



Douglas Partners

Geotechnics | Environment | Groundwater

Report on
Remedial Action Plan

Jindabyne Central School
Part Lot 101 DP1019527, Jindabyne

Prepared for
NSW Department of Education - School Infrastructure
NSW

Project 103109.05
December 2021

Integrated Practical Solutions





Douglas Partners

Geotechnics | Environment | Groundwater

Document History

Document details

Project No.	103109.05	Document No.	R.001.Rev1
Document title	Report on Remedial Action Plan Jindabyne Central School		
Site address	Part Lot 101 DP1019527, Jindabyne		
Report prepared for	NSW Department of Education - School Infrastructure NSW		
File name	103109.05.R.001.Rev1.RAP		

Document status and review

Status	Prepared by	Reviewed by	Date issued
Revision 0	Shannon Goodsell	Dean Woods	28 July 2021
Revision 1	Shannon Goodsell	Dean Woods	1 December 2021

Distribution of copies

Status	Electronic	Paper	Issued to
Revision 0	1	0	Scott Kneller on behalf of NSW Department of Education - School Infrastructure NSW
Revision 1	1	0	David Carey on behalf of NSW Department of Education - School Infrastructure NSW

The undersigned, on behalf of Douglas Partners Pty Ltd, confirm that this document and all attached drawings, logs and test results have been checked and reviewed for errors, omissions and inaccuracies.

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Report on Remedial Action Plan

Jindabyne Central School

Part Lot 101 DP1019527, Jindabyne

1. Introduction

This Remediation Action Plan (RAP) conducted by Douglas Partners Pty Ltd (DP) accompanies an Environmental Impact Statement (EIS) pursuant to Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act) in support of an application for a State Significant Development (SSD No 15788005). The SSDA is for a new education campus at Jindabyne, comprising of a new primary and high school, located at the Jindabyne Sport and Recreation Centre (JSRC).

This report addresses the Secretary's Environmental Assessment Requirements (SEARs), notably:

- Key Issue 19 – Contamination:
 - Assess and quantify any soil and groundwater contamination and demonstrate that the site is suitable for the proposed use in accordance with State Environmental Planning Policy No. 55 (SEPP 55). This must include the following prepared by certified consultants recognised by the NSW Environment Protection Authority:
 - Remediation Action Plan (RAP) where remediation is required. This must specify the proposed remediation strategy.

2. Proposed Development

The proposed development is for the construction of the Jindabyne Education Campus comprising a new primary school and a new high school at Jindabyne (the proposal). The proposal is located within the JSRC located at 207 Barry Way (the site) and will accommodate approximately 925 students with the capacity for expansion in the future.

The new primary school will be located generally in the northern portion of the site whilst the new high school will be to the south of the site. While the schools are inherently separate identities, with separate student entries, opportunities for integration are provided in a central shared plaza with co-located school administration facilities, as identified in Figure 1 below. This outdoor learning space is activated by the school canteen (shared) and separate core facilities including the primary school hall and library, and the high school gym and library, and provides opportunities for shared community use.

The new primary school will provide for a Core 21 school. This will comprise of 20 home base units and 2 support learning units, administration and staff facilities, covered outdoor learning area (COLA), hall, staff and student amenities, out of school care facilities, library and special programs. Landscaped areas include active and passive open space play areas, and a games court.

The new high school will provide for a stream 2 high school. This is to comprise of 20 general/specialised learning spaces and support learning units, administration and staff facilities, covered outdoor learning

area (COLA), hall, staff and student amenities, library, an agricultural learning unit. Landscaped areas include active and passive open space play areas, a sports field and multipurpose games courts.

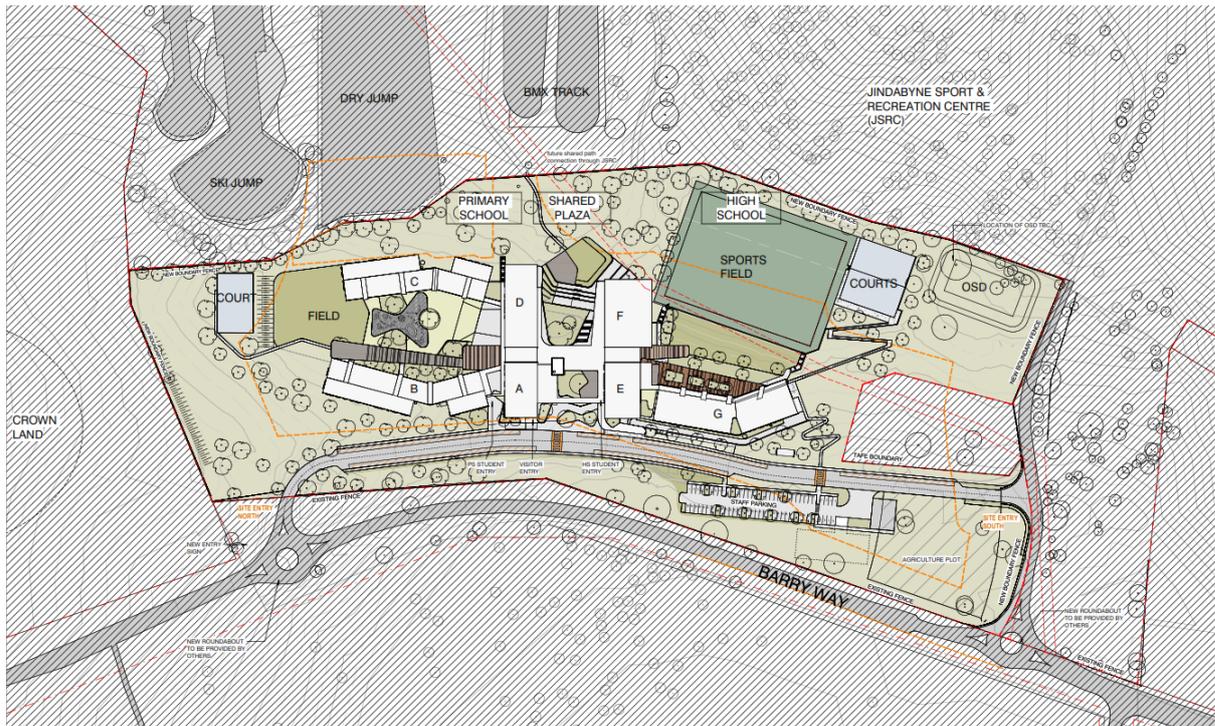


Figure 1 Proposed Site Plan
Source: DJRD

3. Site Description

3.1 Site Identification

Site Address	207 Barry Way, Jindabyne
Legal Description	Part of Lot 101 Deposited Plan 1019527
Area	9.5 ha
Zoning	Zone RU1 Primary Production
Local Council Area	Snowy Monaro Regional Council
Current Use	Vacant (part of a former golf course) and residential land
Surrounding Uses	North – Agriculture East – Vacant and recreational South – Agriculture West – Agriculture/Airport

3.2 Site Description

The site of the proposed new education campus at Jindabyne is located within the western extent of the existing JSRC at 207 Barry Way (101 DP1019527). The site is located within the Snowy Monaro Regional Council local government area and is approximately 2.2 km south of the Jindabyne town Centre. A site aerial is provided in Figure 2.

The site is approximately 9.5 ha in size, containing a former golf course and three existing workers cottages which were occupied during the construction of the Snowy Hydro Scheme. The site is undeveloped and contains scattered trees. Much of the surrounding land comprises remnant grassland, woodland and agricultural land.

As identified above, the site is within the existing JSRC which is a high performance and community sport centre located directly east of the site. The JSRC has a range of sporting facilities including a synthetic running track, cycling track, netball and tennis courts, fitness and indoor sports centres, and sporting ovals, as well as other services and accommodation facilities. The newly constructed BMX track is located directly east of the site with the new ski jump currently under construction to the northeast.

The surrounding locality is generally rural in character with other land uses also including the Jindabyne Aero Club located to the west of the site on Tinworth Drive, an industrial area to the southwest and the Jindabyne Community recycling centre is located east of the JSRC.



Figure 2: Site aerial - new education campus within the Jindabyne Sport and Recreation Centre.
Source: DJRD

4. General

DP has been engaged by Colliers on behalf of NSW Department of Education - School Infrastructure NSW to complete this RAP undertaken for a new primary and high school in Jindabyne for the site at Part Lot 101 DP1019527, Jindabyne (hereinafter referred to as 'the site'). It should be noted that the information contained in Sections 1 – 3 of this report has been provided by the client as a Pro-Forma and DP has been required to reproduce these paragraphs in this report. The site location, site features (including aesthetic impacts) and test locations are shown on Drawings 1 – 3 and the site survey on Drawing 4, Appendix A.

The RAP was undertaken in general accordance with DP's proposal 103109.05.P.003.Rev0 dated 27 May 2021 and acceptance received from Scott Kneller of Colliers on behalf of NSW Department of Education - School Infrastructure NSW dated 2 June 2021 and subsequent variation 103109.05.P.001.Rev0 dated 25 August 2021 and acceptance received from David Carey of Colliers on behalf of NSW Department of Education - School Infrastructure NSW dated 17 September 2021. It should be noted that SINSW engaged a Site Auditor (Ms Rebeka Hall of Geosyntec Consultants Pty Ltd (Geosyntec)) and at the request of the Site Auditor, the RAP was to be revised to address several points (see DP's correspondence letter 103109.05.C.002.Rev0). This report must be read in conjunction with all appendices including the notes provided in Appendix B.

A summary of all previous laboratory results from DP's Preliminary Site Investigation with Limited Sampling and Targeted Detailed Site Investigation are provided in Appendix C.

5. Objective of the RAP

In accordance with Section 2.1 of the Snowy River Development Control Plan (part of the Snowy Monaro Regional Council), all proposed remediation works within the council area are considered to be Category 1 remediation, as defined by the SEPP 55 and, as such requires Council's consent.

The objective of the RAP is to provide a strategy for remediation which:

- Prepares appropriate environmental safeguards required to conduct the remediation works in an environmentally acceptable manner;
- Provides procedures required to conduct the remediation works in an acceptable manner that will protect the health and safety of site workers or users to the degree considered practicable; Provides procedures required to conduct the remediation works in an acceptable manner that will protect the health and safety of adjacent site users to the degree considered practicable; and
- Renders the site suitable for the proposed school site land use.

The RAP also provides an outline procedure for the excavation, management and disposal of soil, and a contingency plan for contamination finds (soil impacted with asbestos or other contaminants).

6. Environmental Setting

Regional Topography	The area is surrounded by undulating hills to the west and south and Lake Jindabyne and the Snowy River/Snowy River valley are located to the north and east, respectively. Further west and north, steep mountains are located and slope towards the east. Further south and east, high plains are located in the region. The area generally slopes west to east, towards Lake Jindabyne/Snowy River.
Site Topography	The site is undulating with an overall moderate slope from the western boundary of the site at an approximate height of 1,004 m relative to

	Australian Height Datum (AHD) towards the eastern boundary of the site at an approximate height of 985 m AHD.
Soil Landscape	NA – A search was conducted through the NSW Government eSpade website (https://www.environment.nsw.gov.au/eSpade2WebApp) and eSpade indicated there is no data for soil landscapes within the site.
Geology	Silurian age Leesville granodiorite located within the south-western corner of the site and Jindabyne tonalite located throughout the remaining area of the site.
Acid Sulfate Soils	Reference to the CSIRO's Atlas of Australian Acid Sulfate Soils online mapping portal, (ASRIS - Atlas of Australian Acid Sulfate Soils (csiro.au)) indicates that the site has an extremely low probability of acid sulfate soils to be present.
Surface Water	Lees Creek located approximately 40 m east at the site's nearest surface water feature. Lees Creek flows into Lake Jindabyne which is located approximately 1.1 km from the nearest point of the site.
Groundwater	Anticipated groundwater flow direction is inferred to be towards the east to north-east towards Lees Creek and Lake Jindabyne. A search of the publicly available registered groundwater bore database indicated that there are no registered groundwater bores within 1 km of the site.

7. Previous Reports

The following previous reports are relevant to the current investigation:

- DP's *Report on Preliminary Site Investigation (Contamination) with Limited Sampling, Jindabyne Central School, Part Lot 101 DP 1019725, Jindabyne* (hereinafter referred to as PSI-L), DP project 103109.03, dated July 2021 (DP, 2021). ; and
- DP's *Report on Targeted Detailed Site Investigation (Contamination), Jindabyne Central School, Part of Lot 101 DP 1019725, Jindabyne*, DP project 103109.03, dated 20 July 2021 (DP, 2021a).

7.1 DP, Preliminary Site Investigation (Contamination) (2021)

DP (2021a) was undertaken on the southern portion of the current site, to provide a preliminary investigation into potential contamination and the associated implications with respect to the JCS development proposed at the time the PSI was undertaken. It should be noted that at the time of reporting, the proposed site boundaries were smaller (refer to Figure 3) and did not include an assessment on the northernmost and easternmost portions of the current site boundaries.

DP (2021a) comprised a desktop review of available historical and environmental site information, a site walkover, the preparation of a preliminary conceptual site model (CSM) and the preparation of a report.

The review of historical aerial photography indicated that residential dwellings had been constructed within the eastern and southern portion of the site prior to 1962 and subsequently demolished prior to

1979. It was considered highly likely that the dwellings and associated underground services to have contained ACM and potentially other hazardous building materials (HBM). It was further considered likely that residual HBM may be present in this area.

During the site walkover, potential fill areas were observed throughout the PSI site. Historical aerial photographs indicated that the fill areas were likely associated with the construction of the golf course, or the building area along the eastern and south-eastern boundary of the PSI site.

A preliminary CSM was prepared as part of the PSI as a representation of site-related information regarding contamination sources, receptors and exposure pathways between those sources and receptors. The preliminary CSM is provided in Section 8.

Based on the findings of the PSI, it was considered that the likelihood of gross chemical contamination to be present on the site is low to moderate. However, further investigation was recommended to intrusively investigate the extent and quality of fill areas identified across the site in the PSI including through the former golf course tees and greens and the areas where former residential dwellings were previously located.



Figure 3: Previous site layouts from the desktop PSI (highlighted blue) and Limited Contamination assessment and T-DSI (highlighted red).

7.2 DP, Limited Intrusive Investigation (Contamination) (2021a)

DP (2021a) comprised a limited intrusive investigation (contamination) and included a site walkover for the extended boundaries of the site, excavation of test pits, laboratory analysis of soils and PACM fragments and the preparation of a report detailing the methodology and results of the limited intrusive investigation and recommendations for further works if considered necessary. It is noted that the limited intrusive investigation detailed herein was primarily driven by geotechnical considerations, with most of

the investigation locations targeted the proposed development footprint and were not undertaken to close out the recommendations provided in the PSI.

