RAMBOLL

ENVIRONMENT
& HEALTH

10 July 2020

Department of Education
School Infrastructure NSW
Attn: Mayank Chaturvedi
Level 8, 259 George Street
Sydney NSW 2000

By email: Mayank.chaturvedi@det.nsw.ed.au

Dear Mayank

RE: INTERIM AUDIT ADVICE LETTER NO. 1 - REVIEW OF INVESTIGATIONS, CHATSWOOD HIGH SCHOOL, 24 CENTENNIAL AVENUE, CHATSWOOD NSW

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Ref 318001008

1. INTRODUCTION

As a NSW Environment Protection Authority (EPA) accredited Contaminated Site Auditor, I am conducting an Audit under the *Contaminated Land Management Act 1997* (the CLM Act) in relation to the subject site. This initial Interim Audit Advice (IAA) has been prepared to provide an independent review of the suitability and appropriateness of environmental investigations completed at the site.

The Department of Education intends to undertake upgrades to buildings and facilities at both Chatswood High School and Chatswood Public School including construction of new buildings and refurbishment of existing facilities. Environmental consultant JBS&G Australia Pty Ltd (JBS&G) completed Detailed Site Investigations (DSIs) at both school sites to determine the potential for contamination. A State Significant Development Application (SSDA) was lodged for the proposed development (SSD 9483) that relates to both the public school and the high school. The Audit was requested by Schools Infrastructure NSW (SINSW) to ensure contamination issues have been adequately addressed at the high school. A separate Audit is being completed for the public school.

This interim letter is based on a review of the documents listed below and observations made on a site visit on 24 June 2020, as well as discussions with Johnstaff who are the project manager.

The reports reviewed were:

- 'Preliminary Site (Contamination) Investigation with Limited Sampling, Proposed Redevelopment Chatswood Public School, High School and

Public School "Bush Campus", Chatswood' dated 16 April 2018, Douglas Partners Pty Ltd (Douglas) (*the PSI*).

- 'Chatswood High School, Chatswood Education Precinct, Detailed Site Investigation, 24 Centennial Avenue, Chatswood NSW' dated 1 March 2019, JBS&G (*the DSI*).
- 'Hazardous Building Materials Survey, Chatswood High School, Chatswood Education Precinct, 24 Centennial Avenue, Chatswood NSW' dated 15 March 2019, JBS&G (*the HBMS*).

The DSI and HBMS were included as Appendices to the Geotechnical Report prepared by Pells Sullivan Meynink (PSM) for the public and high school sites dated 18 February 2020. This IAA does not review the adequacy of the PSM Geotechnical Report however, where applicable, information on the site stratigraphy and hydrogeological conditions encountered during the geotechnical investigation have been included.

2. SITE DETAILS

2.1 Location

The site details are as follows:

Street address:	24 Centennial Avenue, Chatswood, NSW 2067 (Attachment 1)
Identifier:	Lot 1 in DP 725204 Lots 20, 21, 22, 23 in Section 6 DP2273 Lots 18, 19, 20, 21 in Section 7 DP2273 Lots 16, 17, 18, 19, 20 in Section 8 DP2273.
Local Government:	Willoughby City Council
Owner:	NSW Department of Education
Site Area:	Approximately 5.9 ha
Zoning:	SP2 Infrastructure (Educational Establishment) E2 Environmental Conservation (south-western corner)

The boundaries of the site are well defined by adjoining streets and properties. A perimeter fence is present with multiple public access gates on the site boundaries.

2.2 Adjacent Uses

The site is located within an area of mixed residential and commercial land uses. The surrounding site use includes:

North: Centennial Avenue with residential land use beyond

East: High density residential apartment blocks with the Pacific Highway and commercial land use further east

South: Eddy Road with low density residential land use beyond

West: Low density residential dwellings border the site to the north-west along Dardanelles Road with De Villiers Avenue forming the southwest boundary with low density residential land use beyond.

Nearby sensitive receptors include adjacent residential properties. The closest surface water receptor is Swaines Creek, approximately 300 m to the west of the site, which flows into Lane Cove River.

Douglas noted in the PSI that 'an area of protected bushland and associated creek' is located to the south of the high school, however, it is unclear which area this relates to as no water course was noted in the south of the site during the site inspection.

2.3 Site Condition

The site is currently an operational high school campus, incorporating a small primary school campus known as the 'Bush Campus' which is utilised by years 3-4 from Chatswood Public School in the eastern portion of the site. The main campus buildings are in the north-western portion of the site with a series of demountable classrooms in the south and east (including the Bush Campus) and a playing field, basketball courts, car park and vegetated land in the south. The playing field and car park are used by the public for recreational purposes. The site layout at the time of the DSI is shown in Attachment 2.

In the DSI, JBS&G noted the following with respect to the site condition:

- The site comprises a rectangular parcel of land of approximately 5.1 hectares, measuring approximately 230 m x 280 m. The site is secured at its perimeter with fencing and multiple access points to the site are provided via locked gates. Two access points are located on the eastern boundary (Oliver Road and Freeman Road), on the northern and north-western boundary of the site (Centennial Avenue), and on the southern boundary of the site via Eddy Road. Vehicular access is also provided via an entrance located southwest of the site on De Villiers Avenue which leads to a car park located in the south-western portion of the site.
- The site generally slopes in a south/south-westerly direction, from Centennial Avenue towards Eddy Road. The site is generally split into two halves, with the northern half of the site containing the majority of buildings and hardstand areas of the site. The southern half of the site largely comprises recreational areas, including a synthetically turfed sports field, basketball courts, an asphalt carpark and a corridor of dense vegetation at the southern boundary of the site – Eddy Rd.
- Concrete and asphalt hardstand covered all ground surfaces between the various buildings and demountables within the northern portion of the site, with purpose-built planter boxes present throughout containing soils, mulch, and plants.
- A fragment of bonded asbestos containing material (ACM) was noted on the ground surface during the DSI near the locations of BH13 (Attachment 4). No other ACM fragments were detected.

The HBMS was completed for the buildings and identified non-friable ACM, friable asbestos containing dust, lead containing dust, lead based paints, synthetic mineral fibres and polychlorinated biphenyls (PCBs) in various buildings on the site. There is no mention in the HBMS of the potential for hazardous building materials to be present in soils outside the buildings. No site-specific asbestos management plan was available for the site. Douglas mention in the PSI that a HBMS completed by them in 2018 identified asbestos cement sheeting debris in subfloor areas of the high school and the Bush Campus. Presumably this refers to areas below the demountables. The Douglas HBMS was not available for review.

The site conditions observed by the Auditor during a site visit on 24 June 2020 were generally consistent with those noted by JBS&G. The Auditor also noted the following:

- The main high school buildings were in the north-western portion of the site. New demountables were being erected to the immediate north of the playing field.
- The majority of the ground surface around permanent buildings comprised concrete or asphalt hardstand. Accessible soils were present along the eastern site boundary, in occasional garden beds between the permanent buildings in the northwest of the site, surrounding the demountables and the vegetated areas in the northeast and south.

- The Bush Campus was separated from the main high school campus by metal fencing with lockable gates. The play area for the primary school students is understood to be within the fenced area and includes a ground level play area.
- The vegetated areas in the northeast and southern portions of the site contained trees and shrubs and were generally accessible by site users, however, the density of ground cover in the south-western portion of the site limited accessibility in this area. A geofabric layer, potentially an erosion control measure, was noted in the vegetated area in the northeast which slopes quite steeply from Centennial Avenue to the demountables.

