Landcom

Remedial Action Plan

Stage 5 and Stage 6
Claymore Renewal Project
Claymore, NSW

17 November 2022

63956/148,389 (Rev B)

JBS&G Australia Pty Ltd

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Abbreviations

Term	Definition
ACM	Asbestos Containing Material
AF/FA	Asbestos Fines/Fibrous Asbestos
AHD	Australian Height Datum
AMP	Asbestos Management Plan
ASS	Acid sulfate soil
B(a)P	Benzo(a)pyrene
Bgs	Below Ground Surface
BOM	Bureau of Meteorology
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes
COPC	Contaminants of Potential Concern
CSM	Conceptual Site Model
DP	Deposited Plan
DQIs	Data Quality Indicators
DQOs	Data Quality Objectives
DSI	Detailed Site Investigation
ENM	Excavated Natural Material
EPA	Environment Protection Authority
EIL/ESL	Ecological Investigation/Screening Level
ha	Hectare
HIL/HSL	Health Investigation/Screening Levels
JBS&G	JBS&G Australia Pty Ltd
LAA	Licensed Asbestos Assessor
LAHC	Land and Housing Corporation
LEP	Local Environmental Plan
LOR	Limit of Reporting
OCPs	Organochlorine Pesticide
OEH	NSW Office of Environment and Heritage (includes EPA)
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NSW	New South Wales
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PSI	Preliminary Site Investigation
QA/QC	Quality Assurance/Quality Control
RAP	Remedial Action Plan
R&H SEPP	State Environmental Planning Policy (Resilience and Hazards) 2021
SWNSW	SafeWork NSW
TCLP	Toxicity Characteristic Leachate Procedure
TRH	Total Recoverable Hydrocarbons
VENM	Virgin Excavated Natural Material

Executive Summary

JBS&G Australia Pty Ltd (JBS&G) was engaged by Landcom (the client) to prepare a Remedial Action Plan (RAP) for Stage 5 and Stage 6A/6B of the Claymore Renewal Project (the site). Stage 5 and Stage 6A/6B of the Claymore Renewal Project comprises an irregularly shaped parcel of land between Dobell Road and Arkley Avenue, Claymore, NSW (refer **Figures 1 and 2**). Stage 5 Claymore comprises an area of approximately 5.5 hectares (ha) and Stage 6 Claymore is split into Stage 6A and Stage 6B, comprising an area of approximately 6.4 ha and 5.0 ha, respectively. The site covers a total area of approximately 16.9 ha. The site is defined by numerous cadastral lots as described in **Section 2.1** and shown on **Figure 3**.

It is understood that the client is working to deliver Stages 5, 6A and 6B of the Claymore Renewal Project to redevelop the area into public and private residences, public recreation and associated paths and roads.

Douglas Partners Pty Ltd (DP) prepared a Detailed Site Investigation (DSI) for the site in 2020 (DP 2020[1]). DP reported the site was historically used as farmland and bushland before 1975 when earthworks commenced for the residential development of the site. Between 2011 and mid-2012, demolition of parts of the adjacent land commenced.

The DP (2020) investigation included excavation of 54 testpits and associated soil sampling across the stages, including 24 testpits within Stage 5, 21 testpits within Stage 6A, and 9 testpits within Stage 6B. The investigation also included three soil bores (two in Stage 5 and one in Stage 6A) and installation and groundwater assessment of one monitoring well (in Stage 6A).

DP (2020) found isolated copper and nickel and zinc exceedances of health and/or ecological criteria in Stage 5. While statistical analysis for these sample results indicated these metals at the site do not pose an actual risk to site receptors, leachate data undertaken on samples showed elevated copper, nickel, and zinc concentrations suggesting metals that are potentially leachable. Asbestos was identified as bonded asbestos containing material (ACM) fragments on site surfaces, bonded ACM fragments in surface fill and bonded ACM and asbestos fines / fibrous asbestos (AF/FA) in fill at depth, exceeding health-based at various locations. Additionally, AF/FA and ACM in poor condition was identified below the adopted site criteria in surface fill. DP (2020) conclude further assessment and/or remediation of asbestos at the site is required to make the site suitable for the proposed development.