The field work comprised the excavation of 28 test pits (Pits 1 to 27 and 16A). The test pits encountered variable subsurface conditions underlying the site with the principal succession of strata broadly summarised as follows:

- **TOPSOIL/TOPSOIL FILL:** generally stiff to hard, low plasticity sandy clay and medium dense to dense clayey sand, with various amounts of gravel and rootlets to depths of between 0.15 m to 0.3 m in all test pits, except Pits 2, 12, 16, 24 and 27. Remnant topsoil (very stiff low plasticity sandy clay) was encountered in Pit 23 between depths of 0.15 m to 0.3 m;
- **FILL:** generally low plasticity to low – medium plasticity, stiff – very stiff to very stiff-hard sandy clay and/or loose to medium dense sandy soils, with various mixtures of silt, sand, gravel, rootlets and cobbles, trace building debris, from the ground surface to depths of between 0.15 to 1.5 m in Pits 2, 5, 12, 16, 20, 23, 24, 26 and 27; Pit 24 refused in this stratum at a depth of 1.5 m;
- **NATURAL SOILS:** generally low plasticity to medium – high plasticity, very stiff to hard sandy clay and/or medium dense to dense sandy soils with various mixtures of sand, gravel, trace cobbles and boulders from depths of between 0.15 m to 1.5 m in Pits 1, 4, 7, 8, 10 to 13, 15, 16, 18, 19, 21 to 23, 25 and 16A; Pit 16 terminated in this stratum at the limit of investigation depth of 1.5 m.
- **INTRUSIVE VOLCANICS:** variably very low strength to high - very high strength, highly weathered to slightly weathered granodiorite/tonalite from depths of 0.2 m to 1.5 m to the termination depths of 0.6 m to 3.6 m in all the test pits except Pits 16 and 24.

Non-soil anthropogenic items and building debris were observed in the fill at Pits 2, 16, 24, 25 and 26 and included steel reinforced concrete, fragments of concrete, brick, terracotta pipe, terracotta pots, glass, asphalt and timber.

PACM fragments were observed in fill at Pits 25 (collected as M1) and 26 (collected as M4) and on the surface in the south-eastern portion of the site (collected as M2 and M3). The material samples were submitted to the analytical laboratory for asbestos identification in materials to confirm the presence or absence of asbestos. Asbestos was identified in samples M1 and M2.

Perched groundwater was observed in Pit 20 at 2.2 m depth. No free groundwater was observed during the site investigation in all other test pits.

The analytical results for all contaminants tested in all samples were below the site assessment criteria (SAC) except for zinc in sample Pit 25/0.1, reported at a concentration of 550 mg/kg which exceeded the adopted Ecological Investigation Level (EIL) criterion of 500 mg/kg. While it was considered that the exceedance was a marginal exceedance of the adopted SAC, given the limited nature of the intrusive investigation undertaken, it was considered appropriate that further intrusive investigation should be undertaken at and near this location.

Chlordane in sample Pit 23/0.1, reported at a concentration of 65 mg/kg, also exceeded the adopted Health Investigation Level-A (HIL-A) criterion of 50 mg/kg. While this is a marginal exceedance of the adopted SAC, given the limited nature of the intrusive investigation undertaken, it was considered appropriate that further intrusive investigation should be undertaken at and near this location.

It was further noted that the data set from the investigation was not sufficient to undertake statistical analysis for both these exceedances.

It was considered that the site can be made suitable for the proposed school development subject to recommended further investigation, subsequent further data analysis and subsequent remediation or management if considered necessary based on the findings of the further investigation.

7.3 DP, Targeted Detailed Site Investigation (Contamination) (2021b)

DP (2021b) comprised a targeted detailed site investigation (DSI) (contamination) and included the excavation of test pits, field screening of soil samples for asbestos (sieving bulk soil samples ~10 L on-site), laboratory analysis of soils and PACM fragments and the preparation of a report detailing the methodology and results of the DSI and recommendations for remediation.

The field work comprised the excavation of 34 test pits (Pits 101 to 134). The test pits encountered variable subsurface conditions underlying the site with the principal succession of strata broadly summarised as follows:

- **TOPSOIL FILL:** generally stiff to very stiff, low plasticity sandy clay with various amounts of brick, glass, tile, terracotta and PVC pipe, plastic, PACM fragments, nails, gravel and rootlets to depths of 0.15 m to 0.4 m below ground level (bgl) in all test pits, except Pits 108, 126 to 128 and 130 to 134;
- **NATURAL TOPSOIL:** very stiff, low plasticity sandy clay with rootlets to a depth of 0.2 m bgl encountered in Pit 126;
- **FILL:** generally low plasticity to low – medium plasticity, stiff – very stiff to very stiff-hard sandy clay and/or medium dense sandy soils, with various mixture of silt, sand, gravel, rootlets and cobbles, trace terracotta pipe and brick fragments from the ground surface to depths of 0.2 to 2.5 m bgl in Pits 108, 127, 129 and 130 to 134;
- **NATURAL SOILS:** generally low plasticity to medium plasticity, very stiff to hard sandy clay and/or medium dense to dense clayey sand soils with various mixtures of sand, gravel and trace cobbles (residual soils and extremely weathered granodiorite/tonolite) from depths of 0.15 m – 2.5 m bgl in Pits 101 to 108, 110 to 120, 122 to 132 and 135. Pits 101 to 104, 106 to 108, 110 to 120, 122 to 125, 130 and 131 were terminated in this stratum at the limit of investigation depths of 0.5 m to 2.6 m bgl; and
- **INTRUSIVE VOLCANICS:** variably very low strength to high strength, highly weathered to slightly weathered granodiorite/tonalite from depths of 0.15 m to 0.7 m bgl to the termination depths of 0.5 m to 1.1 m bgl in Pits 109, 121, 126 to 129 and 135.

No free groundwater was observed during excavation of test pits. It should be noted that groundwater levels are affected by climatic conditions and soil permeability and will therefore vary with time.

Observations of potential asbestos contamination within the test locations and ground surface included PACM fragments in the spoil of Pits 102, 116 and 117 and the observation of PACM sheeting adjacent to Pit 119.

Potential bonded ACM fragments were collected and submitted for laboratory analysis for asbestos identification.

Bulk soil samples (approximately 10 L) were collected from test pits where fill was present for on-site sieving for the assessment of asbestos. The results of the on-site sieving analysis reported PACM fragments in test pits 102, 116, 117, 119, 120, 121, 123 and 124 at depths of approximately 0.1 m bgl

The results of the field screening of samples indicated that asbestos was identified in the 10 L soil samples collected from Pits 102, 116, 117, 119, 120, 121, 123 and 124, and the asbestos was identified as being bonded ACM. The results of the laboratory analysis of soil samples (500 mL) submitted for asbestos in soil analysis (AF/FA) indicated that no asbestos fibres were reported in all samples submitted for analysis. Calculated concentrations of bonded ACM were reported exceeding the Health Screening Level-A (residential - including primary school sites) in samples collected from Pits 102 and 116.

The analytical results indicated that bonded asbestos was identified within the material samples collected from test pit spoil from Pits 102, 116 and 117 and the material sample collected from the ground surface, adjacent to Pit 119. The materials submitted for analysis comprised fibre cement material, with either, one or more of chrysotile, amosite and crocidolite fibre types being identified in the material. The presence of asbestos on the ground surface exceeds the adopted Health Screening Level-A (HSL-A)

With the exception of asbestos, all analytical results, for tested soil samples were all within the adopted health-based (i.e. HIL-A/HSL-A/B) and ecological (i.e. EIL/ESL) criteria and management limits, for primary school land use.

All soil results for total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene and xylene (BTEX), polycyclic aromatic hydrocarbons (PAH), organochlorine pesticides (OCP), organophosphate pesticides (OPP) and polychlorinated biphenyl (PCB) were below the laboratory's practical quantitation limit (PQL) except for aldrin and dieldrin in samples Pit 127/0.1 m (0.1 mg/kg) and Pit 130/0.1 m (0.1 mg/kg) but were below the adopted SAC. Total chlordane in samples Pit 127/0.1 m (0.6 mg/kg) and Pit 130/0.1 m (0.7 mg/kg) were above the PQL but below the adopted SAC. All soil results for metals were above the PQL except for arsenic, cadmium and mercury, but below the adopted site criteria.

It should be noted that a calculation of the 95%UCL_{average} using the ProUCL statistical software package was undertaken for zinc and total chlordane from DP (2021a) results and the targeted DSI results. The 95%UCL_{average} was then compared to the adopted assessment criteria. The 95%UCL_{average} for zinc and chlordane across the site was calculated as being below the assessment criteria (HIL-A of 50 mg/kg for total chlordane and EIL of 470 mg/kg for zinc).

Based on the results of the targeted DSI, it was considered that the site is not currently suitable for the proposed use as a school, due to the presence of asbestos in topsoil fill material present within the south-eastern portion of the site. Further analysis of past pesticide use and presence of metals/metalloids within the topsoil fill indicated that there is a low risk for metal/metalloids and pesticide contamination, however, it was considered that fill associated with the tees and greens should be managed/remediated appropriately.

It was recommended that a RAP should be developed to address the identified asbestos contamination at the site. It was considered that following the successful implementation of a RAP, the site would be rendered suitable for the proposed development.

It was also recommended that during development, a construction environmental management plan (CEMP) incorporating an asbestos and unexpected finds protocol (UFP) should be prepared and implemented during construction. It was also noted that should any fill material (i.e. the tee and green pads on site) be required to be disposed off-site, the material must be assessed in accordance with NSW EPA Waste Classification Guidelines Part 1 Classifying Waste (2014) and assigned a waste classification prior to off-site disposal.

8. Conceptual Site Model

The findings of the previous investigations were used to update the conceptual site model (CSM). The CSM was prepared as part of DP (2021a) and provides the framework for identifying how the site may become contaminated and how potential receptors may be exposed to contamination either in the present or the future i.e. it enables an assessment of the potential source – pathway – receptor linkages (complete pathways).

Potential Sources

Based on the findings of DP(2021) and DP (2021a), the following sources of potential contamination and associated CoPC have been identified.

- S1: Fill: Associated with levelling and development of the golf course, demolition of former residential dwellings on the site and former unsealed roads that were present on the site.
 - o Various CoPC and may include metals/metalloids, total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene, xylene (BTEX), polycyclic aromatic hydrocarbons (PAH), polychlorinated biphenyls (PCB), organochlorine pesticides (OCP), phenols and asbestos.
- S2: Former and current residential dwellings and underground services dating back to the 1960's
 - o CoPC include asbestos, synthetic mineral fibres (SMF), lead (in paint) and PCB.
- S3: Application of pesticides to the golf course.
 - o CoPC include metals/metalloids and OCP/OPP.

Potential Receptors

The following potential human receptors have been identified:

- R1: Current site users [recreational];
- R2: Future construction and maintenance workers;
- R3: End users [school – students, teachers and other school employees]; and
- R4: Adjacent site users [recreational and agricultural].

The following potential environmental receptors have been identified:

- R5: Surface water [Lees Creek – Fresh Water]; and
- R7: Terrestrial ecology.

Potential Pathways

The following potential pathways have been identified:

- P1: Ingestion and dermal contact;
- P2: Inhalation of dust and/or vapours;
- P3: Surface water run-off; and
- P6: Contact with terrestrial ecology.

Summary of Potentially Complete Exposure Pathways

A ‘source–pathway–receptor’ approach has been used to assess the potential risks of harm being caused to human or environmental receptors from contamination sources on or in the vicinity of the site, via exposure pathways (potential complete pathways). The possible pathways between the above sources (S1 to S3) and receptors (R1 to R7) are provided in Table 1.

Table 1: Summary of Potentially Complete Exposure Pathways

Source and Contaminants of Potential Concern (CoPC)	Transport Pathway	Receptor	Risk Management Action
S1: Undocumented/uncontrolled fill - Metals/metalloids, TRH, BTEX, PAH, OCP and asbestos	P1 and P2	R1, R2 and R3	Fill was identified in the tees and greens during the intrusive work.
	P2	R4	The results of the laboratory analysis indicated that reported concentrations of contaminants of concern were below the adopted assessment criteria or not detected with the exception of asbestos (bonded) within the south-east portion of the site and chlordane (sample Pit 25/0.1 m (DP, 2021)). A groundwater assessment is considered to not be necessary due to the low risk of contamination within the soils and no notable/known storage of hazardous substances within the site.
	P3	R5	
	P6	R7	It is considered that the potential for chemical contamination associated with fill at the site is low, however, a CEMP is

Source and Contaminants of Potential Concern (CoPC)	Transport Pathway	Receptor	Risk Management Action
			<p>recommended to be prepared and implemented during potential future site works, including an UFP and asbestos finds protocol to address any CoPC associated with the former tee and green pads or any other fill identified on site.</p> <p>It is recommended that a RAP is prepared to assess remediation options for the impacted areas of the site.</p> <p>It is also recommended that if on-site fill is to be removed off-site, it needs to be done so in accordance with NSW EPA Waste Classification Guidelines Part 1 Classifying Waste (2014).</p>
S2: Former and current buildings and underground services, residual hazardous building material (within topsoil fill) – asbestos, SMF, lead (in paint) and PCB	P1, P2 and P3	R1	<p>The results of the investigation indicate that asbestos in the form of bonded ACM is present in concentrations above the adopted Health Screening Level across the site. Chemical analysis of soil samples indicated that lead and PCB were either recorded at levels below the adopted site assessment criteria or PQL.</p> <p>DP considers that in its current condition, the site is not suitable for the proposed Jindabyne Central School development and that remediation is required in order to make the site suitable for the proposed use. It is recommended that a RAP is prepared to assess remediation options.</p>
		R2	
		R3	
	P3	R4	<p>Options for the management of ACM impacted fill which exceed the relevant land use criteria may include cap and contain (however, the topsoil fill would be considered not be suitable to keep on site from a geotechnical standpoint), remediation of impacted soil and off-site disposal.</p>
	P3	R5	
	P6	R7	<p>DP also recommends a hazardous building materials assessment for the existing structures that are potentially planned on being demolished. Should</p>

Source and Contaminants of Potential Concern (CoPC)	Transport Pathway	Receptor	Risk Management Action
			hazardous building materials be present in structures that are planned to be demolished, a validation assessment is also recommended within the building footprints once a current structure has been demolished.
S3: Past and present golf course maintenance practices – metals and OCP/OPP	P1, P2 and P3	R1	The results of the laboratory analysis indicated that reported concentrations of CoPC (metals and pesticides) were below the adopted assessment criteria.
		R2	
		R3	
	P3, P4 and P5	R4	It is considered that the potential for chemical contamination associated with greens and tees at the site is low, however, it is recommended that the fill material associated with the tees and greens should be remediated (i.e. removed off-site as waste in accordance with NSW EPA Waste Classification Guidelines Part 1 Classifying Waste (2014)).
	P3	R5	
	P6	R7	

9. Summary of Remediation Required and Pre-Remediation Works

9.1 Remediation Required

Based on the findings of the PSI-L (DP, 2021a) (Pits 1 to 27 and Pit 16A) and the targeted DSI (DP, 2021b) (Pits 101 to 135) the extent of the required remediation is defined as follows:

- ACM impact identified in the vicinity of Pits 25 and 119 (ground surface);
- ACM impact identified in test pit spoil of Pits 25, 102, 116 and 117;
- ACM impact identified in bulk soil sample sieving in Pits 102, 116, 117, 119 to 121, 123 and 124;
- OCP contamination (Chlordane in Pit 23) associated with the former golf course green;
- Hazardous building material (HBM) survey and demolition of current residential dwellings; and
- Aesthetic impacts.