2.4 Proposed Development

The site is to be redeveloped by SINSW for ongoing use as a high school, incorporating the Bush Campus for primary school children. As shown on Attachment 3, this will involve retention of four buildings to the northwest of the playing field (buildings K, H and M) and one on the northern site boundary (building J), demolition of buildings in the northwest of the site and construction of new buildings in this area and to the north of the playing field. The Bush Campus, playing field, basketball courts and car park are to remain unchanged, as will the vegetated area along the southern site boundary.

The redevelopment is to be undertaken as a staged process. For the purposes of this audit, the 'residential with soil access' land use scenario will be assumed as this is appropriate for primary school use and is relevant to the eastern portion of the site.

3. SITE HISTORY

Douglas undertook a review of the site history in the PSI which was based on aerial photographs, site photographs, NSW EPA records, Council records, school website, SafeWork NSW dangerous goods records and Certificates of Title. The Auditor has summarised the historical site use in Table 3.1.

Table 3.1: Historical Site Use

Date	Activity
Pre 1954	The site was occupied by a large private residential dwelling 'Marrombah' and gardens set in bushland.
1954 to present	The site was acquired for development as a school in 1954. The site was opened in 1959 and developed to the current site layout in the 1960s. A search of Council records identified development applications (DA) for works including construction of a new two-storey learning building in 2005, demolition of a former Industrial Arts block in 2009, replacement of the asphalt courts and turf surface in 2014 and installation of an onsite detention system and resurfacing of the car park in 2017.

The site was not listed on the NSW EPA contaminated land data base however Chatswood Toyota located at 728 Pacific Highway, approximately 200 m northeast of the site, and the former Caltex service station, located at 607 Pacific Highway, approximately 400 m southeast of the site, were listed by the NSW EPA as being regulated. The records for these sites indicated that a notice of completion of approved Voluntary Management Proposal was issued in 2013 for the Toyota site and a notice to end the significantly contaminated land declaration for the service station was issued in 2017. Based on this information, Douglas considered that the two formerly regulated sites were unlikely to present a contamination risk to the site.

The search of the SafeWork NSW records for the storage of hazardous chemical records did not locate any records pertaining to the site.

In the PSI, Douglas reviewed a historical report entitled *'Asbestos assessment of Chatswood High School oval'*, prepared by Parsons Brinckerhoff Australia Pty Ltd (PB) for NSW Public Works, dated April 2015.

This report was not available to the Auditor at the time of completing this IAA. Douglas reported that the PB assessment included a walkover to assess the surface for ACM followed by targeted sampling at three locations to a depth of 0.02 m, and laboratory analysis of soil samples for asbestos using the WA guideline/ NEPM method. Douglas comment that the PB report also indicated that Environmental Investigation Services (EIS) conducted a waste classification of fill material at the oval located at Chatswood High School to a depth of 0.5 metres below ground level (mbgl). This included a preliminary waste classification in May 2014 and a subsequent excavated natural material (ENM) classification letter in September 2014. Three asbestos-containing fibre cement fragments were identified on the soil surface, separate to the borehole investigation. The fill material in the area surrounding the asbestos samples was subsequently classified as General Solid Waste (GSW) with asbestos and all remaining fill material outside the asbestos contaminated areas to a depth of 0.5 mbgl was classified as ENM. Natural soil in the work area was classified as virgin excavated natural material (VENM). EIS's report was not available for review by the Auditor and it is unclear what portion of the site the EIS and subsequent PB reports related to. The purpose and outcome of the PB assessment is also unclear.

Review of historical aerial photography using Near Map imagery was completed by the Auditor and identified that resurfacing of the playing field and basketball courts was completed at the site between January and August 2017. An internet search relating to the works identified a media release suggesting that ACM and asbestos fines or friable asbestos (AF/FA) were encapsulated below the playing field. No further information has been made available at the time of this IAA to assess the potential for asbestos to be present below the playing field area of the site.

Douglas indicated that no information on former construction or demolition of buildings at the site or information on previous filling could be obtained. Despite these data gaps, Douglas considered that sufficient information was available for the site to assess potential contaminants of concern and the contamination risk profile. JBS&G did not refer to the PB report in the DSI or include any comment on the potential for asbestos to be present beneath the playing field.

Further to the site history presented in the DSI, JBS&G undertook a search of the NSW EPA's Per- and Poly- Fluoroalkyl Substances (PFAS) Register and the NSW Fair Trading loose fill asbestos insulation register as part of the DSI. No records pertaining to the site were encountered.

3.1 Auditor's Opinion

While the main historical site uses are adequately known, there are data gaps in relation to the potential for filling to have occurred at the site and in particular the potential for asbestos impacted soils to be retained below the playing field. The Auditor has requested additional information in relation to the redevelopment of the playing field in 2017. This information is required to assess the level of risk (if any) related to potential soil contamination in this portion of the site. The PSI and DSI provide information on the soil contamination status in areas of the site other than the playing fields which is assessed in this IAA.

The Auditor considers the most significant potential for contamination at the site is associated with filling activities and hazardous building materials in soils from demolition of former site structures.

4. CONTAMINANTS OF CONCERN

JBS&G provided a list of the contaminants of concern and potentially contaminating activities in the DSI. These have been tabulated by the Auditor in Table 4.1.

Table 4.1: Contaminants of Concern

Activity	Potential Contaminants
Filling – Imported and/or reworked fill materials used to create site levels (comprising material of unknown character and/or origin)	Heavy metals, total recoverable hydrocarbons (TRH), benzene toluene ethylbenzene and xylenes (BTEX), polycyclic aromatic hydrocarbons (PAH), PCBs, organochlorine pesticides (OCP), organophosphate pesticides (OPP) and asbestos
Demolition of former site structures - The demolition of former structures at the site prior to and during the various stages of redevelopment may have resulted in cross-contamination to underlying and surrounding soils.	Heavy metals, TRH/BTEX, PAHs, PCBs, asbestos

Douglas identified similar activities and contaminants of concern in the PSI and included analysis of phenols in the analytical suite.

4.1 Auditor's Opinion

Volatile organic compounds (VOCs) were identified as potential contaminants of concern by Douglas in relation to off-site sources (the Caltex service station and Toyota dealership) however were not specifically assessed. Based on the results of the PSI and DSI, the Auditor considers that the analyte list used for the investigations was adequate to identify significant impact by these potential contaminants, and adequately reflects the site history and condition.

There has been no assessment by the consultants for the presence of PFAS, but in the Auditor's opinion there are no indications in the site history that they would be potential contaminants of concern.

5. STRATIGRAPHY AND HYDROGEOLOGY

5.1 Stratigraphy

Based on the reviewed geological maps, Douglas and JBS&G both reported that the site is underlain by dark grey to black Ashfield Shale of the Wianamatta Group which weathers to a residual clay profile.

Douglas undertook 15 boreholes (BH1-BH15) to a maximum depth of 3.0 mbgl and JBS&G undertook 30 boreholes (BH01-BH30) to a maximum depth of 2.8 mbgl. The combined sample locations are shown in Attachment 4. In addition, PSM undertook 28 boreholes for geotechnical purposes to a maximum depth of 11.5 mbgl. The geotechnical bore locations are shown on Attachment 5. The sub-surface profile encountered is summarised by the Auditor in Table 5.1.