The works were audited by Rebeka Hall from Geosyntec (formerly Zoic), a NSW EPA accredited contaminated land auditor, who prepared interim audit advice on the DP (2020) DSI including comments regarding further investigation and delineation once remaining structures are demolished to inform a robust RAP (Zoic 2020[2]).

This document presents a Remedial Action Plan (RAP) that outlines the principles of remedial/validation works required for the site, that when completed, will make and demonstrate that the site has been made suitable for the intended land uses.

[1] *Detailed Site Investigation – Claymore Urban Renewal Project – Stages 5, 6A and 6B, Dobell Road, Claymore, NSW (Rev 4)* Douglas Partners Pty Ltd 16 December 2020 (DP 2020)

[2] *Re: Interim Advice (IA4R) – Review of Detailed Site Investigation (DSI) for Stages 5, 6A & 6B Claymore Urban Renewal Project* (IA4R Stage 5 & 8 DSI) Zoic Environmental Pty Ltd 21 December 2020 (Zoic 2020)

Remediation is required to address the following contamination risks to ensure the suitability of the site for public open space land use:

- Bonded ACM fragments identified on site surfaces at TP130 (Stage 5), TP143, TP148 and TP155 (Stage 6A), TP157 and TP158 (Stage 6B) and three unlabelled locations (Stages 6A and 6B);
- Bonded ACM fragments identified in surface fill (0 to 0.2 m bgs) at TP126, TP143, TP148, TP166 (Stage 6A), TP178 and TP187 (Stage 5);
- Bonded ACM and AF/FA identified in fill at depth (1.0 to 2.3 m bgs) at TP137 (Davis Park Stage 6A), including multiple ACM fragments (34) identified between 1.0 – 1.2 m bgs;
- AF/FA identified below the adopted site criteria in surface fill (0 to 0.2 m bgs) at TP143 (Stage 6A) and TP150 and TP187 (Stage 5), as well as ACM in poor condition identified in surface fill (0 to 0.2 m bgs) at TP178 (Stage 5) that does not present an unacceptable risk to current and future users at the site, however, needs to be considered during the earthworks from an work, health and safety (WHS) perspective;
- Asbestos service trenches and redundant electrical crossings containing asbestos requiring removal prior to bulk earthworks; and
- Construction, demolition and domestic refuse on the site surface requiring management to ensure that identified aesthetic risks are appropriately addressed.

Prior to remedial works and development-related earthworks and civil works, further investigation works are required to assess potential impacts within inaccessible areas and building footprints following demolition of the remaining site structures, to confirm the suitability of inaccessible portions of the site for the intended land uses.

The preferred remedial approach involves:

- Emu-picking of surface ACM; and
- On-site containment beneath proposed road areas of asbestos in soil impacts.

Contingency actions include excavation and disposal of impacted soil where surplus to containment capacity. A protocol is included for dealing with unexpected finds.

Subject to the successful implementation and validation of the measures detailed in this RAP and subject to the limitations in **Section 14**, it is considered the site can be made suitable for the proposed residential land use.

1. Introduction

1.1 Background

JBS&G Australia Pty Ltd (JBS&G) was engaged by Landcom (the client) to prepare a Remedial Action Plan (RAP) for Stage 5 and Stage 6A/6B of the Claymore Renewal Project (the site). Stage 5 and Stage 6A/6B of the Claymore Renewal Project is understood to comprise an irregularly shaped parcel of land between Dobell Road and Arkley Avenue, Claymore, NSW. Stage 5 Claymore comprises an area of approximately 5.5 hectares (ha) and Stage 6 Claymore is split into Stage 6A and Stage 6B, comprising an area of approximately 6.4 ha and 5.0 ha, respectively. The site covers a total area of approximately 16.9 ha.

The site location is shown on **Figure 1**. The site layout is shown in **Figure 2** and **Figure 3**, shows the numerous cadastral lots that legally define the site, as identified in **Section 2.1**.

Douglas Partners Pty Ltd (DP) prepared a Detailed Site Investigation (DSI) for Stage 5, Stage 6A and Stage 6B in 2020 (DP 2020[3]). DP reported the site was historically used as farmland and bush land before 1975 when earthworks commenced for the residential development of the site. Between 2011 and mid-2012, demolition of parts of the adjacent land commenced.