It should be noted that ACM was not observed in the area west of the access road between Pit 108 and 109 and ACM fragments observed in Pits 117, 119, 120, 121, 123 and 125 were below the adopted health screening levels. However, this does not rule out the potential for asbestos contamination within the topsoil fill where previous residential dwellings were once located. DP recommends that the entire area where previous residential dwellings were once located should be treated as ACM impacted topsoil

fill to reduce the risk of ACM being left on site or being disposed of incorrectly. The likely extent of the identified impacts is shown on Drawing 3, Appendix B, the areas have been identified as Area 1 (where ACM was observed to exceed the adopted SAC of HIL-A) and Area 2 (where ACM was not observed or observed to be below the adopted SAC of HIL-A).

Although statistical analysis from DP (2021) and DP (2021a) indicated that the presence of chlordane contamination within the site is considered to be low, discussions with Colliers indicated that it was in the interest of the client to remediate/dispose of soil material that is impacted by chlordane or potentially impacted by pesticides (i.e. the upper portion of the tees and greens fill pads strata).

9.2 Pre-Remediation Works

Should the current residential dwellings that are located within the site require demolition, an intrusive HBM survey within accessible and inaccessible locations of the dwellings on site would need to be completed, before any development works start. The HBM survey would need to be completed by a suitably qualified environmental consultant and all recommendations of the survey would need to be completed prior to demolition of any building within the site. Validation sampling should be undertaken in the footprints of demolished dwellings before further development works continue.

It is recommended that one test location per 25 m² should be located across each building envelope. It would be recommended that test locations are excavated 0.5 m into natural material and samples are taken at regular intervals (i.e. near surface/~0.1 m, 0.5 m, 1.0 m and every 0.5 m after or changes in soil strata/signs of contamination (i.e. staining and odorous material). Samples should be tested for bonded asbestos and asbestos fines/friable asbestos (screening 10 L bulk samples and collecting 500 mL samples). Samples should also be taken for chemical analysis for heavy metals, hydrocarbons, pesticides and other HBM contaminants. If underground services that contain ACM are observed during demolition and/or validation assessment, validation samples would need to be collected at every 5 m linear along the service corridor. Samples would be collected within the walls of the trench and the base of the trench.

9.3 Simplistic Volume Estimation of Fill

DP has undertaken a simplistic volume estimate based on results of previous test pits excavated. This was achieved by applying simplistic volume assumptions based on the likely extent of the identified impacts and average observed depths of fill. It is noted that survey data was not available at the time of preparing the estimate and the volume estimation presented below was prepared on the assumption that the ground surface was level. The actual material volumes and tonnages will vary from the below quoted figure due to bulking factors and unknown fill depths between previous sampling locations. Any estimates based on these calculations should include an appropriate risk factor to account for any unforeseen contamination. The simplistic in-situ volume estimate is shown in Table 2.

Table 2: Simplistic Volume Estimate

Identified ACM Impacts (also Contains Aesthetic Impacts)	
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Average Topsoil Fill/Fill Depth Across Area 1, the Former Residential Dwelling Area for ACM impacted soil to be removed off-site (where ACM exceeded the SAC).	0.24 m
Average Topsoil Fill/Fill Depth Across Area 2, the Former Residential Dwelling Area for areas where no ACM was observed or where ACM was below the SAC and will be treated on-site.	0.21 m
Area of Likely Extent of Identified Impact for Area 1, ACM impacted soil to be removed off-site (where ACM exceeded the SAC).	~4,300 m ²
Area of Likely Extent of Identified Impact for areas where ACM was not observed or where ACM was below the SAC and will be treated on-site.	~ 11,550 m ²
Calculated Simplistic Fill Volume Estimate (i.e. area to average depth) for ACM impacted soil to be removed off-site (where ACM exceeded the SAC)	~ 1,032 m ³
Calculated Simplistic Fill Volume Estimate (i.e. area to average depth) for areas where no ACM was observed or where ACM was below the SAC and will be treated on-site.	~ 2,425.5 m³
Identified and Potential Chlordane (OCP) Impacts (up to 0.5 m of Topsoil Fill/Fill Material in the Tees and Greens)	
Calculated Simplistic Fill Volume Estimate (i.e. area to average depth, see Table D2, Appendix D)	~ 1477 m³
Identified and Potential Aesthetic Impacts (not including the ACM impacted area)	
Calculated Simplistic Fill Volume Estimate (i.e. ~areas of fill to depth of fill)	4,616 m³

Note: The area for ACM impacted soils also includes the areas of where current dwellings are located and where DP could not sample due to access constraints. It is possible that ACM may be present in these areas as well. Good demolition practices should minimise the potential for ACM to impact the soil within the building envelope.

The estimate of the total fill volume that requires remediation, based on the information in DP (2021) and DP (2021a) is approximately 8,071.5 m³. It should be noted that this is a conservative estimation and the actual material volumes and tonnages will vary from the above quoted figure due to bulking factors and unknown fill depths between previous sampling locations. It also does not take into account unexpected finds that may occur between previous sampling locations and in other untested areas. It should also be noted that the green and tee areas of fill for aesthetic impacts were calculated by

measuring the areas of fill with the LIDAR tool in the web service page of MetroMap and are approximate measurements. Approximate areas and volumes are provided in Tables D1 and D2, Appendix D.

10. Remediation Acceptance Criteria

10.1 Asbestos

The remediation works should be validated as meeting an acceptable standard for the proposed land use (residential with accessible soils which includes primary schools). The validation will be undertaken based on one or a combination of visual inspection, field screening, sample analysis and review of disposal dockets.

The remediation acceptance criteria (RAC) are based on Health Screening Levels (HSLs) for asbestos in soil as presented in National Environment Protection Council, National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended 2013 (NEPC, 2013).

NEPC (2013) defines the various asbestos types as follows:

- **Bonded ACM:** Asbestos containing material which is in sound condition, bound in a matrix of cement or resin, and cannot pass a 7 mm x 7 mm sieve;
- **FA:** Fibrous asbestos material including severely weathered cement sheet, insulation products and woven asbestos material. This material is typically unbonded or was previously bonded and is now significantly degraded and crumbling; and
- **AF:** Asbestos fines including free fibres, small fibre bundles and also small fragments of bonded ACM that pass through a 7 mm x 7 mm sieve.

Health Screening Levels (HSLs) for asbestos in soil, which are based on likely exposure levels for different scenarios, have been adopted in NEPC (2013) from WA DoH (2009).

On the basis of the proposed land use (primary school) and in accordance with Table 3 (from Schedule B1, NEPC (2013)) the following asbestos HSLs have been adopted:

Table 3: Health Screening Levels for Asbestos Contamination in Soil (% w/w)

Form of Asbestos	HSL A
Bonded ACM	0.01%
FA and AF, and friable ACM	0.001%
All forms of asbestos	No visible asbestos for surface soil

10.2 OCP (Including Chlordane) Golf Course Greens and Tees

The RAC for chlordane (and other OCPs) that may be identified during validation or site development works) is presented in Table 4. The following assumptions/inputs are noted:

- HILs from Schedule B1, NEPC (2013) are shown in Table 4.

Table 4: Remediation Acceptance Criteria (HIL)

Contaminant	HIL Residential/Primary School A (mg/kg)
OCP	
DDT+DDE+DDD	240
Aldrin + Dieldrin	6
Chlordane	50
Endosulfan (total)	270
Endrin	10
Heptachlor	6
HCB	10
Methoxychlor	300
Mirex	10
Toxaphene	20

10.3 Aesthetic Impacts

With respect to aesthetic impacts, the criteria set out in the NEPM 2013, Section 3.6 Aesthetic Considerations in Schedule B(1) have been used, which state that higher expectations for soil quality would apply the residential properties and in this case a school site, compared to sites that are used for industrial/commercial purposes.

General assessment considerations include:

- That chemically discoloured soils or large quantities of various types of inert refuse, particularly if unsightly, may cause ongoing concern to site users;
- The depth of the materials, including chemical residues, in relation to the final surface of the site;
- The need for, and practicality of, any long-term management of foreign material; and
- Caution should be used for assessing sensitive land uses, such as residential (including primary schools), when large quantities of various fill types and demolition rubble are present.

Within the south-eastern portion of the site (where previous residential dwellings were located), DP (2021) and DP (2021a) encountered anthropogenic material (nails and fragments of glass, tiles, terracotta pipe, concrete, brick, etc.) and ACM fragments within the topsoil fill. It was considered that the topsoil fill was not suitable for reuse within the site. However, it is considered with the appropriate remediation of some areas where volumes of ACM were below the site assessment criteria (SAC) or not observed and the sieving of anthropogenic material occurs (further details of these areas where ACM contamination was below the SAC or not observed are shown in Drawing 3, Appendix A), the topsoil fill can be reused on-site in landscaped areas (preferably within the high school campus areas and out-side of the agricultural plot). It is considered that more than 5% by volume is significant (as determined by the Environmental Consultant and equivalent to the 'trace' descriptor in test pit logs), therefore, a suitable **threshold for percentage of foreign inclusions would be <5% by volume**.

DP (2021) and DP (2021a) encountered minor anthropogenic material (i.e. fragments of included steel reinforced concrete, fragments of concrete, brick, terracotta pipe, terracotta pots, glass, asphalt and timber) within the fill pads associated with the tees and greens. The fill material and anthropogenic

material could be reused in areas of deep fill within the site (i.e. sports oval area where up to 6 m of fill is expected), subject to geotechnical suitability and any oversized fragments of anthropogenic material (i.e. over 200 mm in size) would need to be segregated and disposed off-site correctly.

11. Assessment of Remediation Options

11.1 Remediation Goal

The ultimate goal/objective of the remediation will be to render the site compatible with the proposed land use (primary school and high school).

11.2 Extent of Remediation

The extent of remediation is summarised below:

- ACM impact identified in the area of where former residential dwellings were once located;
- Identified OCP (chlordane) and potential OCP associated with the former golf course greens and tees; and
- Aesthetic impacts (fill areas i.e. tees, greens and where previous and current residential dwellings were/are located).

The likely extent of the identified impacts is shown on Drawing 3, Appendix B. As previously noted, once current residential dwellings are removed, some additional ACM is likely to be encountered and may require similar treatment.

11.3 Remediation Options Assessment

The preferred hierarchy for remediation of soil at contaminated sites in a decreasing order of preference, as set out in NEPC (2013) and outlined in NSW EPA *Contaminated Land Management Guidelines for the NSW Site Auditor Scheme* 3rd Edition (NSW EPA, 2017) is:

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

DP assessed selected remediation alternatives, taking into considerations their applicability for the site, time constraints, economic feasibility, long-term management implications, and potential environmental and health impacts. Off-site treatment is generally not viable for asbestos, therefore this option is not further considered at this time. The remediation options evaluation is summarised in Table 5 below and

includes a red (not suitable), amber (potentially suitable – refer to comments) and green (suitable) overall grading system to assist SINSW in their decision making.

Table 5: Summary of Remediation Options Appraisal

Option	Remediation Scope		
	Scope 1 – Bonded ACM in Fill Material	Scope 2 –OCP in Tees and Greens	Scope 3 – Aesthetic Impacts
1 – Do nothing	<p>As ACM has been identified in topsoil fill material and along the ground surface where former residential dwellings were previously located, this approach is not considered suitable.</p> <p>This is due to the likely disturbance of ACM during construction works which would likely result in the release of asbestos fibres.</p> <p>This option would only be suitable should development plans be modified to avoid development within the area and have the area fenced off from the proposed school.</p>	<p>The reported chlordane concentration was above the HIL within the fill material. There is the potential for agricultural plot and/or playground areas to be developed where chlordane was identified, this approach is not considered suitable.</p>	<p>The aesthetic impacts that were identified within the site would not be suitable to leave as it is on-site (i.e., glass, nail, terracotta pipe fragments). Some oversized fragments of material would not be suitable for material re-use on-site as well.</p>
	Not suitable	Not suitable	Not suitable
2 – On-site treatment and off-site disposal to landfill.	<p>ACM can be removed using a process of excavating fill, placing in a dedicated treatment area where it is spread out for visual inspection and removal of ACM by a team of pickers. Treated material would be validated to demonstrate if RAC have been met.</p> <p>It is not recommended that the topsoil fill be reused on-site. The validated material would be proposed to be assessed for a waste classification and be disposed off-site to landfill.</p>	<p>Excavation, treatment, stockpiling, waste classification and off-site disposal to landfill.</p>	<p>Excavation, segregation (sieving), waste classification and/or off-site disposal to landfill or recycling centre (e.g. concrete recycler). Soil material could also be reused on-site if it meets the adopted RAC for aesthetic impacts.</p>