Table 5.1: Stratigraphy

Depth (mbgl)	Subsurface Profile
0.0 – 2.1	Fill material comprising grey or brown gravelly silty sand, sandy silt or silty clay with minor anthropogenic inclusions of concrete, brick, glass, ash, geofabric and metal in some locations. JBS&G identified fill at all but one of their 30 locations. Douglas report in the PSI that the fill encountered was predominantly silty clay and '*was observed to have similar classification to the natural clay present at the site*'. The logs included in the PSM geotechnical report did not identify fill material at any of the 28 locations but described near surface soils as silty clay or gravelly sand and several had a comment that the material was 'inferred fill'. Fill was generally recorded to depths of between 0.3 and 1.0 mbgl. The deepest fill was encountered by DP at BH10 but it was noted on the log that the material could be natural.
0.0 to depth	Natural silty clay was encountered beneath the fill material and generally extended to termination depths of the boreholes or to the underlying bedrock. Shale bedrock was encountered underlying the natural clays.

mbgl – metres below ground level

Bore logs indicate that seven of the 45 bores were terminated in fill material. These included Douglas locations BH14 and BH15, located in the Bush Campus area at depths of 0.3 m and 0.6 m respectively in gravel fill and BH19 at a depth of 0.5 m in fill at what was inferred to be the interface with bedrock. JBS&G locations BH02, BH07, BH12 and BH29 were also terminated in fill at depths of 0.3, 1.0, 1.5 and 0.8 mbgl respectively.

Based on a review of acid sulfate soil (ASS) risks maps, Douglas and JBS&G indicated that the site is in an area of non-occurrence of ASS. Douglas indicated that ASS are not likely to be present at the site while JBS&G indicated that based on observations made during the DSI, no indicators of ASS were observed.

5.2 Hydrogeology

Douglas undertook a search for registered bores in February 2018. Two bores were identified within a 500 m radius of the site, approximately 450 m east of the site at Chatswood Oval. The bores were installed into clay, shale and sandstone in 1967 and 2005 for recreational purposes and have drill depths of 21.6 and 162.6 mbgl respectively. The standing water level was reported at 25.6 mbgl in one bore. The Auditor also undertook a search of registered bores in June 2020. The same two bores were identified.

Intrusive groundwater investigations have not been undertaken at the site and the depth to groundwater over the site is not known. Groundwater was not encountered during the intrusive investigations which extended to a maximum depth of 11.5 mbgl. Based on the reported geology and surrounding topography, JBS&G indicated that the direction of groundwater flow would be to the west towards the Lane Cove River.

5.3 Auditor's Opinion

The Auditor considers that the stratigraphy is sufficiently well known for the purpose of assessing the contamination status of fill materials in accessible portions of the site. Further investigation to characterise fill material is not considered necessary prior to demolition and redevelopment, however, as noted in Section 3 and discussed further in Section 8, the potential for asbestos impacted soils to be present beneath the playing field requires further assessment through review of available documentation.

Intrusive groundwater investigations were not undertaken at the site. The site history does not indicate the presence of point source contamination that would be likely to cause groundwater contamination that would present a risk to future site occupants. The Auditor considers that the shallow formation underlying the site is of low permeability and therefore the potential for significant groundwater contamination or migration of contamination is low and therefore the absence of intrusive groundwater investigation is acceptable.

6. EVALUATION OF QUALITY ASSURANCE AND QUALITY CONTROL

The data sources are summarised in Table 6.1.

Table 6.1: Summary of Investigations

Investigations	Field Investigations	Analytical Data Obtained
Preliminary Site Investigation (Douglas, 2018) *Fieldwork date: January 2018*	15 boreholes (BH1 to BH15) were located in accessible areas of the high school site including three in the Bush Campus (BH13-BH15) to provide site coverage.	18 soil samples: Metals, TRH/BTEXN, PAHs, total phenols, OCP, OPP, PCB 16 soil samples: asbestos (presence/absence)

Investigations	Field Investigations	Analytical Data Obtained
Detailed Site Investigation (JBS&G, 2019) *Fieldwork date: January 2019*	30 boreholes (BH01 to BH30) in accessible areas of the site to provide site coverage.	30 soil samples: Metals, PAH and asbestos (500 mL % w/w) 5 soil samples: TRH/BTEX, OCP, chlorinated benzenes 2 soil samples: PCBs

The Auditor has assessed the overall quality of the data by review of the information presented in the referenced reports, supplemented by field observations. The Auditor's assessment follows in Tables 6.2 and 6.3.

Table 6.2: QA/QC – Sampling and Analysis Methodology Assessment

Sampling and Analysis Plan and Sampling Methodology	Auditor's Opinion
Data Quality Objectives (DQO) Douglas and JBS&G defined specific DQOs in accordance with the seven-step process outlined in Schedule B2 of NEPM (2013). The following decisions were identified in the DQOs for the DSI: • Are there any unacceptable risks to likely future on-site receptors? • Are there any issues relating to background soil concentrations that exceed appropriate site soil criteria? • Are there any impacts of chemical mixtures? • Are there any aesthetic issues at the site? • Is there any evidence of, or potential for, migration of contaminants from the site? • Is a site management strategy required?	The identified DQOs were considered appropriate for the investigations conducted.
Sampling pattern and locations Investigation locations were spaced within accessible areas to gain coverage of the majority of the site. The various fill materials at the site were targeted for sampling with natural soils also sampled but at a lower frequency.	There are spatial soil sampling data gaps under building footprints however the majority of these building footprints will remain or be covered/capped as part of the development. In the Auditor's opinion, the lack of investigation locations inside the building footprints is not considered significant as the investigation locations target the likely primary source of contamination at the site (fill material). Sample were not collected from below the playing field and there is uncertainty regarding the potential for ACM to be present in this portion of the site (see Section 3.1 above). Development of this area is not proposed and it will remain capped by the synthetic playing field surface.
Sampling density and depth The combined (Douglas and JBS&G) sampling density of 45 locations over approximately 5.2 ha (if the area of the playing fields, 0.7 ha, is excluded) is less than the minimum density of 55 locations recommended by EPA (1995) *Sampling Design Guidelines*. The majority of soil samples were analysed for PAH, TRH, BTEX, metals and asbestos with around half of the samples analysed for PCBs, OCP, OPP and phenols. Samples were collected from a range of depths, with the primary intervals being within the shallow fill (0-0.15 mbgl) directly beneath pavements, at 0.5 mbgl	The density of sample locations is considered acceptable given that the playing field and building footprints are excluded and the extent of accessible areas for sampling is restricted. The assessment of soil condition below the playing field and the building footprints is addressed in Section 9. Lower densities of analysis for PCBs, OCP, OPP and phenols are considered acceptable based on the absence of detections (refer Section 8). In the Auditor's opinion the sampling density was acceptable to characterise the fill material in areas outside of the playing field. Natural soils were not analysed, with the exception of one shale sample from BH22. Natural soils have therefore not been characterised at the site, however, given the low

