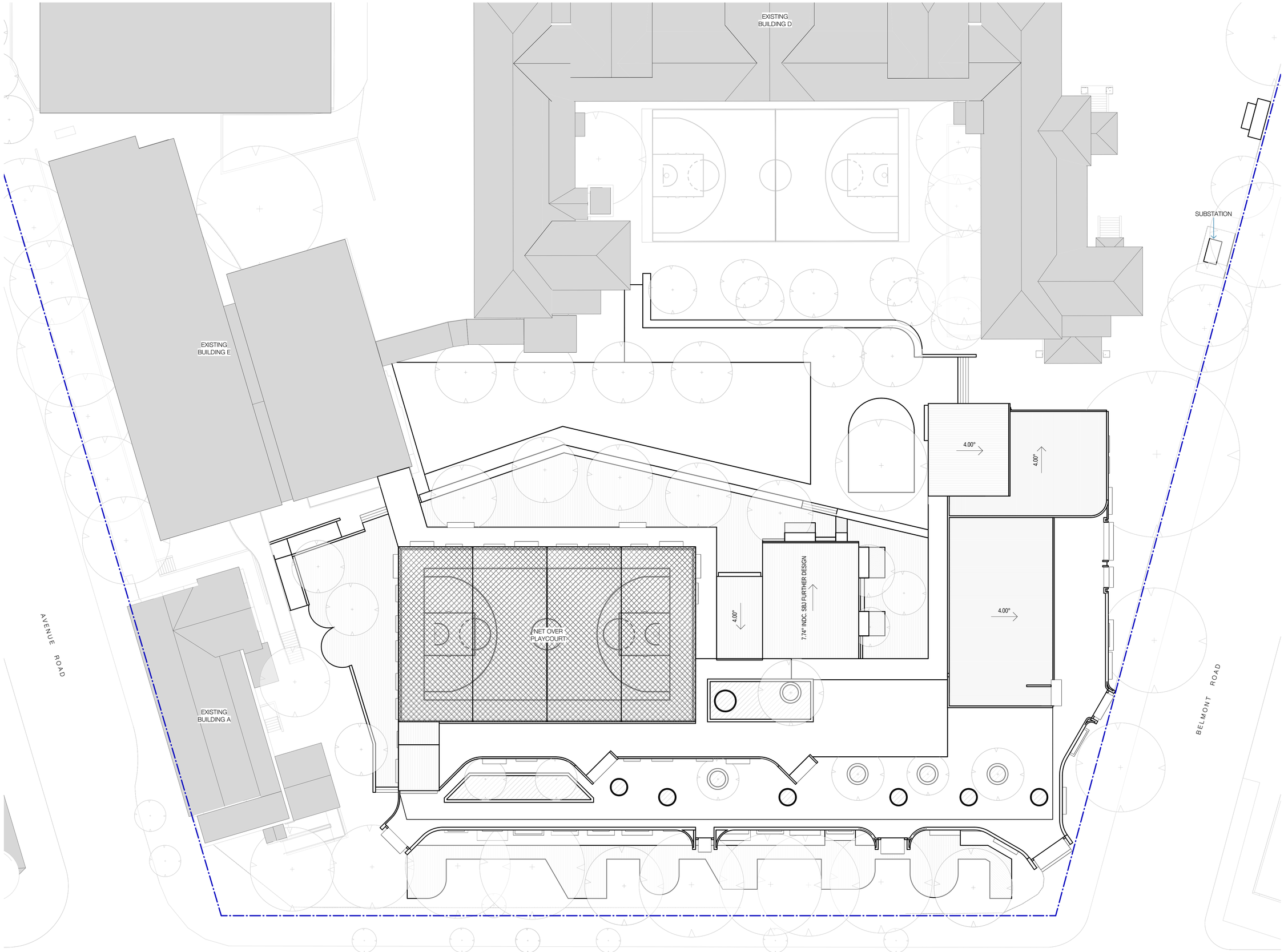

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25mm

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ROOF PLAN

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