Option	Remediation Scope		
	Scope 1 – Bonded ACM in Fill Material	Scope 2 –OCP in Tees and Greens	Scope 3 – Aesthetic Impacts
	Potentially Suitable – This option would require more validation work.	Potentially Suitable – It may be more cost and time effective to skip on-site treatment of OCP	
3 – Excavation of borrow pit and placement of impacted fill material at depth	<p>ACM impacted fill material can be excavated and temporarily stockpiled on site. Strategic re-burial of the ACM impacted topsoil fill within open-space areas of the site and at least 1.0 m below ground level so that soil is not exposed by future erosion and/or excavation for services.</p> <p>The borrow pit should be located in an area of the site where it likely will not be disturbed, e.g. outside of building footprints/beneath roadways or public space areas where basement car parking will not be present.</p> <p>Placement of asbestos impacted material on site would require an ongoing asbestos management plan.</p>	<p>Could be contained and capped on site beneath an engineered barrier subject to leachability analysis.</p>	<p>Could be contained and capped on site. However, oversized anthropogenic material would not be suitable to be placed as fill.</p>
	Not Suitable – The client has expressed that they do not wish to have a burial pit within the site.	Not Suitable – The client has expressed that they do not wish to have a burial pit within the site.	Not Suitable – The client has expressed that they do not wish to have a burial pit within the site.
4 – Off-site disposal to an approved facility.	<p>Whilst off-site disposal would remove the maintenance and risk legacy associated with impacted soils, the disposal costs will be significant, with current soil disposal costs at the Jindabyne Regional Waste Management Facility and Cooma Landfill of \$260/tonne in tip fees alone.</p>	<p>Excavation, stockpiling, waste classification and off-site disposal to landfill. The estimated volume of OCP impacted material is considered to be relatively small.</p>	<p>Excavation, stockpiling, waste classification and off-site disposal to landfill</p>

Option	Remediation Scope		
	Scope 1 – Bonded ACM in Fill Material	Scope 2 –OCP in Tees and Greens	Scope 3 – Aesthetic Impacts
	Current estimates of the area and depth of fill that requires remediation indicates approximately 3,300 m ³ of fill material would require off-site disposal. It is considered that the cost of disposal of such a volume of material may not be prohibitive when compared to the overall cost of the project development.		
	Suitable	Suitable	

12. Remediation Strategy

12.1 Overview

The extent of remediation works is outlined in Section 11.2. Taking into account the nature and potential extent of remediation required and the proposed development, the recommended remediation approaches are summarised below (in general order). It is noted that remediation works should not commence until the current site residential dwellings have been demolished and further inspections for the presence of ACM conducted:

1. Set up the remediation area;
2. Remediate areas containing ACM, OCP and aesthetic impacts (see remediation options below). Refer to Drawing 3, Appendix B for known lateral extent of impact;
3. For any material that is proposed to be disposed off-site, the material will need to be sampled to prepare a waste classification assessment; and
4. Validate excavation footprints of remediated areas.

The detailed procedures and sequence for the remediation work will rest with the contractor and will depend upon the equipment to be used and the overall sequence of the remediation or development. It is the contractor's responsibility to devise a safe work method statement and to implement proper controls that enable the personnel undertaking the remediation to work in a safe environment. This RAP does not relieve the contractor(s) of their ultimate responsibility for occupational health and safety of their workforce and to prevent contamination of areas outside the immediate workspace. This RAP sets out the minimum standards and guidelines for remediation that will need to be used in preparing a method statement.

Asbestos remediation works must be undertaken by an appropriately licensed asbestos remediation contractor and in accordance with *Work Health and Safety Regulation NSW 2011* and any other applicable SafeWork NSW or Safe Work Australia regulations or guidelines.

DP recommends that the remediation contractor must be licensed for Class B asbestos removal. A Class B licence is suitable the remediation given that asbestos at the site has been identified in a bonded (non-friable) form (i.e. ACM in good condition). In the event that FA/AF are observed during the remediation, works shall cease until a Class A asbestos removal license is obtained by the remediation contractor. Additionally, a licenced asbestos assessor must undertake air quality monitoring if FA or AF are identified.

The licensed asbestos remediation contractor must give written notice to SafeWork NSW at least five days before remediation work commences.

12.2 Set up Remediation Area

Prior to the implementation of the proposed remediation, the site is to be established in accordance with all NSW legislative requirements. Establishment of the remediation area should be undertaken.

Appropriate signage and demarcation must be placed around both the remediation area and ACM material awaiting disposal so to prevent cross contamination as well as prevent unauthorised access by non-inducted personnel and members of the public.

12.3 ACM Remediation Options

With reference to Table 5, DP have been advised by the client that they would prefer to remediate the site using Options 2 and 4.

12.3.1 Option 2 – ACM Impacted Topsoil Fill

Option 2 is the preferred asbestos treatment scope for Area 2 as highlighted on Drawing 3, where either ACM was observed to be below the SAC or not observed during investigation works. As a mixture of surface and buried asbestos fragments were noted across the site, it is recommended that an asbestos treatment area (ATA) should be established at the site for treatment of ACM-impacted soils. The ATA should be covered with geotextiles and/or black plastic to minimise the possibility of moving ACM from one area of the site to another. The treatment of asbestos on-site, methods from the WA DoH (2009) Guidelines or the Assessment and Management of Asbestos Contaminated Sites must be followed.

The following steps should be undertaken for the remediation of materials contaminated with bonded ACM fragments, initially as a trial to demonstrate that screening/segregation (treatment) will meet the desired objectives:

1. Vegetation, where practical and allowed should be removed where remediation is to occur;
2. Before moving the material to the ATA, raking and “emu bobbing” by the Remediation Contractor for surface fragments of ACM should occur first. At least two passes (and then as many as required) must be completed until a final validation pass results in no visible bonded ACM being found;
3. After the surface remediation/removal of ACM fragments, excavation of ACM-impacted fill and transport to the designated ATA awaiting treatment. The excavation of the impacted topsoil fill and placement into the ATA will also assist in “loosening”/breaking apart any cohesive topsoil fill material;
4. Spreading materials in a designated ATA in a layer no thicker than 0.1 m. Given the inherent heterogeneous distribution of bonded ACM in fill, it is recommended that impacted materials are treated in 10 m³ portions to minimise the potential for mixing of highly impacted soils with low/non impacted soils as part of the treatment process and to mitigate overall risks associated with potential cross-contamination;
5. Inspection and removal by hand (“emu-bobbing” and raking) of the asbestos by the Remediation Contractor. At least two passes (and then as many as required) should also be applied when emu-bobbing the 10 m³ portions;
6. Re-working and spreading the material across the ATA using appropriate plant/equipment, with the material being “emu-bobbed” and raked by the Remediation Contractor. Clods of clay must be broken down/crushed as part of the spreading process. Each spreading should be recorded, which would specify the date, time, ID of stockpile, volume of material being treated, description of the soil, number of passes, number of asbestos finds per pass, and photographed;

7. Repeating the spreading and “emu-bobbing” process iteratively until no bonded ACM fragments are observed on three consecutive complete passes by the Remediation Contractor and Environmental Consultant;
8. Place recovered bonded ACM in a demarcated stockpiling/treatment/storage area with clear signage and fencing to limit access. Double bag bonded ACM fragments for temporary storage whilst on site in a secure designated area awaiting off-site disposal;
9. Soil that has been remediated should be placed in a demarcated stockpiling area. Validation of the material by both visual, screening test and laboratory analysis and with reference to the procedures specified in NEPC (2013) and DoH (2009) guidelines (for potential off-site General Solid Waste disposal):
 - a. Validation samples collected by the Environmental Consultant at a minimum approximate rate¹ of one sample per 10 m³ comprising:
 - i. Manual on-site screening by passing one ~10 L bulk sample through a 7 mm aperture sieve (or spreading out each sample on contrasting coloured sheeting if soils are too cohesive) for visual identification of bonded ACM and weighing recovered fragments to calculate the asbestos %w/w and compare against the RAC (Section 10);
 - ii. Collect a 500 ml sample for each ~10 L sample for laboratory analysis of FA and AF (with scope to reduce the frequency to 30% if bonded ACM is consistently observed to be in good condition) to calculate the asbestos %w/w and compare against the RAC (Section 10); and
 - iii. Should the material need to be taken off-site, chemical analysis is also recommended to provide a waste classification.
10. If the tests indicate that the material fails validation due to the presence of bonded ACM fragments, the treatment/process can be repeated. If the tests indicate that the material fails the validation due to FA and AF in soil, it will be considered a contingency situation (i.e. off-site disposal to landfill);
11. Successfully validated material will either be reused on-site (see section 12.6 for aesthetic impacts) in appropriate areas (i.e. landscaped areas within the high school area) or if the material is to be removed off-site, the material will be subject to a waste classification assessment and disposed off-site; and
12. Following completion of all treatment, visual validation of the resultant ATA surface should be undertaken by the Environmental Consultant including the collection of validation samples in accordance with Section 13.

The procedures described herein must be clearly documented including compilation of a photographic record. All pieces of bonded ACM and material not suitable for HIL-A land use are to be manually removed as they are encountered during the remediation and bulk earthworks programme and disposed off-site in accordance with regulatory requirements. The removal of these materials shall be recorded on daily field sheets that are to be copied and provided to the Environmental Consultation for inclusion in the validation report. The recorded information shall include, but may not be limited to, the date,

¹ The nominated minimum approximate frequency of one sample per 10 m³ exceeds that recommended in DoH (2009) for the validation of ‘screened’ material of one sample per 70 m³. The recommended sampling frequency is considered appropriate given that treatment will not comprise ‘screening’ through a 7 mm x 7 mm (or larger) mesh, rather, it will comprise turning and manual hand picking which has a lower likelihood of removing all or most ACM fragments.

location, description of the material removed, quantity estimate, and how it was disposed, including tip docket for volume reconciliation.

Measures are to be taken by the Remediation Contractor to minimise dust generation capable of leaving the ATA. Air quality (para-occupational monitoring) adjacent to the ATA shall be monitored by the Environmental Consultant while stockpiles are present or soil treatment is occurring. The para-occupational monitoring shall be undertaken with reference to the National Occupational Health and Safety Committee (NOHSC) (2005a) *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Edition [NOHSC:3003 (April 2005)]* during the remediation works using static battery operated air monitoring pumps.

It is also recommended that when the soil has been cleared of ACM, the material should be screened/sieved for anthropogenic material inclusions (see Section 12.6).

12.3.2 Option 4 – Off-Site Disposal of ACM Impacted Soils

Option 4 is the preferred asbestos treatment scope for Area 1 as highlighted on Drawing 3, where ACM was observed to be above the SAC. The following remediation methodology is proposed for the ACM impacted topsoil fill within the south-east portion of the site (with responsibilities shown in brackets):

1. Undertake air monitoring during the works (Environmental Consultant/Licensed Asbestos Assessor).
2. Excavation of fill within the identified Area 1 shown on Drawing 3, Appendix B (Asbestos Contractor) under full time monitoring of the Environmental Consultant. Excavation should progress to chase out all fill observed within the side walls of the excavations, if present.
3. Stockpile materials, waste classify and dispose excavated fill to a waste facility licensed to receive asbestos waste and obtain EPL from specified facility (Asbestos Contractor).
4. Supply tipping docket to the Environmental Consultant (Asbestos Contractor) for waste reconciliation purposes.
5. Validation of the resultant remedial excavation surface and sidewalls, undertaken by the Environmental Consultant, including the collection of validation samples in accordance with Section 13.
6. If required, further excavation by the contractor to 'chase out' any additional impacted materials identified by the validation inspection and sampling which should be followed by further validation by the suitably qualified Environmental Consultant as required.
7. Survey of the full extent of the remediation areas, supply coordinates and produce a survey drawing showing the extent of the known location of the remediation area relative to proposed development layout.

12.4 Surface ACM

ACM sheeting was observed on the ground surface of the site both in DP's PSI-L (DP, 2021) and targeted DSI (DP, 2021a). The observed surface ACM should be collected and double bagged by a licensed asbestos removalist and disposed off-site to a licensed landfill facility. At the completion of the

ACM sheeting removal, a clearance inspection is to be carried out and written certification is to be provided by the licensed asbestos assessor that the area is safe to be accessed and worked. Clearance should include soil samples, which should be collected by the EC, and asbestos analysis. Soil samples are to be collected at a rate of one sample per 25 m².

12.5 OCP Remediation

DP recommends that Option 4 is utilised for the remediation of OCP impacted soils as shown on Drawing 3, Appendix B. It is envisaged that the remedial works will comprise the following scope:

1. Excavation of the topsoil/top portion of fill (approximately 0.15 to 0.5 m bgl) in the green and tee areas of the site;
2. The material is to be stockpiled either on a hardstand area or on plastic sheeting and a waste classification assessment is to be undertaken of the excavated material for disposal off-site;
3. Validation of the resultant remedial excavation surface and sidewalls, undertaken by the Environmental Consultant, including the collection of validation samples in accordance with Section 13.

DP notes that OCP and other associated contaminants of concern (heavy metals and OPP) were not observed in the other areas of greens and tees within the site. However, DP recommends that the topsoil fill material and top portion of fill associated with the greens and tees should be disposed of off-site to reduce the risk of potential on-site OCP contaminants, subject to a formal waste classification assessment. Validation of the underlying soils would determine whether the soil can be reused on site or if it will need to be disposed of off-site.

12.6 Aesthetic Impacts

12.6.1 Topsoil Fill

Topsoil fill within the site is considered to not be appropriate from a geotechnically point of view to be used as controlled fill. Therefore, it is considered that the topsoil fill may be able to be reused on-site in landscaping areas (preferably within the high school campus only and outside of the agricultural plot), providing that the topsoil fill is not impacted by ACM, OCPs or other potential contaminants.

The remediation criteria for aesthetic impacts are discussed in Section 10.3 and states that topsoil fill should contain less than 5% of anthropogenic material by volume. Before the topsoil is reused on-site, it will need to be screened/sieved to remove as much anthropogenic material as possible. The material should be placed in a demarcated stockpiling area where samples can be collected to determine whether the material is suitable to be reused or not. Anthropogenic material should also be placed in a demarcated stockpiling area and disposed off-site correctly (where possible, the material should be taken to a recycling facility i.e. concrete recyclers). Table 6, in Section 12.7 below would be an appropriate soil sampling regime to assess that the material meets with the adopted RAC for aesthetic impacts. If the material does not meet the adopted RAC for aesthetic impacts, then the material would need to be disposed off-site as waste (see Section 12.7 below).

12.6.2 Fill

Fill material observed on site may be suitable for on-site controlled fill use. It is recommended that this fill material is used in the deeper sections of required controlled fill placement (i.e. the sports oval area). Oversized fragments of anthropogenic material (i.e. > 200 mm in size) must be screened out of the fill and disposed off-site correctly (where possible, the material should be taken to a recycling facility i.e. concrete recyclers). If the fill is not suitable for controlled fill, either mixing should be incorporated with more suitable materials, or the fill material can be validated for landscape use or disposed off-site as waste. Section 12.15 discusses on-site cut/fill activities more in depth.