Sampling and Analysis Plan and Sampling Methodology	Auditor's Opinion
and then at 0.5 m intervals to the termination depths of the borehole at around the fill/natural interface. Samples analysed were all collected from within the fill unit (with the exception of one shale sample from BH22).	concentrations of contaminants detected in fill material (see Section 8) and the lack of any subsurface sources of contamination, the potential for natural soil below the fill material to be impacted by contamination is considered low.
Sample collection method Sample collection was via solid stem auger and hand auger. Soils were collected from the auger flights. It has not been specified whether the external material was removed prior to collecting the sample. The asbestos analysis completed during the PSI was for the presence/absence of asbestos in small volume soil samples from boreholes. During the DSI, 500 mL samples were collected for laboratory analysis for asbestos fines/ fibrous asbestos (AF/FA). Field quantification of asbestos (10 L samples) was not undertaken, therefore the asbestos quantification was not in accordance with the methodology outlined in NEPM (2013) (Schedule B1).	Sample collection from the auger flights is not ideal as it can result in loss of volatiles and sample cross contamination, however, based on the absence of potential sources of these contaminants and the low concentrations reported, the sampling method is not considered to have had a significant impact on the data set. Assessment of asbestos contamination was completed on soil samples of limited volume from soil bores which allows limited visual inspection for potential ACM. There is the potential therefore that unidentified asbestos in soil may be present. This will be addressed through the redevelopment process through implementation of an unexpected finds protocol.
Decontamination procedures Decontamination procedures were not specified by Douglas however a rinsate sample was obtained during the PSI sampling event. JBS&G indicated in the DSI that sampling equipment (augers) were cleaned via brushing and rinsing between sampling events to prevent cross contamination. New gloves were reportedly used by Douglas and JBS&G for each new sample.	Although not clearly documented, it is not expected that the potential lack of decontamination will adversely impact the reliability or usability of the data.
Sample handling and containers Samples were placed into prepared and preserved sampling containers provided by the laboratory and chilled during storage and subsequent transport to the labs. Samples for asbestos analysis obtained during the DSI were placed in plastic zip-lock bags. Asbestos analysis of the Douglas samples was performed from glass jars which were sub-sampled by the laboratory.	Acceptable.
Chain of Custody (COC) Completed COC forms were provided in the reports.	Acceptable.
Detailed description of field screening protocols Field screening of samples was not undertaken by Douglas. Field screening for volatiles was undertaken by JBS&G using a photoionisation detector (PID). Soil sub-samples were placed in ziplock plastic bags and the headspace measured for VOCs after allowing time for equilibration.	In the Auditor's opinion, the absence of field screening data for the PSI soil sampling event does not impact on the completeness of the data.
Calibration of field equipment JBS&G indicated that calibration of the PID had been undertaken prior to use and checks were performed during use. Calibration certificates from the equipment supplier were provided by JBS&G as were the field calibration records.	Acceptable.
Sampling logs Soil logs are provided within the reports, indicating sample depth, PID readings and lithology. The logs report no indications of contamination (odours or staining) were encountered.	Acceptable.

Table 6.3: QA/QC – Field and Lab Quality Assurance and Quality Control

Field and Lab QA/QC	Auditor's Opinion
Field quality control samples Field quality control samples including trip blanks, trip spikes, rinsate blanks, field intra-laboratory and inter-laboratory duplicates were undertaken for the soil sampling event completed by Douglas during the PSI. Field intra-laboratory and inter-laboratory duplicates and a rinsate blank were undertaken for the soil sampling event completed by JBS&G during the DSI, however, no trip blanks or trip spikes were analysed as part of the DSI. JBS&G noted that all sample handling procedures, including the transfer and storage of samples into chilled eskies were adhered to prior to and during shipment to the laboratory. JBS&G did not consider the omission to adversely affect the representativeness of the data set.	Acceptable.
Field quality control results The results of field quality control samples were generally within appropriate limits. The following exceptions were noted: • Exceedance of the relative percent difference (RPD) limits for metals and PAHs for both the intra- and inter-laboratory soil duplicates analysed during the PSI. Douglas indicated that the exceedances were not significant as the recorded concentrations were generally close to the detection limit, were heterogenous and had typically low actual differences. • JBS&G did not tabulate individual RPDs in the DSI but did comment that high RPDs in the duplicate samples can be expected when materials are heterogeneous and/or when analyte concentrations are close to limit of reporting (LOR). JBS&G considered elevated RPDs for both intra-laboratory and inter-laboratory duplicates were acceptable on the basis that the reported concentrations were typically within 10 times the LOR. As a conservative measure, JBS&G adopted the highest values in the interpretation of data. • Low concentrations of DDT (0.0001 mg/L for DDT+DDE+DDD (Total) and 4.4'-DDT) were detected within the rinsate sample collected by JBS&G on 23 January 2019 during the DSI. JBS&G noted that no pesticides were reported within soils at any of the sample locations and therefore the potential false positive is not considered to significantly impact upon the data set.	Overall, in the context of the dataset reported, the elevated RPD results and detections of pesticides in the rinsate are not considered significant and the field quality control results are acceptable.
NATA registered laboratory and NATA endorsed methods Douglas used Envirolab as the primary laboratory during the DSI and Eurofins | mgt was the secondary laboratory. Eurofins | mgt was the primary laboratory used by JBS&G during the DSI and Envirolab was the secondary laboratory. Laboratory certificates were NATA stamped. Analysis for asbestos in accordance with NEPM (2013) is not NATA accredited.	Acceptable
Analytical methods Analytical methods were included in the laboratory test certificates. Both laboratories provided brief method summaries of in-house NATA accredited methods used based on USEPA and/or APHA methods (excluding asbestos) for extraction and analysis in accordance with the NEPM (2013). Asbestos identification was conducted using polarised light microscopy with dispersion staining by method AS4964-2004 *Method for the Qualitative Identification of Asbestos Bulk Samples*.	The analytical methods are considered acceptable for the purposes of the site audit, noting that the AS4964-2004 is currently the only available method in Australia for analysing asbestos.
Holding times Review of the COCs and laboratory certificates indicate that the holding times were met. Douglas and JBS&G also reported that holding times have been met.	Acceptable

Field and Lab QA/QC	Auditor's Opinion
Practical Quantitation Limits (PQLs) *Soil:* PQLs (except asbestos) were less than the threshold criteria for the contaminants of concern. *Asbestos:* The limit of detection for asbestos in soil was 0.01% w/w although NEPM (2013) analyses were reported to 0.001% w/w for AF/FA based on a larger volume of soil assessed.	*Soil (except asbestos):* Overall the soil PQLs are acceptable. *Asbestos:* In the absence of any other validated analytical method, the detection limit for asbestos is considered acceptable. A positive result would be considered to exceed the *"no asbestos detected in soil"* criteria.
Laboratory quality control samples Laboratory quality control samples including laboratory control samples, matrix spikes, surrogate spikes, blanks, internal standards and duplicates were undertaken by the laboratories.	Acceptable
Laboratory quality control results The results of laboratory quality control samples were generally within appropriate limits, however, JBS&G reported matrix spike recoveries outside the limits for benzene and toluene during the DSI. The results were considered acceptable as an acceptable recovery was obtained from the laboratory control sample.	The matrix spike recoveries outside limits are not considered to affect the usability of the data and the laboratory quality control results are acceptable.
Data Quality Indicators (DQI) and Data Evaluation (completeness, comparability, representativeness, precision, accuracy) Predetermined data quality indicators (DQIs) were set for laboratory analyses including blanks, replicates, duplicates, laboratory control samples, matrix spikes, surrogate spikes and internal standards. These were discussed with regard to the five category areas by Douglas and JBS&G. The DSI concluded that "*The field sampling and handling procedures across the site produced QA/QC results which indicate that data collected is of an acceptable quality for the DSI objectives.* *The NATA certified laboratory reports indicate that the project laboratories were achieving levels of performance within their recommended control limits during the period when the samples from this program were analysed.* *On the basis of the results of the field and laboratory QA/QC program, the soil data are of an acceptable quality upon which to draw conclusions regarding the environmental condition of the site."*	An assessment of the data quality with respect to the five category areas has been undertaken by the Auditor and is summarised below.