The DP (2020) investigation included excavation of 54 testpits and associated soil sampling across the stages, including 24 testpits within Stage 5, 21 testpits within Stage 6A, and 9 testpits within Stage 6B. The investigation also included three soil bores (two in Stage 5 and one in Stage 6A) and installation and groundwater assessment of one monitoring well (in Stage 6A).

DP (2020) found isolated copper, nickel, and zinc exceedances of health and/or ecological criteria in Stage 5. While statistical analysis for these sample results indicated these metals at the site do not pose an actual risk to site receptors, leachate data undertaken on samples showed elevated copper, nickel, and zinc concentrations suggesting metals that are potentially leachable. Bonded ACM fragments were identified on site surfaces at TP130 (Stage 5), TP143, TP148 and TP155 (Stage 6A), TP157 and TP158 (Stage 6B) and three unlabelled locations (Stages 6A and 6B). Bonded ACM fragments were identified in surface fill at TP126, TP143, TP148, TP166 (Stage 6A), TP178 and TP187 (Stage 5). Bonded ACM and AF/FA was identified in fill at depth at TP137 (Davis Park Stage 6A), including multiple ACM fragments (34) identified between 1.0 – 1.2 m bgs. AF/FA was identified below the adopted site criteria in surface fill at TP143 (Stage 6A) and TP150 and TP187 (Stage 5). Additionally, ACM in poor condition was identified in surface fill at TP178 (Stage 5).

DP (2020) conclude further assessment and/or remediation of asbestos at the site is required to make the site suitable for the proposed development. Additional investigation works are required, including confirmation of potential asbestos impacts within inaccessible areas and building footprints following demolition of the remaining site structures prior to development-related earthworks and civil works, to confirm the suitability of inaccessible portions of the site for the intended land uses.

The works were audited by Rebeka Hall from Geosyntec (formerly Zoic), a NSW EPA accredited contaminated land auditor, the audit endorsement including comments regarding further investigation were provided in Interim Advice 4R (Zoic 2020[4]).

[3] *Detailed Site Investigation – Claymore Urban Renewal Project – Stages 5, 6A and 6B, Dobell Road, Claymore, NSW (Rev 4)* Douglas Partners Pty Ltd 16 December 2020 (DP 2020)

[4] *Re: Interim Advice (IA4R) – Review of Detailed Site Investigation (DSI) for Stages 5, 6A & 6B Claymore Urban Renewal Project* (IA4R Stage 5 & 8 DSI) Zoic Environmental Pty Ltd 21 December 2020 (Zoic 2020)

This document presents a RAP that outlines the principles of remedial/validation works required for the site, that when completed, will make and demonstrate that the site has been made suitable for the intended land uses.

This RAP has been prepared with reference to relevant guidelines made or endorsed by the NSW Environment Protection Authority (EPA) inclusive of NEPC (2013[5]), EPA (2020[6]) and EPA (2017[7]), and planning guidelines associate with Chapter 4 Remediation of land in *State Environmental Planning Policy (Resilience and Hazards) 2021* (R&H SEPP).

1.2 Objectives

The objective of this RAP is to document the procedures and standards to be followed in order to remove the potential contamination risks for the proposed development such that the site can be made suitable for the intended residential land use, consistent with the requirements of 'Chapter 4 Remediation of land' in R&H SEPP.

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

[6] *Consultants Reporting on Contaminated Land – Contaminated Land Guidelines.* NSW EPA 2020 (EPA 2020)

[7] *Contaminated Land Management: Guidelines for the NSW Site Auditor Scheme (3rd Edition*). NSW Environment Protection Authority 2017 (EPA 2017)

2. Site Condition & Surrounding Environment

2.1 Site Identification

The following site condition and surrounding environment is based on review of DP (2020). The location of the sites is shown in **Figure 1**. The layout of the site and the cadastral boundaries are shown respectively in **Figure 2** and **Figure 3**. The site details are summarised in **Table 2.1** and described in detail in the following sections.