12.7 Waste Classification/Waste Disposal

A waste classification assessment for all material to be disposed off-site should be carried out in accordance with NSW EPA, *Waste Classification Guidelines*, 2014. The scope of the assessment will depend on the volume and type of material requiring disposal. It should be noted that the NSW EPA *Waste Classification Guidelines*, 2014 do not outline a sampling density guideline. However, it is recommended that sampling should be undertaken in general accordance with the 'Sampling Guidelines' section of the EPA Victoria guidance titled *Industrial Waste Resource Guidelines IWRG 702 – Soil Sampling* dated June 2009. For homogenous fill material that is proposed to be disposed off-site, it should be assessed with reference to the sampling regime outlined in Table 6 below. Each stockpile generated should be treated as a separate domain and sampled as such. It is not appropriate to combine stockpiles excavated from different areas in order to reduce the sampling requirements outlined below.

Table 6: Adopted Sampling Guidelines for Proposed Waste Classification

Volume of Soil (m ³)	Number of samples	Number of samples with a 95% UCL average
< 200	Minimum of three samples per stockpile, then one sample per 25 m ³ of material should be collected.	Minimum of 10 samples should be collected.
200 – 2,500	Minimum of one sample per 25 m ³ of material	Minimum of 10 samples should be collected.
> 2,500	Minimum of one sample per 25 m ³ of material	Minimum of one sample per 250 m ³

For **heterogeneous fill** material, a minimum of **one sample per 25 m³** of material should be collected.

No soils should leave the site without a formal waste classification. The environmental consultant is to undertake the necessary sampling and reporting to provide the final waste classification.

12.8 Contingencies for Unexpected Finds

DP (DP, 2021b) recommended that during development, a construction environmental management plan (CEMP) incorporating an asbestos finds protocol and unexpected finds protocol (UFP) should be prepared and implement during future construction.

If unexpected conditions are encountered during site works (such as buried tanks and further suspected ACM or pesticide impacted soil), the following general approach will be adopted:

- Stop work in the area of impact and barricade area to prevent access;
- The Remediation Contractor is to contact the principal's representative (PR) or their Project Manager and the Environmental Consultant;
- The Environmental Consultant will make an assessment of the severity/extent of the unexpected find in terms of the potential impact to human health and the environment;
- The Environmental Consultant will liaise with the PR as required;
- The Environmental Consultant will provide advice to the PR regarding the recommended course of action; and
- The Remediation Contractor is to implement the agreed management/remedial strategy.

12.9 Minimisation of Cross-Contamination

Appropriate measures should be adopted, as required, to eliminate or at least minimise the potential for cross contamination. In addition to the recommendations provided in the following sections for management of the remediation works, plant movement within areas of active remediation should be restricted and monitored to ensure vehicles do not unnecessarily pass over validated surfaces or through contaminated areas.

12.10 Contingency for Stockpiling of Contaminated Soils

Potentially contaminated material shall be stockpiled at a suitable designated location. Dust control is required for all stockpiled materials and should include light conditioning with water (spray) for exposed materials or covering with anchored geotextile or similar.

All stockpiles of contaminated material which may be required to remain on the site overnight shall be demarcated to clearly delineate their boundaries and be adequately secured in order to reduce the risk of sediment runoff and dust blow. Should the stockpiles remain for over 48 hours, they should be appropriately managed to prevent fugitive dust leaving the site (e.g.: light wetting or covering with anchored geotextile depending on weather conditions). Stockpiles should either be placed on an impermeable surface or the defined stockpile footprint area must be subject to validation upon completion of the remediation works (refer to Section 13).

12.11 Spoil Contingency Plan

Any materials which fail to meet the EPA criteria for direct landfill disposal (i.e. Hazardous Waste materials) following initial waste classification/assessment will require segregation and separate stockpiling pending further testing and treatment. The contingency plan to cater for the storage, treatment and disposal of these materials is as follows:

- On the basis of on-site observations and the contaminant exceedances detected, materials should be carefully excavated, segregated and placed in well delineated locations;
- Stockpiles of excavated materials should be appropriately banded with hay bales/sandbags and if required, conditioned with water, covered and/or lined with anchored impermeable plastic sheeting or geotextile to prevent dust generation;
- If considered appropriate, further sampling and analysis should be conducted to more fully characterise the subject material, and confirm its contamination status. If the further characterisation works show that the material can be classified as General Solid or Restricted Solid Waste, dispose of the material directly to an appropriately licensed landfill;
- Review potential options for the treatment, reuse or recycling of the material, and adopt options identified to be suitable for the subject material; and
- Review EPA General Immobilisation Approvals on the EPA website. If an applicable General Immobilisation Approval exists, further assess/dispose of the waste in accordance with the approval and other approvals or licences as required by the EPA.

12.12 Loading and Transport of Spoil

All transport of waste and disposal of materials must be conducted in accordance with the requirements of the POEO Act. All licences and approvals required for disposal of the material should be obtained prior to removal of the materials from the site.

Removal of waste materials from the site shall only be carried out by a licensed contractor holding an appropriate licence, consent and/ or approvals to dispose of the waste materials according to the assigned waste classification and the corresponding requirements outlined in NSW EPA (2014), and with the appropriate approvals obtained from the EPA, if required.

Transport of spoil shall be via a clearly delineated, pre-defined haul route. Truck dispatch shall be logged and recorded by the Contractor for each load leaving the site associated with the remediation. A record of the truck dispatch should be provided to the principal and the environmental consultant.

12.13 Disposal of Material

All materials removed from the site (including VENM) shall be disposed in accordance with the POEO Act to a facility/site legally able to accept the material. The environmental protection licence (EPL) of receiving sites should be checked by the contractor and provided to the principal prior to transport of materials to the receiving sites to demonstrate that the waste is being legally disposed. Copies of all necessary approvals from the receiving site should be given to the principal prior to any contaminated material being removed from the site.

All relevant analytical results, as part of waste classification reports, shall be made available to the contractor and proposed receiving site/waste facility to enable selection of a suitable disposal location.

A record of the disposal of materials should be maintained. Copies of all consignment notes for the transport, receipt and disposal (tip dockets) of all materials (including VENM) should be maintained as part of the site log and made available to the environmental consultant for inspection and reporting purposes upon request.

12.14 Materials for Use in Backfilling and Imported Fill

Any additional material required for redevelopment works, including backfilling of remedial excavations shall be either:

- Uncontaminated material from the site (i.e. materials meeting the RAC, such as other uncontaminated soil on site); or
- Imported material, which is to be analysed and certified as VENM, as well as meeting the RAC and via a validation certificate by the contractor. The VENM is to be inspected by the Environmental Consultant at the point of importation/placement to confirm that the materials are consistent with documentation and free of contamination, including ACM and AF/FA. The material and material management should also comply with relevant legislation (e.g. *POEO Act 1997*).

The report for any imported VENM is to be prepared by a suitably qualified consultant. Sampling and analysis of any imported material should be undertaken to confirm its suitability for use on the site as follows:

- Collect samples at a density of 1 sample per 1,000 m³ of imported VENM, or a minimum of three samples per source site;
- Analysis of samples for metals (eight), PAH, TPH, BTEX, PCB, OCP, OPP, phenol, asbestos (including ACM and FA/AF) and any other identified contaminant of concern;
- Collection and analysis of QA/QC samples in accordance with Section 13.3; and
- Comparison of results with published background levels and the RAC and SAC to determine its status as VENM and its suitability for use on the site.

Materials used on site should also meet other requirements (eg: geotechnical and salinity requirements). It should also be noted that DP are not aware of any NSW EPA Resource Recovery Orders/Exemptions for the site and therefore, VENM should only be imported into the site or on-site reuse of material can occur.

During remediation works and future construction works, the appointed contractor/s must ensure that the documentation and recording of imported/exported material is implemented (i.e. material tracking register that enables reconciliation with the material type, waste classification, material origin, final destination/placement, volumes and receipt docket).

Monitoring data, documents and records shall be maintained so that they are identifiable and readily

available for inspection at any time during the remediation and construction works. The super-intendent or developer of the proposed Jindabyne Central School would be responsible for keeping detailed records of audits and the audit reports.

12.15 On-Site Cut/Fill Activities

DP understands that the site will undergo cut and fill activity. Continual visual inspection of the excavated material should be conducted for signs of contamination. Segregation of stockpiles should occur when material exhibits clear visual signs of potential contamination (chemical, asbestos and aesthetic impacts). Visual signs of contamination includes but is not limited to:

- Building rubble/demolition waste;
- Construction waste from previous developments (i.e. buried silt fences, plastic, pipe off-cuts, etc.);
- Ash;
- Grease and oil;
- Batteries;
- Tyres;
- Potential asbestos containing material; and
- Stained and odorous soils.

DP notes that the designated spotters should be trained/inducted for visual signs of potential contamination. Where possible, sieving of foreign anthropogenic materials should occur to separate soil material and anthropogenic materials.

A suitably qualified environmental consultant should also be engaged to assess any material that has been segregated and considered to be contaminated. Any assessment conducted should outline whether the material is suitable to be reused on-site or if it needs to be disposed off-site.

13. Validation Plan

13.1 Validation Scope

The objective of the validation plan is to assess the results of post remediation testing against the RAC stated within this RAP (Section 10). All validation works as part of the RAP must be adequately recorded throughout the course of the remedial works.

The validation assessment will be conducted in accordance with Data Quality Objectives (DQOs) and Quality Assurance/Quality Control (QA/QC) procedures to demonstrate the repeatability and reliability of the results.

The following DQOs will be adopted based on those provided in Appendix B, Schedule B2 of NEPC (2013). The DQO process is outlined as follows:

- State the Problem;

- Identify the Decision;
- Identify Inputs to the Decision;
- Define the Boundary of the Assessment;
- Develop a Decision Rule;
- Specify Acceptable Limits on Decision Errors; and
- Optimise the Design for Obtaining Data.

A checklist of Data Quality Indicators (DQI) will be completed as part of the validation assessment.

13.2 Validation of Excavations

13.2.1 ACM

The following validation works will be carried out by the Environmental Consultant and/or Asbestos Assessor, where required:

- Visual inspection of the excavation extent and/or demolished dwelling footprints;
- If any ACM is observed during the visual inspection, an additional 0.3 m of soil should be removed below the observed ACM or in natural strata if encountered at a shallower depth;
- The excavation surface will be validated on a 5 m x 5 m grid basis unless in areas where pre-validation results are consistently below the RAC and as advised by the Environmental Consultant;
- Sampling of the side walls of excavations will be undertaken at 5 m lateral and 1 m depth intervals. Sampling shall be conducted with reference to NEPC (2013) and DoH (2009) guidelines and shall include collection of ~10 L bulk samples and a 500 mL sample for each ~10 L bulk sample for laboratory analysis of AF and FA; and
- Field screening and laboratory assessment results shall be used to calculate the asbestos %w/w and compare against the RAC.

13.2.2 ACM Conduits (Underground Services)

The following validation works will be carried out by the Environmental Consultant and/or Asbestos Assessor/Removalist should ACM conduits from underground services be encountered during remediation works or future development works:

- Engage a licensed asbestos removalist to determine if the service contains asbestos;
- If the service does contain asbestos, the service needs to be confirmed whether it is currently in-use or redundant. If the service is still in-use, the location and nature of the infrastructure should be recorded/registered with the Schools Asbestos Register. If the service is redundant, the service should be removed by a licensed asbestos removalist;
- Once the ACM service line is removed, a visual inspection of the excavation extent including the walls and the base of the trench line should be undertaken;
- If any ACM is observed during the visual inspection, an additional 0.3 m of soil should be removed below the observed ACM or in natural strata if encountered at a shallower depth;

- The excavated trench line will be validated every 5 m lateral intervals within the walls (two walls) and base of the trench excavation

13.2.3 OCP

The following validation works will be carried out by the Environmental Consultant:

- Visual inspection of the excavation extent; and
- The excavation surface will be validated on a 5 m x 5 m grid basis unless in areas where pre-validation results are consistently below the RAC and as advised by the Environmental Consultant. Sampling of the side walls of excavations will be undertaken at 5 m lateral and 1 m depth intervals.

13.2.4 Aesthetic Impacts

The aesthetic impacts are considered to be a source of physical contamination within fill and possibly the upper 0.3 m of natural soil (should anthropogenic material be compacted into the natural ground during past fill placement). Therefore, it is considered that an Environmental Consultant should visually inspect an area of excavation once the fill has been removed. Should the visual inspection of the removed fill indicate that there may be the possibility of chemical contamination, the excavation surface will be validated with soil sample collection on a 5 m x 5 m grid basis. Sampling of the side walls of excavations will be undertaken at 5 m lateral and 1 m depth intervals.

13.3 Quality Assurance Plan

13.3.1 Sample Collection and Handling

The general sampling procedures comprise:

- The use of stainless steel or disposable sampling equipment;
- Decontamination of sampling equipment prior to the collection each sample;
- Labelling of the sample containers with individual and unique identification including Project No. and Sample No.; and
- The use of chain-of-custody documentation so that sample tracking and custody can be cross-checked at any point in the transfer of samples from the field to hand-over to the laboratory.

13.3.2 Field QA/QC

Appropriate sampling procedures will be undertaken to prevent cross contamination. These include:

- Standard DP operating procedures are followed;
- Samples are stored under secure, temperature-controlled conditions;
- Inter-laboratory and intra-laboratory replicate samples should be collected and sent for laboratory analysis at a rate of 5% per primary sample;
- Trip blank, trip spikes and rinsates (if appropriate) should also be sent for laboratory analyses at a rate of one per sampling event;

- Chain-of-custody documentation is employed for the handling, transport and delivery of samples to the selected laboratory; and
- Proper disposal of contaminated soil, fill or surface water originating from the site.

13.3.3 Laboratory QA/QC

A National Association of Testing Authorities (NATA) accredited laboratory will be used to conduct analysis.

13.3.4 Achievement of Data Quality Objectives

Based on fulfilment of the data quality objectives, an assessment of the overall data quality will be presented in the final validation report.

13.4 Validation Reporting

A validation assessment report will be required once the remediation works have been completed and should be prepared by the environmental consultant in accordance with EPA NSW *Guidelines for Reporting on Contaminated Land: Contaminated Land Guidelines* (2020). The validation report(s) may be prepared in a staged manner, depending on the Project Programme.