6.1 Auditor's Opinion

In considering the data as a whole, the Auditor concludes that:

- The data is likely to be adequately representative of fill material present at the site outside of the playing field and building footprints.
- The data is considered to be adequately complete.
- There is a high degree of confidence that data is comparable for each sampling and analytical event.
- The primary laboratory provided sufficient information to conclude that data is of sufficient precision.
- While most of the data is likely to be accurate, there is some doubt regarding potential for asbestos to be present in fill based on the small volume samples obtained.

7. ENVIRONMENTAL QUALITY CRITERIA

The Auditor has assessed the results against Tier 1 criteria from National Environmental Protection Council (NEPC) *National Environmental Protection (Assessment of Site Contamination) Measure 1999*, as Amended 2013 (NEPM, 2013). Other guidance has been adopted where NEPM (2013) is not applicable or criteria are not provided. Based on the proposed development being a high school that includes a primary school campus, the human health criteria for 'residential with accessible soil' and ecological criteria appropriate for 'urban residential and public open space' were adopted for the initial screening.

7.1 Soil Assessment Criteria

Human Health Assessment Criteria

The Auditor has adopted human health assessment criteria from the following sources:

- NEPM (2013) Health Investigation Levels (HILs) for 'Residential' (HIL-A) land use.
- NEPM (2013) Health Screening Levels (HSLs) for 'Low-High Density Residential' (HSL-A&B) land use assuming sand soil type. Depth to source adopted was <1 m as an initial screen.
- NEPM (2013) Management Limits (MLs) for petroleum hydrocarbons for 'Residential and Open Space' land use and assuming coarse soil texture.
- NEPM (2013) HSLs for Asbestos Contamination in Soil for 'Residential A' (HSL-A) land use for asbestos fines/fibrous asbestos (AF/FA) in 500 mL samples and 'no asbestos detected' for presence/absence samples.
- Friebel & Nadebaum (2011) HSLs for direct contact for all land use categories, and vapour inhalation/direct contact pathways for intrusive maintenance workers.

Ecological Assessment Criteria

The Auditor has adopted ecological soil assessment criteria from the following sources:

- NEPM (2013) Ecological Screening Levels (ESLs) for 'Urban Residential and Public Open Space' land use, assuming coarse soil.
- NEPM (2013) Ecological Investigation Levels (EILs) for 'Urban Residential and Public Open Space' land use. In the absence of site-specific soil data on pH, clay content, cation exchange capacity and background concentrations, the published range of the added contaminant limits (ACL) have been applied as an initial screen.
- Canadian Council of Ministers of the Environment (CCME) (2010) *Canadian soil quality guidelines: carcinogenic and other polycyclic aromatic hydrocarbons (PAHs)* soil quality guideline (SQG) for benzo(a)pyrene for 'Residential' land use. The SQG has been adopted in place of the NEPM (2013) ESL as it is based on a larger and more up-to-date toxicity database than the low reliability NEPM (2013) ESL.

Soil Aesthetic Considerations

The Auditor has considered the need for soil remediation based on 'aesthetic' contamination as outlined in *Section 3.6 Aesthetic Considerations* of NEPM (2013) Schedule B1, which acknowledges that there are no chemical-specific numerical aesthetic guidelines. Instead, site assessment requires a balanced consideration of the quantity, type and distribution of foreign material or odours in relation to the specific land use and its sensitivity.

7.2 Auditor's Opinion

The environmental quality criteria referenced by the Auditor are consistent with those adopted by Douglas and JBS&G, with the exception of the following:

- Douglas calculated site specific EILs using input parameters of aged soil, average CEC of 5 for coarse soil and 20 for fine soil (considered to be conservative), average pH of 4.96 (based of Douglas geotechnical testing at the site), carbon content of 1% (considered to be conservative), clay content of 2% for coarse soil and 40% for fine soil and high for traffic volumes. These numbers were continued in the DSI by JBS&G.

Given the results obtained, the Auditor considers that these discrepancies do not affect the overall conclusions reached by the consultants and the Auditor.

8. EVALUATION OF SOIL RESULTS

As outlined in Table 6.1, Douglas undertook a PSI including the drilling of 15 boreholes in accessible areas of the site. JBS&G undertook a DSI at the site which included the drilling of 30 boreholes in accessible areas of the site to increase the site coverage. Douglas and JBS&G soil sampling locations are shown as Attachment 4. The following sections outline the soil field and analytical results for the PSI and DSI investigations.

8.1 Field Results

The PSI and DSI identified anthropogenic material (including concrete, brick, ash, geofabric, glass, metal and plastic) in some fill samples. No odours or staining were noted during the field investigations. PID readings were not reported for the PSI however readings encountered during the DSI ranged from 0 ppm to 9.8 ppm (BH04).

One fragment of bonded ACM was identified on the ground surface during the DSI near JBS&G bore location BH13 in the north-western portion of the site, in the location of the demountables. The sample was removed from the site and confirmed by the laboratory to contain chrysotile and amosite asbestos. No other ACM was reported to have been observed on the site surface during the PSI or DSI.

8.2 Analytical Results

Fill soil samples were analysed for a variety of contaminants and the results have been assessed against the environmental quality criteria outlined in Section 7. The Auditor has summarised the fill analytical results in Table 8.1. One natural (shale) soil sample was analysed for asbestos, PAH and metals with no detections of asbestos or PAH and no elevated concentrations of metals detected.

Table 8.1: Evaluation of Fill Analytical Results – Summary Table (mg/kg)

Analyte	n	Detections	Maximum	n > Human Health Screening Criteria	n > Terrestrial Ecological Screening Criteria
AF/FA (500 mL samples)	30	0	<PQL	0 above HSL 0.001%	-
Asbestos in soil	16	0	<PQL	0 above 0.1 g/kg	-
BTEX	23	0	<PQL	0 above HSL A&B 0-1 m, sand	0 above ESL (urban residential) (coarse)
F1 (TRH C_6–C_{10} minus BTEX)	23	0	<PQL	0 above HSL A&B 0-1 m, sand 45 mg/kg	0 above ESL (urban residential) 180 mg/kg
F2 (TRH >C_{10}–C_{16} minus naphthalene)	23	0	<PQL	0 above HSL A&B 0-1 m, sand 110 mg/kg	-
TRH >C_{16}-C_{34}	23	7	**600**	0 above ML (urban residential) 2500 mg/kg	**4 above ESL 300 mg/kg**
TRH >C_{34}-C_{40}	23	5	800	0 above ML (urban residential) 10,000 mg/kg	0 above ESL 2800 mg/kg