Table 2.1: Summary of Site Details

Lot / DP	• Part Lots 5, 14, 15, 16, 17, 18, 25, 27 in DP258940 • Lot 26 in DP258940 • Part Lot 35 in DP258939 • Part Lot 512 in DP1210126 • Part Lot 1999 in DP1203428 • Lot 991 and Part Lot 980 in DP 1203266 • Lots 2995, 2996. 2998 and Part Lot 2999 in DP1259914 • Lots 3123, 3124 and Part Lots 3122, 3125 in DP1259915
Address	Stage 5 and 6 of the Claymore Renewal Project, Dobell Road, Arkley Avenue and Norman Crescent, Claymore, NSW
Local Government Authority	Campbelltown City Council
Approximate MGA Coordinates (MGA 56)	Stage 5: 297776 E, 6230411 N Stage 6A: 297745 E, 6230708 N Stage 6B: 297857 E, 6230580 N
Site Zoning	Zoning per *Campbelltown Local Environmental Plan 2015* (Campbelltown LEP): R2: Low Density Residential RE1: Public Recreation (Davis and Dimeny Parks)
Current Use	Residential, roadways and parkland/open space areas
Proposed Use	Residential with areas of public open space, infrastructure and community facilities.
Permissible Uses	R2: Low Density Residential Permitted without consent: home occupations Permitted with consent: Attached dwellings; Building identification signs; Business identification signs; Centre-based child care facilities; Community facilities; Dual occupancies; Dwelling houses; Emergency services facilities; Environmental facilities; Environmental protection works; Exhibition homes; Exhibition villages; Flood mitigation works; Group homes; Home-based child care; Home businesses; Home industries; Oyster aquaculture; Places of public worship; Pond-based aquaculture; Recreation areas; Recreation facilities (outdoor); Respite day care centres; Roads; Schools; Semi-detached dwellings; Tank-based aquaculture. RE1: Public Recreation Permitted without consent: Nil Permitted with consent: Aquaculture; Boat launching ramps; Camping grounds; Car parks; Community facilities; Emergency services facilities; Environmental facilities; Environmental protection works; Flood mitigation works; Heliports; Information and education facilities; Jetties; Kiosks; Markets; Recreation areas; Recreation facilities (indoor); Recreation facilities (major); Recreation facilities (outdoor); Registered clubs; Restaurants or cafes; Roads; Signage; Small bars; Water recreation structures; Water supply systems.
Site Area	Stage 5: Approximately 5.5 ha Stage 6A: Approximately 6.4 ha Stage 6B: Approximately 5 ha

2.2 Site Description

The site layout is shown on **Figure 2**.

DP (2020) report the site is located within the central portion of the Claymore Renewal Project, located 2 km northwest of Campbelltown CBD. The site generally comprised open (unfenced) land however, occasional lots that had been recently demolished were fenced off with secure chain-link metal fencing. At the time of the DSI, demolition works were in progress, however, several houses were still occupied by tenants.

2.3 Surrounding Land Use

The current land use of adjacent properties and across adjacent roads is shown in **Figure 2** and summarised below.

- North – Dobell Road follows the northern site boundary beyond which is Claymore Public School, Waratah Cottage Early Learning Centre and Claymore Shopping Centre
- East – Claymore residential properties and Highfield Park (also located in the site)
- South – Arkley Avenue beyond which are residential properties associated with Stages 1 and 2.
- West – Vacant land and a new residential development associated with Stages 1 and 3 in the southwest, with Stage 4 bordering the site to the northwest.

Based on the surrounding land uses identified from a review of aerial imagery, there do not appear to be any significant potential for offsite sources of contamination proximal to the site.

2.4 Topography

DP (2020) report the site topography to comprise a ridge rising to approximately 88 m relative to Australian Height Datum (AHD) through the centre of the site (running northeast/ southwest) trending south towards Dimeny Park (80 m AHD) and north/northeast towards Davis Park (70 m AHD) and McBarron Creek which is located approximately 200 m northeast of the site.

2.5 Hydrology

As reported by DP (2020), the nearest off-site surface water body is McBarron Creek, located approximately 180 m to the north of the site. McBarron Creek flows into the Georges River approximately 12 km to the northeast of site. Regional and site-specific topography indicate the direction of surface water flow is expected to be towards the northeast. It is considered likely there is localised variation to surface water flow, influenced by the storm water drainage network in the north/northeast of the site (anticipated flows towards Dobell Road), and in the south of the site (anticipated flows towards the south / southeast, toward Norman Crescent).