The objective of the validation report will be to document that the site has been remediated to a suitable standard for the proposed redevelopment and that no related adverse human health and environmental effects have occurred as a result of the works. The validation report will include:

- Documentation of the implementation of the Remedial Strategy;
- Details of the location and total estimated volume of materials excavated and replaced within the site and volume of material removed from the site for disposal as well as the tonnages reported by the licensed landfill;
- Photographic record during the works and of final excavations;
- Survey records of excavations and final levels after fill placement;
- Drawings showing contamination assessment sample locations and validation sample locations;
- Detailed analytical results;
- Details of materials imported to the site, as required; and
- Details, including survey records, of the final cover.

14. Site Management Plan for Remediation Works

It is the responsibility of the Contractor to develop a Site Management Plan (SMP) detailing overall site management, environmental management (including soil, air and water) and occupational health and safety (OH&S) plans. This section provides a brief summary of some of the items which need to be included in the Contractor's plans.

Works should comply with all legislative requirements including, but not limited, to those set out under the following Acts (and subsequent amendments and regulations):

- Environmentally Hazardous Chemicals Act (1985);
- *Hazardous Chemicals Act (1985)* (under review);
- Environmental Offences and Penalties Act (1989);
- Agricultural and Veterinary Chemicals Act (1994);
- *Protection of the Environment Operations Act (POEO) (1997)* and associated exclusions;
- *Pesticide Act (1999)*;
- Work Health and Safety Act 2011;
- *OHS Amendment (Dangerous Goods) Act 2003* (including OHS Amendment (Dangerous Goods) Regulation 2005); and
- *POEO Amendment Act 2005* (including POEO Amendment (Scheduled Activities and Waste) Regulation 2008).

14.1 Site Operations

The schedule of remedial works, including timing and staging is to be prepared by the Contractor to meet the requirements of this RAP.

It is the site owner/developer's responsibility to ensure that appropriate personnel are appointed to manage and conduct the remediation and validation works. This will include:

- The Principal's Representative, who is responsible for overseeing the implementation of this RAP;
- The Contractor, who is responsible for overseeing the implementation of this RAP, conducting the remedial works (may be subcontracted) and managing the site; and
- An Environmental Consultant, who will be responsible for providing advice as required for the remedial works and undertaking the validation works in accordance with this RAP.

Other parties who may be employed to assist in the implementation of this RAP include, but are not limited to, occupational hygienist(s) and licensed asbestos contractor(s).

The Contractor will be responsible for preparing a list of contacts for the works, including emergency contacts for the site operations and provision of signage at the site to allow the public to contact nominated site personnel out of hours.

14.2 Environmental Management

The work shall be undertaken with all due regard to the minimisation of environmental effects and to meet all statutory requirements. The Contractor shall have in place a Contractors' Environmental Management Plan (CEMP) including the following:

- Site stormwater management plan;

- Soil management plan;
- Noise control plan;
- Dust control plan;
- Odour control plan; and
- Contingency measures for environmental incidents.

The Contractor shall also be responsible to ensure that the site works comply with the following conditions:

- All appropriate permits and permissions are obtained for the proposed works;
- Fugitive dust leaving the confines of the site is minimised;
- No water containing suspended matter or contaminants leaves the site in a manner which could pollute the environment;
- Vehicles shall be cleaned and secured so that no mud, soil or water are deposited on any public roadways or adjacent areas;
- Spoil is managed in accordance with this RAP; and
- Noise and vibration levels at the site boundaries comply with legislative requirements.

It should be noted that while surface water and/or groundwater disposal is not anticipated to be required (based on the scale of the proposed works). Any surface water or stormwater that has been in contact with contaminated soils or contaminated groundwater, during site works should be treated as contaminated (unless testing shows otherwise) and cannot be directly disposed of into stormwater or sewer or be re-used on-site.

It should also be noted that at this stage, DP consider that it is not necessary to provide an interim site management plan to restrict public access to the area were ACM impacted soils are located due to the area not being in use by the public and is isolated from the JSRC facilities. However, DP considers that installing para webbing or bunding tape around the areas of concern with appropriate signage would be adequate for the interim.

14.3 Work Health and Safety

The Contractor should develop a site emergency response plan (ERP) and work health and safety management plan (WHSP). This will ensure the safety of the personnel working on site, given any likely emergency situation which may occur. The WHSP and ERP should include emergency phone numbers and details of local emergency facilities.

Appropriate fencing and signage should be installed around and within the site to prevent unauthorised access to the site, restricted access remedial areas (e.g.: asbestos remediation areas) and deep excavations. Signage should be appropriate to inform of the occurrence of asbestos remediation works.

All asbestos works will be conducted by an appropriately licensed asbestos removalist contractor and in accordance with SafeWork NSW requirements.

All personnel on site should be required to wear the following personnel protective equipment (PPE) at all times (as a minimum):

- Steel-capped boots;
- High visibility clothing; and
- Hard hat meeting AS1801-1981 requirements.

The following additional PPE should be worn as required:

- All PPE required by the Licensed asbestos contractor (e.g.: P2 disposable dust mask or a particulate half-face mask with a P3 filter, disposal coveralls);
- Hearing protection meeting AS1270-1988 requirements when working around machinery or plant equipment if noise levels exceed exposure standards;
- Safety glasses or safety goggles with side shields meeting AS1337-1992 requirements (as necessary, particularly during demolition);
- Disposable coveralls (if necessary) to prevent contact with splashed contaminated soil, materials or water;
- Nitrile work gloves meeting AS2161-1978 requirements or heavy duty gauntlet gloves; and
- Any additional protection identified by the Environmental Consultant.

All contractors are required to show compliance with the Work Health and Safety Regulation 2011, including the preparation of a Site Safety Management Plan and Safe Work Method Statements.

15. Conclusion

Remediation of the site in accordance with this RAP should render the site suitable for the proposed primary and high school development and facilitate appropriate management of potential temporary impacts on the environment during the remediation process.

16. Limitations

Douglas Partners (DP) has prepared this RAP report for this project at Part Lot 101 DP1019527, Jindabyne in accordance with DP's proposal CAN200329.P.003.Rev0 dated 27 May 2021 and acceptance received from Scott Kneller of Colliers on behalf of NSW Department of Education - School Infrastructure NSW dated 2 June 2021. The work was carried out under contract ID SINSW01290/20, dated 6 November 2020. This report is provided for the exclusive use of NSW Department of Education - School Infrastructure NSW for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the sub-surface conditions on the site only at the specific sampling and/or testing locations, and then only to the depths investigated and at the time the

work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after DP's field testing has been completed.

DP's advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by DP in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and/or testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

The assessment of atypical safety hazards arising from this advice is restricted to the environmental components set out in this report and based on known project conditions and stated design advice and assumptions. While some recommendations for safe controls may be provided, detailed 'safety in design' assessment is outside the current scope of this report and requires additional project data and assessment.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

Douglas Partners Pty Ltd

Appendix A

About This Report

About this Report

Douglas Partners



Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

Copyright

This report is the property of Douglas Partners Pty Ltd. The report may only be used for the purpose for which it was commissioned and in accordance with the Conditions of Engagement for the commission supplied at the time of proposal. Unauthorised use of this report in any form whatsoever is prohibited.

Borehole and Test Pit Logs

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable or possible to justify on economic grounds. In any case the boreholes and test pits represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Groundwater

Where groundwater levels are measured in boreholes there are several potential problems, namely:

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;

- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

About this Report

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

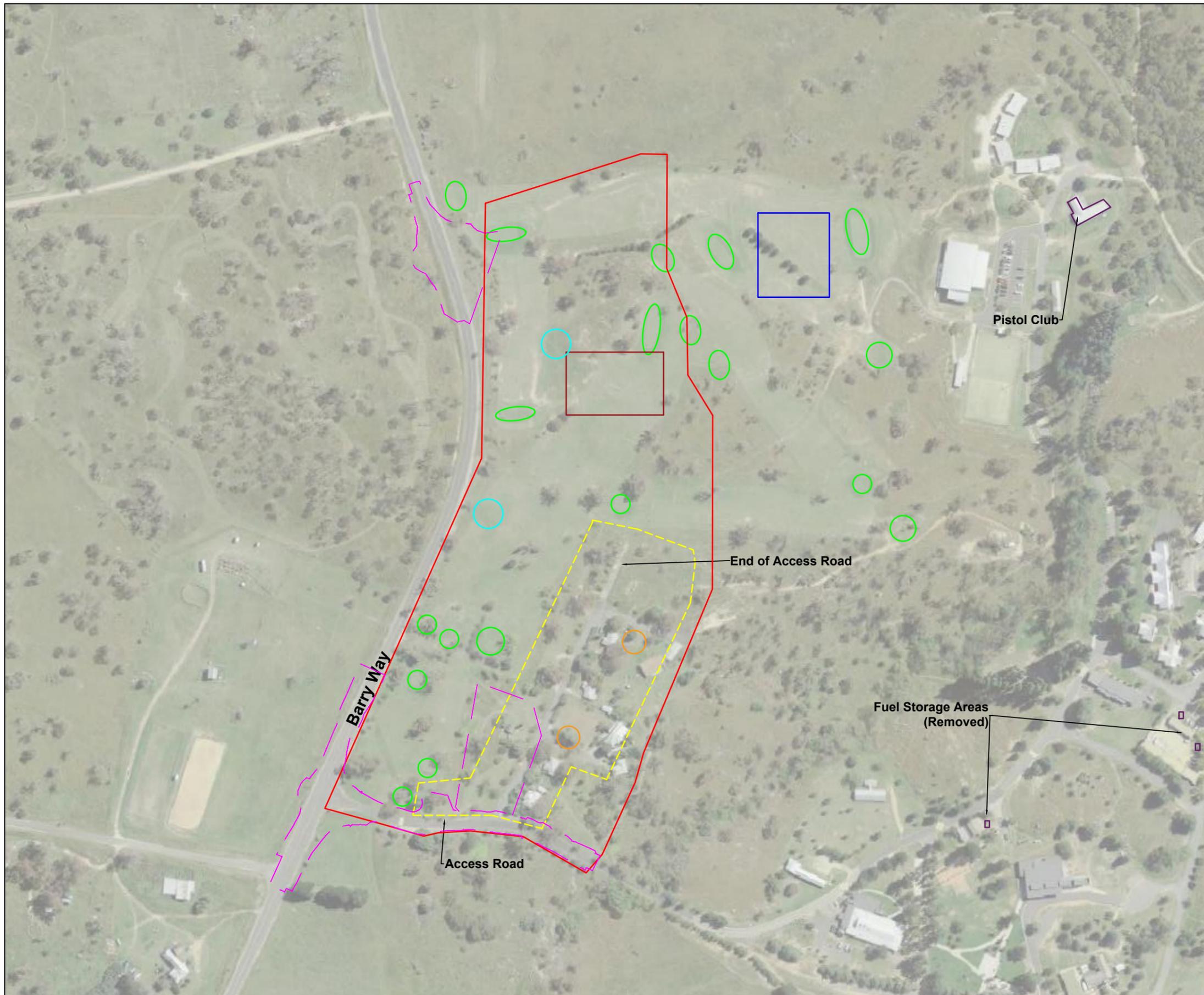
Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

Appendix B

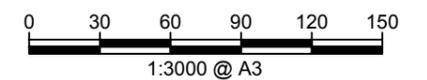
Drawings 1 and 2



Locality Plan

LEGEND

- Approximate Site Boundary
- - - Approximate Boundaries for Areas that are part of a Different Development Application (Roads and TAFE Building) and are not Part of the Site
- - - Approximate Area of Previous and Current Residential Dwellings (also known as south-east portion of the site). Observed Topsoil Fill and Surface Fill with Anthropogenic Materials (Potential Aesthetic Impacts)
- Approximate Area of Tee-Off Points and Greens with Anthropogenic Materials (Potential Aesthetic Impacts)
- Observed Fill (Appeared to not be Associated with Tees and Greens) with Anthropogenic Materials (Potential Aesthetic Impacts)
- Approximate Excavation Area for the Ski-Jump
- Approximate Area of Ski-Jump Construction Site (Residual Soils and Weathered Rock Spoil) Location
- Ground Surface ACM
- SafeWork NSW Search Results (Underground Storage Tanks and Pistol Club)

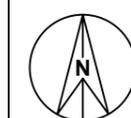


NOTE:
 - Base drawing from maps.six.nsw.gov.au image extracted 22.06.2021.