Analyte	n	Detections	Maximum	n > Human Health Screening Criteria	n > Terrestrial Ecological Screening Criteria
Naphthalene	48	1	0.2	0 above HSL A&B 0-1 m, sand 3 mg/kg	0 above EIL (urban residential) 170 mg/kg
Hexachlorobenzene	5	0	<PQL	0 above HIL A 10 mg/kg	-
Benzo(a)pyrene	48	9	3.9	-	0 above CCME SQG (residential) 20 mg/kg
Benzo(a)pyrene TEQ	48	5	**5.4**	**2 above HIL A 3 mg/kg (BH11_0.0-0.1 and BH13_0.0-0.1)**	-
Total PAHs	48	8	46	0 above HIL A 300 mg/kg	-
Total Phenols	18	0	<PQL	0 above HIL A 3000 mg/kg	-
Arsenic	48	45	17	0 above HIL A 100 mg/kg	0 above EIL (urban residential) 100 mg/kg
Cadmium	48	1	1.0	0 above HIL A 20 mg/kg	-
Chromium	48	48	87	0 above HIL A 100 mg/kg	0 above most conservative ACL (urban residential) 190 mg/kg
Copper	48	48	56	0 above HIL A 6000 mg/kg	0 above most conservative ACL (urban residential) 60 mg/kg
Lead	48	48	130	0 above HIL A 300 mg/kg	0 above generic ACL (urban residential) 1100 mg/kg
Mercury	48	5	0.4	0 above HIL A 40 mg/kg	-
Nickel	48	44	**97**	0 above HIL A 400 mg/kg	**7 above most conservative ACL (urban residential) 30 mg/kg**
Zinc	48	47	**690**	0 above HIL A 7400 mg/kg	**18 above most conservative ACL (urban residential) 70 mg/kg**
PCB	20	0	<PQL	0 above HIL A 1 mg/kg	-
OCP	23	0	<PQL	0 above HIL A	0 above EIL
OPP	23	0	<PQL	0 above HIL A	-

n number of samples
- No criteria available/used
NL Non-limiting
<PQL Less than the practical quantitation limit

In assessing the results, the Auditor makes the following observations:

- Asbestos was not observed during drilling or detected in the fill samples analysed.
- No volatile petroleum hydrocarbons (TRH C_6–C_{10} or BTEX) were detected.
- Concentrations of TRH C_{16}-C_{34} (TRH F3) were identified above the adopted ecological criteria (300 mg/kg) in four samples.
- Concentrations of Benzo(a)pyrene TEQ (BaP TEQ) were identified above the human health criteria in two surface samples completed by Douglas at locations 11 (5.4 mg/kg) and 13 (3.4 mg/kg). The bore logs for these samples indicate that the fill material at location 11 comprised clayey gravel with fragments of broken brick, concrete and igneous gravels while the fill at location 13 comprised silty

sand with trace gravel. A sample collected from a greater depth in BH13 at 0.4-0.5 mbgl contained a concentration of BaP TEQ of 1 mg/kg which is below the HIL A criteria of 3 mg/kg. JBS&G note that both of these locations are in areas of the site that are covered by asphalt which is likely to be the source of elevated PAHs within these samples.

- JBS&G completed statistical analysis of detected concentrations of BaP TEQ detected in fill during both the PSI and DSI and calculated the 95% upper confidence limit (UCL) for carcinogenic PAHs as BaP TEQ. The analysis was completed on the data set for fill which comprised 48 data points. The maximum concentration was 5.6 mg/kg and concentrations below the LOR were assumed to have a concentration of half the LOR. The standard deviation for the assessment was 0.815 which was less that 50% of the HIL. The calculated 95% UCL value was 1 mg/kg which was below the HIL A of 3 mg/kg. JBS&G concluded that "*the reported concentrations of carcinogenic PAHs as B(a)P TEQ at BH11-0-0.1 and BH13-0-0.1 do not represent an unacceptable risk to human health for the proposed future use of the site.*"
- Concentrations of nickel were identified above the most conservative ecological ACL in seven soil samples and concentrations of zinc in 18 samples. JBS&G concluded that *"reported concentrations of the heavy metals nickel and zinc are likely attributed to the parent material of the site's soils, likely to be shales from the Wianamatta Group that are naturally enriched in nickel and zinc."*

8.3 Auditor's Opinion

In the Auditor's opinion, the soil analytical results are consistent with the site history and field observations. The results indicate that fill materials at the site are consistent in nature and do not contain concentrations of chemical contaminants that present a risk to future use of the site as a primary and high school campus. However, the Auditor notes that there is a data gap with respect to soil conditions below site buildings and the playing field and due to the sampling method there is also potential for unidentified ACM in soil, in particular where anthropogenic inclusions were observed.

As outlined in Section 3, there is the potential that asbestos impacted soils are present beneath the playing field and, while soils in this area are not accessible and therefore do not currently present an exposure risk to site users, the nature of the underlying soils should be confirmed to address this data gap and confirm if ongoing management of material in this area is required. The playing field was excavated and resurfaced in 2017 and it is considered likely that records relating to this activity will address the issue of potential asbestos in soils, however, this information was not available at the time of producing this IAA. The site-specific asbestos management plan available on the SINSW website did not identify containment of asbestos or the potential for asbestos impacted soils at the site.

9. EVALUATION OF CONCEPTUAL SITE MODEL

A conceptual site model (CSM) is a representation of the contaminant source, pathway and receptor (SPR) linkages at a site. JBS&G developed a CSM and used it to determine the scope of the DSI and conclude on site suitability. The CSM was initially developed based on the results of the preliminary investigations and was updated following the DSI. Table 9.1 provides the Auditor's review of the CSM used by JBS&G in the DSI.

Table 9.1: Review of the Conceptual Site Model

Element of CSM	Consultant	Auditor Opinion
Contaminant source and mechanism	Fill materials and former building structures with potential contaminants of concern as listed in Table 4.1 of this IAA.	The sources of contamination and contaminants of concern including the mechanism of contamination have generally been appropriately identified.

Element of CSM	Consultant	Auditor Opinion
Affected media	Fill materials and underlying natural soils were identified as potentially contaminated media although the potential for contamination to the underlying natural lithologies/geology and groundwater was considered low.	The potentially affected media have been appropriately identified. The potential for groundwater or soil gas contamination at the site is considered to be low based on the site use and surrounding uses.
Receptor identification	Future construction workers associated with the development works, students and employees of the school, future construction/maintenance workers undertaking ground disturbance and future/current sub-surface excavation/intrusive workers. Flora on-site. Possible off-site ecological receptors include potential surface water receptors (i.e. Swains Creek to the west of the site).	The human and ecological receptors have been appropriately identified.
Exposure pathways	Dermal contact and ingestion with impacted soils. Inhalation of dust generated from fill material. Surface water runoff.	Exposure pathways have been appropriately identified. No volatile contamination was identified therefore exposure by vapour inhalation is an incomplete exposure pathway.
Presence of preferential pathways for contaminant movement	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.	Preferential pathways are not considered relevant to the CSM based on the identified contaminant sources and contaminants of concern.
Evaluation of data gaps	No data gaps identified.	The contamination status of soils beneath buildings and the playing field is not known. Based on the site history review, there is the potential for ACM to be present beneath the playing field and this data gap requires addressing. The likelihood of significant contamination beneath the buildings is low based on the available data set. Further information is required regarding the playing field construction. An unexpected finds protocol should be implemented during the redevelopment to reduce the risk associated with the unknown soil conditions beneath buildings to be demolished during the redevelopment.
Potentially complete SPR linkages	Not specifically outlined in the DSI CSM. The DSI concluded that the site does not present any unacceptable risks to human and ecological health, pursuant to NEPC (2013), and is considered suitable for use as a primary and secondary school facility. JBS&G recommended the formulation of an unexpected finds protocol for the site to address any unexpected finds that may be encountered during the redevelopment of the site.	The potentially complete SPR linkages identified by the Auditor are limited to exposure of construction workers during the redevelopment to potential unidentified contamination (including asbestos) beneath buildings that are to be demolished and future site users if contamination identified during the works is not handled appropriately.