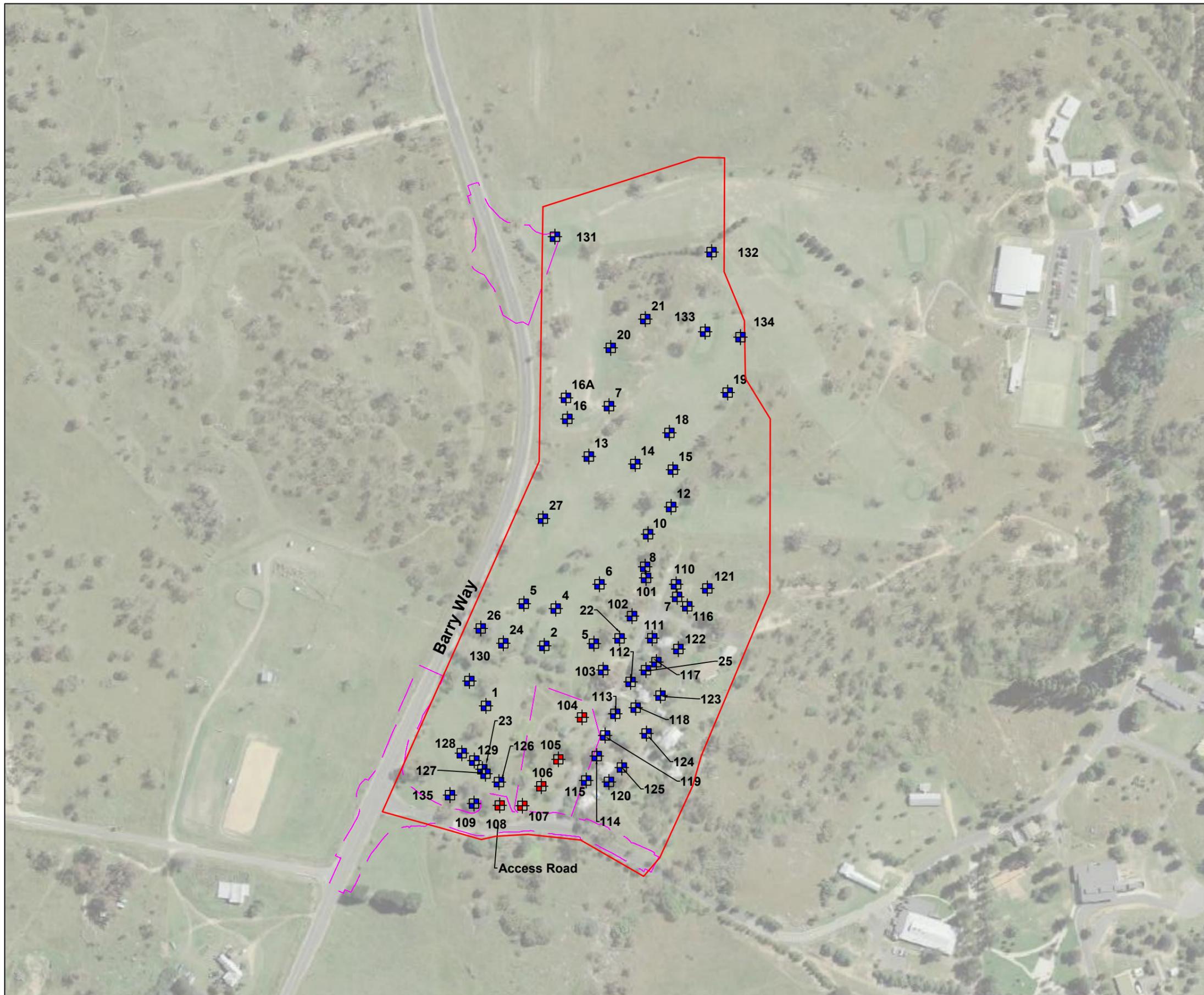


CLIENT: School Infrastructure New South Wales
 OFFICE: Canberra DRAWN BY: SDG
 SCALE: As Shown DATE: 29.11.2021

TITLE: Site Location and Features Plan
Proposed Jindabyne Central School
Part Lot 101 DP1019527, Jindabyne



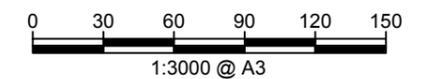
PROJECT No: 103109.05
 DRAWING No: 1
 REVISION: 1



Locality Plan

LEGEND

- Approximate Site Boundary
- - - - Approximate Boundaries for Areas that are part of a Different Development Application (Roads and TAFE Building) and are not Apart of the Site
- Approximate Test Pit Location (PSI-L)
- ¹⁰¹ Approximate Test Pit Location (T-DSI)
- Approximate Test Pit Location that has now been Excluded from the Investigation due to a Site Boundary Change

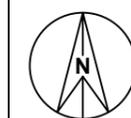


NOTE:
 - Base drawing from maps.six.nsw.gov.au image extracted 22.06.2021.

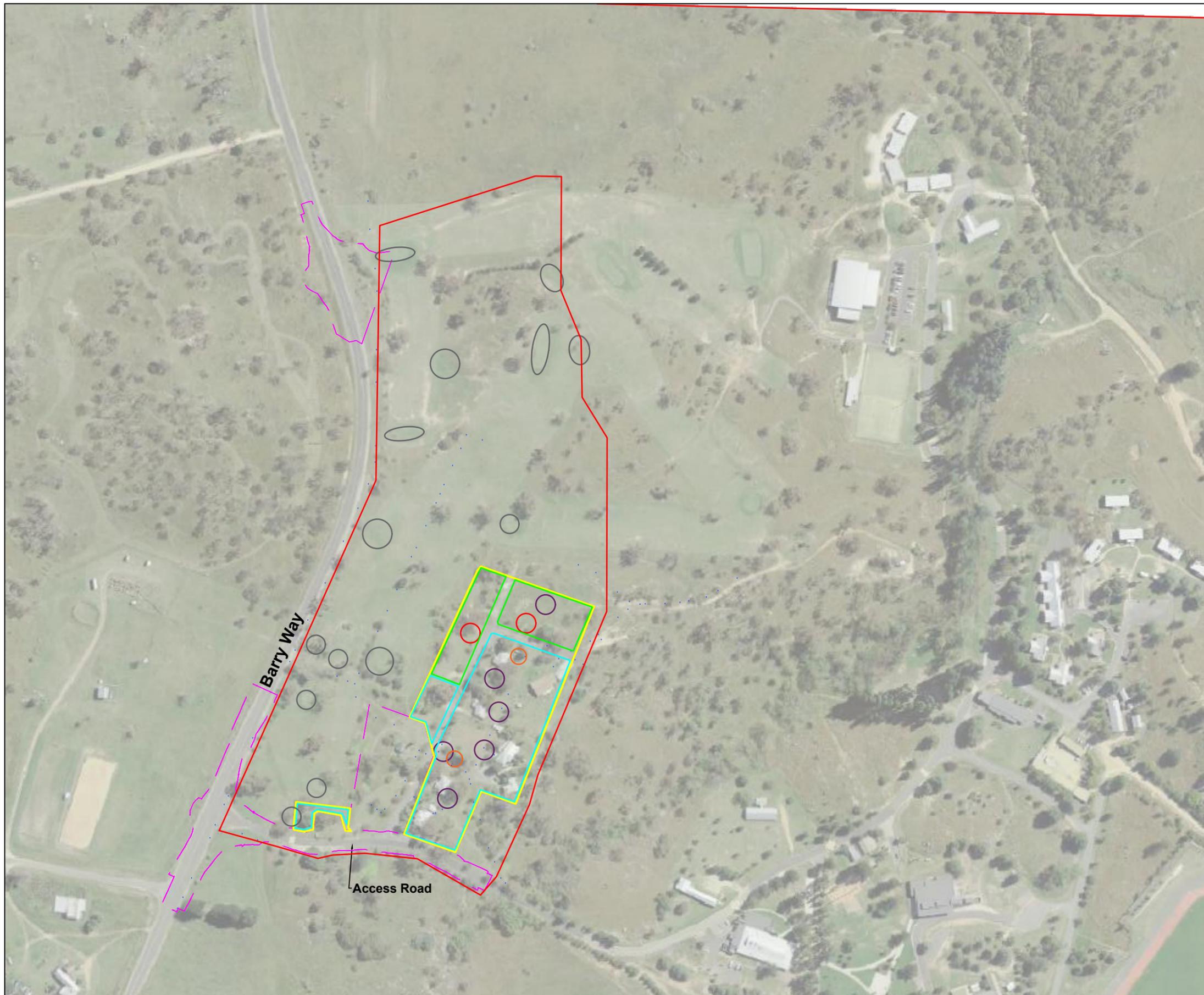


CLIENT: School Infrastructure New South Wales
 OFFICE: Canberra DRAWN BY: SDG
 SCALE: As Shown DATE: 29.11.2021

TITLE: **Test Location Plan**
Proposed Jindabyne Central School
Part Lot 101 DP1019527, Jindabyne



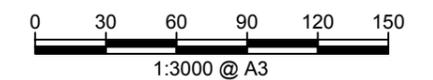
PROJECT No: 103109.03
 DRAWING No: 2
 REVISION: 4



Locality Plan

LEGEND

- Approximate Site Boundary
- - - Approximate Boundaries for Areas that are part of a Different Development Application (Roads and TAFE Building) and are not Part of the Site
- - - Approximate Area of Previous and Current Residential Dwellings (also known as south-east portion of the site). Observed Topsoil Fill and Surface Fill with Anthropogenic Materials (Potential Aesthetic Impacts)
- Area 1 - Area Where ACM was Observed to be above the adopted SAC
- Area 2 - Area Where no ACM was Observed or ACM was Observed below the SAC
- Identified ACM on Ground Surface
- Identified ACM within Test Pit and Exceeding Health Screening Levels
- Identified ACM within Test Pit and below Health Screening Levels
- - - Possible Areas of Aesthetic Impacts

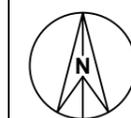


NOTE:
 - Base drawing from maps.six.nsw.gov.au image extracted 22.06.2021.



CLIENT: School Infrastructure New South Wales
 OFFICE: Canberra DRAWN BY: SDG
 SCALE: As Shown DATE: 29.11.2021

TITLE: **Remediation Areas**
Proposed Jindabyne Central School
Part Lot 101 DP1019527, Jindabyne



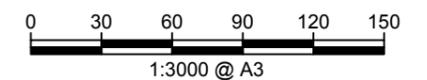
PROJECT No: 103109.05
 DRAWING No: 3
 REVISION: 1



Locality Plan

LEGEND

- Approximate Site Boundary
- - - Approximate Boundaries for Areas that are part of a Different Development Application (Roads and TAFE Building) and are not Part of the Site
- 1m Contour Line
- 1m Contour Line



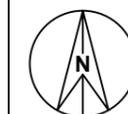
NOTE:

- Base drawing from C.M.S Surveys Pty Limited, dated 03/06/2021
- A surveyed site boundary has not been proved and as such, the boundary provided is approximate.



CLIENT: School Infrastructure New South Wales
 OFFICE: Canberra DRAWN BY: SDG
 SCALE: As Shown DATE: 29.11.2021

TITLE: **Survey Plan**
Proposed Jindabyne Central School
Part Lot 101 DP1019527, Jindabyne



PROJECT No: 103109.05
 DRAWING No: 4
 REVISION: 1

Appendix C

PSI-L and T-DSI Summary of Laboratory Results

TABLE C2
T-DSI SUMMARY OF BULK SOIL SAMPLING AND ANALYTICAL RESULTS -
ASBESTOS

Sample Number	Depth (m)	Weight of 10 Litre Bulk Sample (kg)	Number of fragments > 7mm	Condition of Fragments (good/poor)	Size range of Fragment (mm)	Weight of Screened ACM (g)	Concentration of asbestos in ACM in soil (% w/w)*	Weight of 500mL Sample (g)	Asbestos ID in Soil	Weight of asbestos in ACM > 7mm	Concentration of asbestos in ACM >7mm in soil (%w/w)	Weight of asbestos in AF or FA (g)**	Concentration of asbestos in FA and AF in soil ACM (% w/w)
HSL for Asbestos in soil							0.010				0.010		0.001
Pit 101	0.1	15.485	0	-	-	-	<0.001	599.08	ND	-	-	-	-
Pit 102	0.1	15.817	1	Good	125x48x5	30.1	0.029	601.4	ND	-	-	-	-
Pit 103	0.1	17.101	0	-	-	-	<0.001	496.84	ND	-	-	-	-
Pit 104	0.1	18.085	0	-	-	-	<0.001	579.29	ND	-	-	-	-
Pit 105	0.1	15.292	0	-	-	-	<0.001	543.99	ND	-	-	-	-
Pit 106	0.1	16.484	0	-	-	-	<0.001	621.29	ND	-	-	-	-
Pit 107	0.1	14.786	0	-	-	-	<0.001	602.62	ND	-	-	-	-
Pit 108	0.1	15.079	0	-	-	-	<0.001	432.37	ND	-	-	-	-
Pit 109	0.1	19.36	0	-	-	-	<0.001	629.04	ND	-	-	-	-
Pit 110	0.1	17.423	0	-	-	-	<0.001	588.21	ND	-	-	-	-
Pit 111	0.1	16.393	0	-	-	-	<0.001	689.11	ND	-	-	-	-
Pit 112	0.1	14.651	0	-	-	-	<0.001	699.82	ND	-	-	-	-
Pit 113	0.1	16.581	0	-	-	-	<0.001	508.47	ND	-	-	-	-
Pit 114	0.1	14.761	0	-	-	-	<0.001	478.09	ND	-	-	-	-
Pit 115	0.1	14.385	0	-	-	-	<0.001	549.77	ND	-	-	-	-
Pit 116	0.1	15.488	2	Good	(65-135)x(38-57)x5	75.4	0.073	643.05	ND	-	-	-	-
Pit 117	0.1	13.934	1	Good	32x25x5	4	0.004	438.48	ND	-	-	-	-
Pit 118	0.1	14.999	0	-	-	-	<0.001	452.05	ND	-	-	-	-
Pit 119	0.1	16.691	1	Good	45x27x5	7.3	0.007	616.81	ND	-	-	-	-
Pit 120	0.1	17.057	1	Good	31x15x5	6.5	0.006	493.49	ND	-	-	-	-
Pit 121	0.1	17.121	1	Good	20x15x5	1.5	0.001	556.84	ND	-	-	-	-
Pit 122	0.1	17.78	0	-	-	-	<0.001	663.69	ND	-	-	-	-
Pit 123	0.1	13.871	1	Good	30x22x5	4	0.004	519.24	ND	-	-	-	-
Pit 124	0.1	17.815	1	Good	30x35x5	6.5	0.005	559.6	ND	-	-	-	-
Pit 125	0.1	16.6234	0	-	-	-	<0.001	553.52	ND	-	-	-	-

Notes:

HSL for Asbestos in

soil Table 7 of Schedule B(1), NEPC (2013) for residential land use

* Based on % w/w asbestos in soil assuming 15% asbestos in ACM

** Based on the weight of asbestos in FA and AF as calculated by Envirolab. Values excludes calculated weight of bonded ACM greater than > 7mm in samples

ND Not detected

Table C3: T-DSI Summary of Laboratory Results – Asbestos in Materials

			Asbestos ID in Material	Comments
Sample ID	Depth (m) or Ground Surface (GS)	Sampled Date	-	-
M101	0.1	16/06/2021	D	Chrysotile and amosite asbestos detected
M102	0.1	16/06/2021	D	Chrysotile and amosite asbestos detected
M103	0.1	16/06/2021	D	Chrysotile and amosite asbestos detected
M104	0.1	16/06/2021	D	Chrysotile and amosite asbestos detected
M105	0.1	16/06/2021	D	Chrysotile and amosite asbestos detected
M106	0.1	16/06/2021	D	Chrysotile and amosite asbestos detected
M107	GS	16/06/2021	D	Chrysotile, amosite, and crocidolite asbestos detected
M108	0.1	16/06/2021	D	Chrysotile, amosite, and crocidolite asbestos detected
M109	0.1	16/06/2021	D	Chrysotile and amosite asbestos detected
M110	0.1	16/06/2021	D	Chrysotile, amosite, and crocidolite asbestos detected
M111	0.1	16/06/2021	D	Chrysotile, amosite, and crocidolite asbestos detected
M112	0.1	16/06/2021	D	Chrysotile and amosite asbestos detected
M113	GS	16/06/2021	D	Chrysotile asbestos detected
M114	0.1	17/06/2021	D	Chrysotile and amosite asbestos detected

Notes:
D Asbestos detected
 NAD No Asbestos detected

Table C4: T-DSI Summary of Laboratory Results – Metals, TRH, BTEX, PAH

Sample ID	Depth	Sample Date	Metals								TRH						BTEX				PAH							
			Arsenic	Cadmium	Total Chromium	Copper	Lead	Mercury (Inorganic)	Nickel	Zinc	TRH C6 - C10	TRH >C10-C16	F1 ((C6-C10)-BTEX)	F2 (>C10-C16 less Naphthalene)	F3 (>C16-C34)	F4 (>C34-C40)	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene ^b	Benzo(a)pyrene (BaP)	Benzo(a)pyrene TEQ	Total PAHs				
		PQL	4	0.4	1	1	1	0.1	1	1	25	50	25	50	100	100	0.2	0.5	1	1	1	0.05	0.5	0.05				
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg				
Pit 101/0.1	0 - 0.1 m	16/06/2021	<4	<0.4	21	13	15	<0.1	10	37	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT				
			100	100	20	-	100	410	6000	200	300	1100	40	-	400	160	7400	470	-	-	120	45	180	110	-	-	300	-
Pit 102/0.1	0 - 0.1 m	16/06/2021	<4	<0.4	16	10	15	<0.1	7	33	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT				
			100	100	20	-	100	410	6000	200	300	1100	40	-	400	160	7400	470	-	-	120	45	180	110	-	-	300	-
Pit 103/0.1	0 - 0.1 m	16/06/2021	<4	<0.4	17	28	71	<0.1	8	94	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT				
			100	100	20	-	100	410	6000	200	300	1100	40	-	400	160	7400	470	-	-	120	45	180	110	-	-	300	-
Pit 104/0.1	0 - 0.1 m	16/06/2021	<4	<0.4	17	9	10	<0.1	8	31	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT				
			100	100	20	-	100	410	6000	200	300	1100	40	-	400	160	7400	470	-	-	120	45	180	110	-	-	300	-
Pit 105/0.1	0 - 0.1 m	17/06/2021	<4	<0.4	20	12	32	<0.1	10	62	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT				
			100	100	20	-	100	410	6000	200	300	1100	40	-	400	160	7400	470	-	-	120	45	180	110	-	-	300	-
Pit 106/0.1	0 - 0.1 m	17/06/2021	<4	<0.4	20	11	96	<0.1	9	130	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT				
			100	100	20	-	100	410	6000	200	300	1100	40	-	400	160	7400	470	-	-	120	45	180	110	-	-	300	-
R102	0 - 0.1 m	17/06/2021	<4	<0.4	20	11	110	<0.1	9	120	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT				
			100	100	20	-	100	410	6000	200	300	1100	40	-	400	160	7400	470	-	-	120	45	180	110	-	-	300	-
Pit 107/0.1	0 - 0.1 m	17/06/2021	<4	<0.4	24	17	18	<0.1	11	58	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT				
			100	100	20	-	100	410	6000	200	300	1100	40	-	400	160	7400	470	-	-	120	45	180	110	-	-	300	-
Pit 108/0.1	0 - 0.1 m	17/06/2021	<4	<0.4	14	14	9	<0.1	6	41	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT				
			100	100	20	-	100	450	6000	200	300	1100	40	-	400	160	7400	470	-	-	120	45	180	110	-	-	300	-
Pit 109/0.1	0 - 0.1 m	17/06/2021	<4	<0.4	27	10	23	<0.1	12	53	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT				
			100	100	20	-	100	450	6000	200	300	1100	40	-	400	160	7400	470	-	-	120	45	180	110	-	-	300	-
Pit 110/0.1	0 - 0.1 m	16/06/2021	<4	<0.4	15	9	20	<0.1	8	34	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT				
			100	100	20	-	100	450	6000	200	300	1100	40	-	400	160	7400	470	-	-	120	45	180	110	-	-	300	-
Pit 111/0.1	0 - 0.1 m	16/06/2021	<4	<0.4	19	19	43	<0.1	9	74	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT				
			100	100	20	-	100	450	6000	200	300	1100	40	-	400	160	7400	470	-	-	120	45	180	110	-	-	300	-
Pit 112/0.1	0 - 0.1 m	16/06/2021	<4	<0.4	40	17	34	<0.1	10	95	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT				
			100	100	20	-	100	450	6000	200	300	1100	40	-	400	160	7400	470	-	-	120	45	180	110	-	-	300	-
Pit 113/0.1	0 - 0.1 m	16/06/2021	<4	0.4	19	21	22	<0.1	9	300	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT				
			100	100	20	-	100	450	6000	200	300	1100	40	-	400	160	7400	470	-	-	120	45	180	110	-	-	300	-
Pit 114/0.1	0 - 0.1 m	17/06/2021	<4	<0.4	64	15	23	<0.1	8	94	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT				
			100	100	20	-	100	450	6000	200	300	1100	40	-	400	160	7400	470	-	-	120	45	180	110	-	-	300	-
Pit 115/0.1	0 - 0.1 m	17/06/2021	<4	<0.4	30	24	23	<0.1	9	66	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT				
			100	100	20	-	100	450	6000	200	300	1100	40	-	400	160	7400	470	-	-	120	45	180	110	-	-	300	-
Pit 116/0.1	0 - 0.1 m	16/06/2021	<4	<0.4	15	8	10	<0.1	6	28	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT				
			100	100	20	-	100	450	6000	200	300	1100	40	-	400	160	7400	470	-	-	120	45	180	110	-	-	300	-
Pit 117/0.1	0 - 0.1 m	16/06/2021	<4	<0.4	17	22	22	<0.1	7	120	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT				
			100	100	20	-	100	450	6000	200	300	1100	40	-	400	160	7400	470	-	-	120	45	180	110	-	-	300	-
Pit 118/0.1	0 - 0.1 m	16/06/2021	<4	<0.4	20	18	16	<0.1	9	100	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT				
			100	100	20	-	100	450	6000	200	300	1100	40	-	400	160	7400	470	-	-	120	45	180	110	-	-	300	-
Pit 119/0.1	0 - 0.1 m	16/06/2021	6	<0.4	12	38	19	<0.1	10	60	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT				
			100	100	20	-	100	450	6000	200	300	1100	40	-	400	160	7400	470	-	-	120	45	180	110	-	-	300	-
Pit 120/0.1	0 - 0.1 m	17/06/2021	<4	<0.4	23	14	21	<0.1	10	82	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT				
			100	100	20	-	100	450	6000	200	300	1100	40	-	400	160	7400	470	-	-	120	45	180	110	-	-	300	-
Pit 121/0.1	0 - 0.1 m	16/06/2021	<4	<0.4	21	12	26	<0.1	8	95	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT				
			100	100	20	-	100	450	6000	200	300	1100	40	-	400	160	7400	470	-	-	120	45	180	110	-	-	300	-
Pit 122/0.1	0 - 0.1 m	16/06/2021	<4	<0.4	18	11	10	<0.1	8	86	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT				
			100	100	20	-	100	450	6000	200	300	1100	40	-	400	160	7400	470	-	-	120	45	180	110	-	-	300	-
Pit 123/0.1	0 - 0.1 m	16/06/2021	<4	<0.4	20	15	18	<0.1	9	140	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT				
			100	100	20	-	100	450	6000	200	300	1100	40	-	400	160	7400	470	-	-	120	45	180	110	-	-	300	-
R101	0 - 0.1 m	16/06/2021	<4	<0.4	20	16	18	<0.1	8	110	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT				
			100	100	20	-	100	450	6000	200	300	1100	40	-	400	160	7400	470	-	-	120	45	180	110	-	-	300	-
Pit 124/0.1	0 - 0.1 m	16/06/2021	<4	<0.4	14	16	48	<0.1	7	190	NT	NT	NT	NT														

Table C5: T-DSI Summary of Laboratory Results – OCP, OPP, PCB, Asbestos

			OCP											OPP	PCB	Asbestos			
			DDD	DDT+DDE+DDD ^c	DDE	DDT	Aldrin & Dieldrin	Total Chlordane	Endrin	Total Endosulfan	Heptachlor	Hexachlorobenzene	Methoxychlor	Chlorpyrifos	Total PCB	Asbestos ID in soil >0.1g/kg	Trace Analysis	Asbestos (50 g)	
PQL			0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1				
Tees and Greens																			
Sample ID	Depth	Sample Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	-	-	-	
Pit 126/0.1	0 - 0.1 m	17/06/2021	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	-	-	
			-	240 180	-	180	6	50	10	270	6	10	300	160	1	-	-	-	
Pit 127/0.1	0 - 0.1 m	17/06/2021	<0.1	<0.1	<0.1	<0.1	0.1	0.6	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	-	-	
			-	240 180	-	180	6	50	10	270	6	10	300	160	1	-	-	-	
Pit 128/0.1	0 - 0.1 m	17/06/2021	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	-	-	
			-	240 180	-	180	6	50	10	270	6	10	300	160	1	-	-	-	
Pit 129/0.1	0 - 0.1 m	17/06/2021	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	-	-	
			-	240 180	-	180	6	50	10	270	6	10	300	160	1	-	-	-	
Pit 130/0.1	0 - 0.1 m	17/06/2021	<0.1	<0.1	<0.1	<0.1	0.1	0.7	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	-	-	
			-	240 180	-	180	6	50	10	270	6	10	300	160	1	-	-	-	
R103	0 - 0.1 m	17/06/2021	<0.1	<0.1	<0.1	<0.1	0.2	0.9	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	-	-	
			-	240 180	-	180	6	50	10	270	6	10	300	160	1	-	-	-	
Pit 131/0.1	0 - 0.1 m	17/06/2021	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	-	-	
			-	240 180	-	180	6	50	10	270	6	10	300	160	1	-	-	-	
Pit 131/1.5	1.5 m	17/06/2021	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD	NAD	NAD
			-	240 180	-	180	6	50	10	270	6	10	300	160	1	-	-	-	
Pit 132/0.1	0 - 0.1 m	17/06/2021	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	-	-	
			-	240 180	-	180	6	50	10	270	6	10	300	160	1	-	-	-	
Pit 133/0.1	0 - 0.1 m	17/06/2021	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	-	-	
			-	240 180	-	180	6	50	10	270	6	10	300	160	1	-	-	-	
Pit 134/0.1	0 - 0.1 m	17/06/2021	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	-	-	
			-	240 180	-	180	6	50	10	270	6	10	300	160	1	-	-	-	
Pit 135/0.1	0 - 0.1 m	17/06/2021	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	-	-	
			-	240 180	-	180	6	50	10	270	6	10	300	160	1	-	-	-	

Lab result
HIL/HSL value
EIL/ESL value

■ HIL/HSL exceedance
 ■ EIL/ESL exceedance
 ■ HIL/HSL and EIL/ESL exceedance
 ■ ML exceedance
 ■ ML and HIL/HSL or EIL/ESL exceedance

■ Indicates that asbestos has been detected by the lab, refer to the lab report
 ■ DC exceedance
 HSL 0-<1 Exceedance

Bold = Lab detections - = Not tested or No HIL/HSL/EIL/ESL (as applicable) or Not applicable NL = Non limiting AD = Asbestos detected NAD = No Asbestos detected

HIL = Health investigation level HSL = Health screening level (excluding DC) EIL = Ecological investigation level ESL = Ecological screening level ML = Management Limit DC = Direct Contact HSL

Notes:

- a QA/QC replicate of sample listed directly below the primary sample
- b Reported naphthalene laboratory result obtained from BTEXN suite
- c Criteria applies to DDT only

Site Assessment Criteria (SAC):

Refer to the SAC section of report for information of SAC sources and rationale. Summary information as follows:

SAC based on generic land use thresholds for Residential A with garden/accessible soil

- HIL A Residential / Low - High Density (NEPC, 2013)
- HSL A/B Residential / Low - High Density (vapour intrusion) (NEPC, 2013)
- DC HSL A Direct contact HSL A Residential (Low density) (direct contact) (CRC CARE, 2011)
- EIL/ESL UR/POS Urban Residential and Public Open Space (NEPC, 2013)
- ML R/P/POS Residential, Parkland and Public Open Space (NEPC, 2013)

Appendix D

Contaminants of Concern Impact Areas and Volumes

Table D2: Summary of Fill Volume Estimates

Pit No./Area of Fill	Approximate Depth of potentially impacted OCP Fill Material (m)	Estimated Area (m ²)	Estimated Volume (m ³)
OCP Impacts Tees and Greens Areas			
Pit 2	0.15	510	76.5
Pit 5	0.3	100	30
Pit 6	0.3	240	72
Pit 10	0.3	255	76.5
Pit 12	0.3	170	51
Pit 16	0.5	335	167.5
Pit 20	0.2	440	88
Pits 23, 127, 128 and 129	Average depth of 0.2	280	56
Pit 24	0.5	255	127.5
Pit 26	0.2	90	18
Pit 27	0.5	340	170
Pit 130	0.25	175	43.75
Pit 131	0.3	645	193.5
Pit 132	0.5	115	57.5
Pit 133	0.5	370	185
Pit 134	0.5	130	65
		Estimated Total	1477 m ³

Notes:

Where tee and green fill is greater than 0.5m from the surface, DP have assumed that the potential for OCP Impacts are within the upper 0.5m of the fill material

Table D1: Summary of Fill Volume Estimates

Pit No./Area of Topsoil Fill/Fill	Approximate Depth of Topsoil Fill/Fill (m)	Estimated Area (m ²)	Estimated Volume (m ³)
Asbestos/Topsoil Fill Area and Aesthetic Impacts within the Topsoil Fill			
Area 1	Average depth of 0.24	4300	1032
Area 2	Average depth of 0.21	11550	2425.5
Aesthetic Impacts Fill Tees and Greens Areas			
Pit 2	0.6	510	306
Pit 5	0.6	100	60
Pit 6	0.3	240	72
Pit 10	0.3	255	76.5
Pit 12	0.3	170	51
Pit 16	1.4	335	469
Pit 20	1.5	440	660
Pits 23, 127, 128 and 129	Average depth of 0.2	280	56
Pit 24	1.5	255	382.5
Pit 26	1.4	90	126
Pit 27	0.9	340	306
Pit 130	0.25	175	43.75
Pit 131	2.5	645	1612.5
Pit 132	0.7	115	80.5
Pit 133	0.6	370	222
Pit 134	0.7	130	91
		Estimated Total	4614 m ³

Notes:

Topsoil Fill was not observed in Pits 115 and 123