9.1 Auditor's Opinion

In the Auditor's opinion, the CSM developed is considered an adequate basis for assessing site suitability, however the data gap relating to the contamination status of soils beneath the playing field requires further assessment to confirm that ongoing management of the area is not required. In addition, an unexpected finds protocol should be implemented during the redevelopment to reduce the risk associated with potential for ACM in fill material and the unknown soil conditions beneath buildings to be demolished during the redevelopment.

10. CONCLUSIONS AND RECOMMENDATIONS

Based on the information presented in the Douglas and JBS&G reports and observations made on site, the site is considered suitable for its current use as a primary school and high school campus with public access for recreational use.

With respect to the proposed high school and public school development, the Auditor notes:

1. The contamination status of soils beneath the playing field requires further assessment to confirm ongoing management of the area is not required. The playing field is not included in the redevelopment and no risk to site users is currently present as the soils beneath the playing field are not accessible. However, the uncertainty around the potential for asbestos to be contained beneath the playing fields should be addressed through further information searches, specifically details on the construction process for the playing field redevelopment that occurred in 2017 and review of the Parsons Brinckerhoff 2015 and EIS 2014 reports mentioned in the PSI. If it is confirmed that asbestos materials are present beneath the playing field, an environmental management plan (EMP) should be prepared to manage the risks associated with containment of the material. Following review of the additional information and, if necessary, development of an EMP, a Section A Site Audit Statement can be prepared confirming site suitability for the current and proposed future use as an educational facility.
2. It is recommended that an unexpected finds protocol be implemented during the redevelopment to manage any risks associated with potential ACM in fill material and the unknown soil conditions beneath buildings to be demolished during the redevelopment.

* * *

Consistent with the NSW EPA requirement for staged 'signoff' of sites that are the subject of progressive assessment, remediation and validation, I advise that:

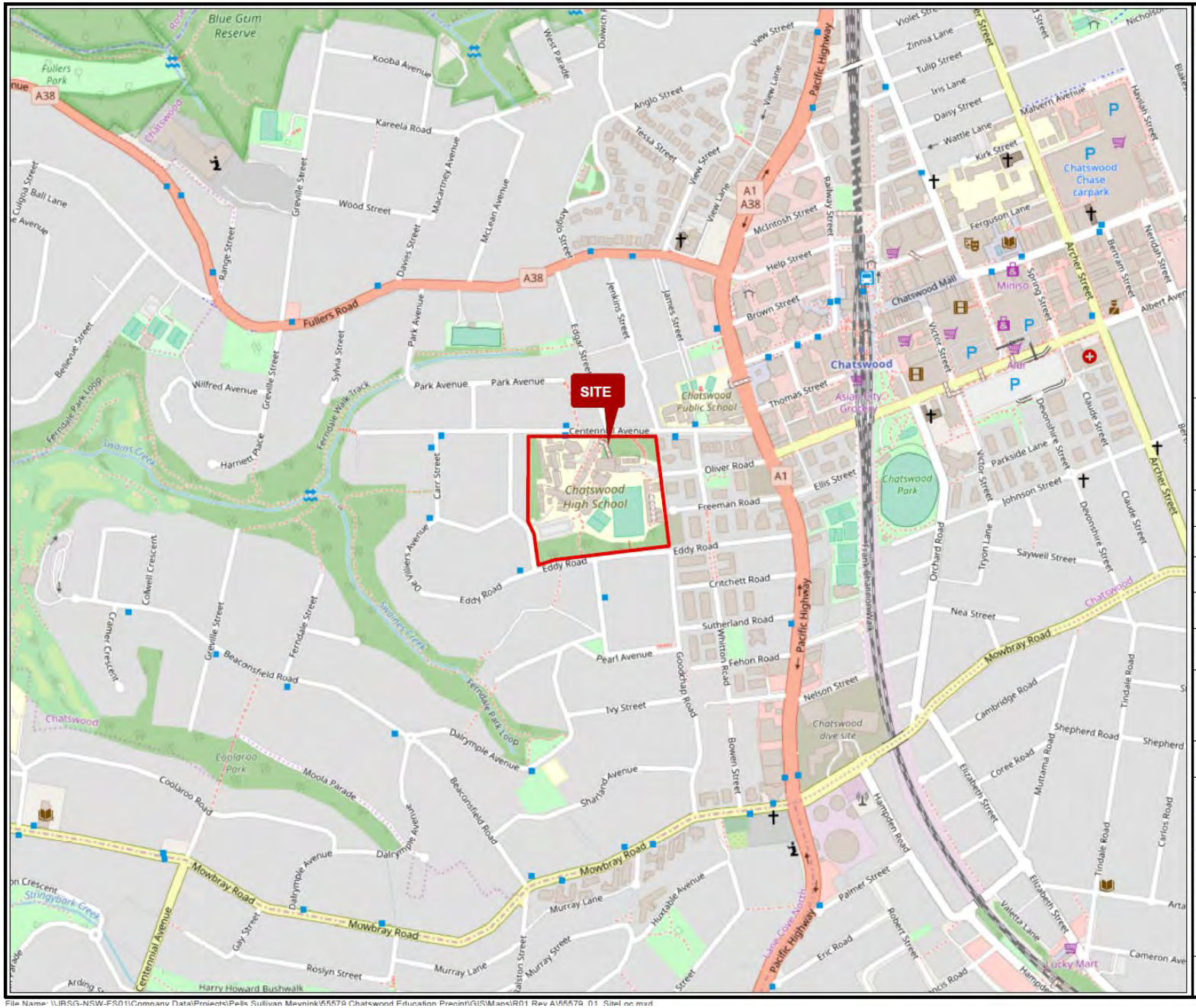
- This advice letter does not constitute a Site Audit Report or Site Audit Statement.
- At the completion of the remediation and validation I will provide a Site Audit Statement and supporting documentation.
- This interim advice will be documented in the Site Audit Report.

Yours faithfully
Ramboll Australia Pty Ltd

Rowena Salmon
EPA Accredited Site Auditor 1002

Attachments:
1 Site Locality Plan
2 Site Layout and Douglas Partners Sample Location Plan
3 Proposed Site Development Plan
4 Soil Sampling Location Plan (PSI and DSI)
5 Geotechnical Bore Sampling Location Plan (PSM)

Attachment 1: Site Locality Plan



Legend:
Approximate Site Boundary

JBS&G

Job No: 55579

Client: Pells Sullivan Meynik

Version: R01 Rev A	Date 27/02/2019
Drawn By: AV	Checked By: DD

Scale 1:10,000

0 120 240
metres

Coord. Sys. GDA 1994 MGA Zone 56

24 Centennial Avenue
Chatswood, NSW

High School

SITE LOCATION

FIGURE 1

File Name: \\JBSG-NSW-FS01\Company Data\Projects\Pells Sullivan Meynik\55579 Chatswood Education Precinct\GIS\Maps\R01 Rev A\55579_01_SiteLoc.mxd

Attachment 2: Site Layout and Douglas Partners Sample Location Plan

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: TSA Management		TITLE: Approximate Locations of Boreholes Preliminary Site Investigation Chatswood High School and Public School Bush Campus	PROJECT No:	86260
	OFFICE: Sydney	DRAWN BY: SB		DRAWING No:	1
	SCALE: As shown	DATE: 26 Feb 2018		REVISION:	A

Attachment 3: Proposed Site Development Plan

REV	DESCRIPTION	DRAWN	APPD	DATE
I	100% SD FOR TENDER	CPO	RET	30.03.20
H	100% SD FOR TENDER	CPO	RET	27.03.20
G	95% SD FOR COORDINATION	CPO	RET	13.03.20
F	SSDA ISSUE	CPO	RET	11.03.20
E	DRAFT SSDA	CPO	RET	27.02.20
D	DRAFT SSDA	CPO	RET	18.02.20
C	ISSUED FOR SSDA	CPO	RET	11.12.19
B	ISSED FOR INFORMATION	CPO	RET	29.04.19

DRAWN:	CPO	
DESIGNED:	RET	
VERIFIED:	...	J.J.
APPROVED FOR TENDER:	...	J.J.
APPROVED FOR CONSTRUCTION:	...	J.J.

ARCHITECT/CLIENT

PROJECT: UPGRADES TO CHATSWOOD PUBLIC SCHOOL AND CHATSWOOD HIGH SCHOOL

TITLE: EROSION AND SEDIMENT CONTROL PLAN - CENTENNIAL AVENUE

40623-SD-AX-C0710.dwg

WOOD & GRIEVE ENGINEERS
Stantec

FOR APPROVAL
NOT FOR CONSTRUCTION

SCALE @ A1	PROJECT No	DRAWING No	REV
AS SHOWN	40623	SD-AX-C0710	I

29/03/2020 7:10:29 PM

Attachment 4: Soil Sampling Location Plan (PSI and DSI)

Legend:
- Approximate Site Boundary
- Sample Locations (JBS&G 2019)
- Historical Samples (DP 2018)

JBS&G

Job No: 55579	
Client: Pells Sullivan Meynik	
Version: R01 Rev A	Date 27/02/2019
Drawn By: AV	Checked By: DD

Scale 1:1,500

0 10 20
metres

Coord. Sys. GDA 1994 MGA Zone 56

24 Centennial Avenue
Chatswood, NSW

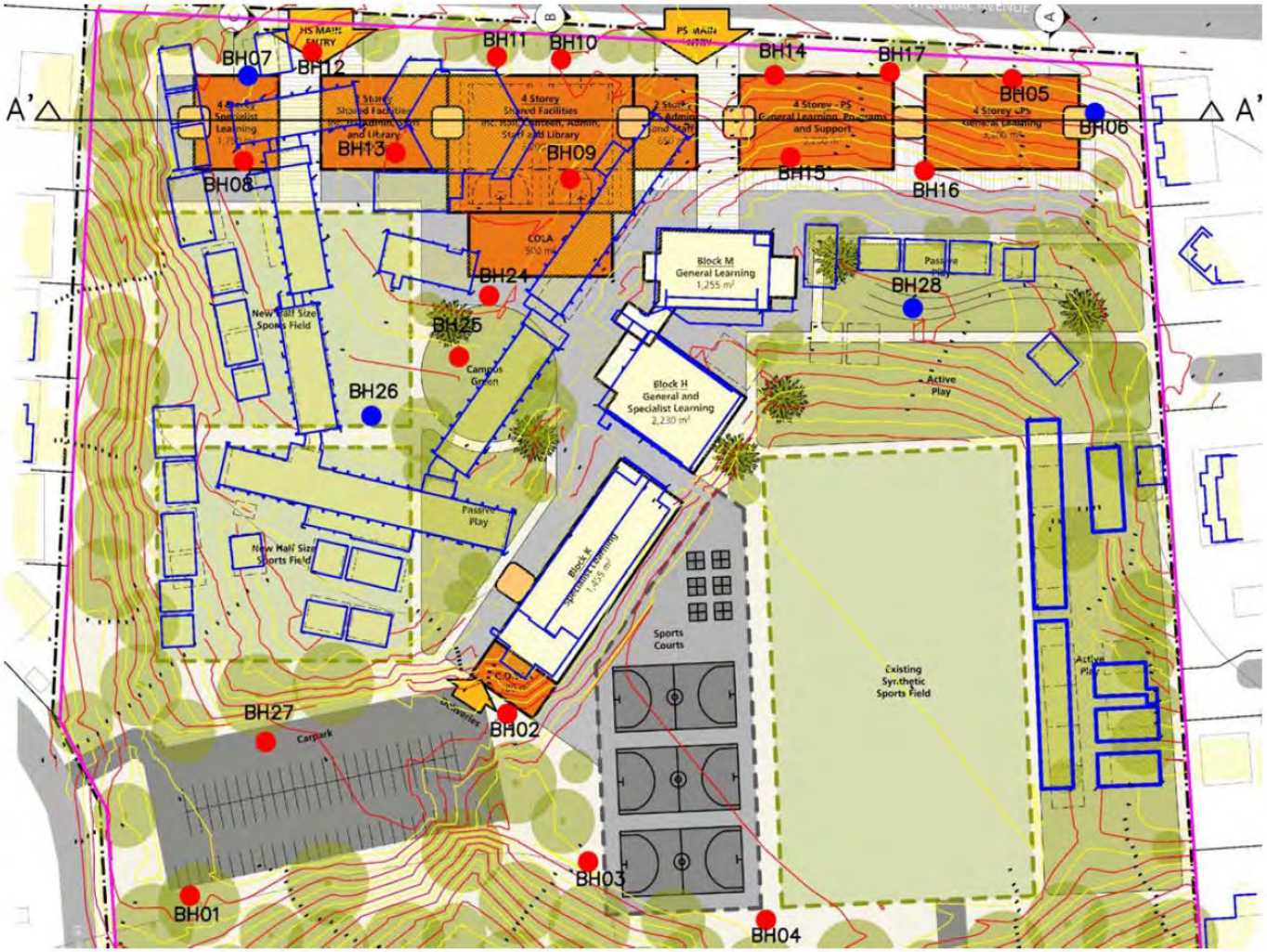
High School

SAMPLE LOCATIONS

FIGURE 3

File Name: \\JBSG-NSW-FS01\Company Data\Projects\Pells Sullivan Meynink\55579 Chatswood Education Precint\GIS\Maps\R01 Rev A\55579_03_SampleLoc.mxd
Reference: Nearmap - nearmap.com.au - Imagery 27-12-2018

Attachment 5: Geotechnical Bore Sampling Location Plan (PSM)



LEGEND

- PSM Auger Hole
- PSM Cored Hole

NOTES:

1. Borehole locations are approximate.

Pells Sullivan Meynink

School Infrastructure NSW

Chatswood Education Precinct

24 Centennial Avenue Chatswood

LOCALITY PLAN & BOREHOLE LOCATIONS

PSM3730-006R	Figure 1A