Some surface water is expected to infiltrate through the unsealed areas into surface soils.

2.6 Geology and Soils

DP (2020) reviewed the Geological Survey of New South Wales Port Hacking – Wollongong 1:100 000 scale Geological Series Sheet 9029-9129, 1st Edition 1985, and reported the site is underlain by Ashfield Shale of the Wianamatta Group, comprising dark grey to black shale and laminate.

Further, DP (2020) reported from review of the Soil Conservation Service of NSW, Soil Landscapes of the Wollongong-Port Hacking 1:100 000 Sheet, that the site is underlain by Blacktown Soil Landscape which is a residual soil group associated with the gently undulating rises on shale geological areas. Blacktown soils comprise shallow to moderately deep red and brown podzolic soils on crests, upper slopes and well drained areas and deep yellow podzolic soils and soloths on lower slopes and in areas of poor drainage. Such soils are generally moderately reactive highly plastic subsoil, low soil fertility with poor soil drainage.

DP (2020) reported the following soil profile from their intrusive investigations:

- Fill was observed from ground surface to between 0.1 to 2.6 m bgs (with deeper fill identified in Davis Park, along former gully areas or adjacent road where services are present). Fill material comprised silty clay and clayey silts with sandstone / siltstone / ironstone gravels and sand. Inclusions of manmade material / wastes were observed in some locations (including asbestos containing materials).
- Silt Clay was generally observed underlying fill to depths of up to 2.7 m bgs.

- Bedrock:
    - Siltstone / shale was observed at depths ranging between 0.5 to 2.2 m bgs is 19 locations.
    - Sandstone was observed at depths ranging from 0.2 to 2.0 m bgs in 15 locations.

2.7 Hydrogeology

DP (2020) reported five registered bores, the majority of which were monitoring bores ranging from depths of 5 to 9 m bgl. One bore, located approximately 800 m from the western boundary, was drilled to 252 m bgl with a water bearing zone approximately 21 to 64 m bgl. It was considered unlikely that groundwater will be encountered at the site, with the possible exception of a perched water table at shallow depth. An additional four registered bores were identified to the south of the site for monitoring purposes, drilled to a depth of 6.5 m bgl with standing water level 4.5 m bgl.

DP (2020) investigations installed one groundwater monitoring well with groundwater observed at a depth of approximately 7 m bgs.

2.8 Acid Sulfate Soils

The site area was not identifiable on the Acid Sulfate Soil Risk Map (1997[8]). Review of geology maps, soil maps, site topography and site observations indicate it is unlikely that acid sulfate soils would be present on-site.

2.9 Meteorology

A review of average climatic data for the nearest relevant Bureau of Meteorology monitoring location (Camden Airport AWS[9]) indicates the site is located within the following meteorological setting:

- Average minimum temperatures vary from 3.0°C in July to 17.0°C in January;
- Average maximum temperatures vary from 17.4° in July to 29.7°C in January;
- The average annual rainfall is approximately 796.6 mm with rainfall greater than 1 mm occurring on an average of 49.7 days per year; and
- Monthly rainfall varies from 39.5 mm in September to 105.1 mm in March with the wettest periods occurring on average from January to March.

[8] *'Acid Sulphate Soil Risk Map – Index,* 1997 1:25 000 (NSW DLWC)
[9] http://www.bom.gov.au/climate/averages/tables/cw_068192.shtml, accessed on 25 October 2022

3. Summary Site History

DP (2020) reported the site comprised farmland and bush land until 1975, at which time earthworks were completed for the residential development that is currently present on the site. Demolition of parts of the adjacent stages (of the Claymore Renewal Project) appears to have commenced between late 2011 and mid-2012.

DP (2020) reported that review of environmental protection areas in the region as mapped on the NSW ePlanning Spatial Viewer indicated there are no known environmentally sensitive or significant ecological / environmental features or habitats within a 5km radius of the site. However, JBS&G notes review of the current Campbelltown LEP Terrestrial Biodiversity Map (**Appendix C**) indicates there are areas of "Biodiversity - significant vegetation" in the north of and adjacent Dimeny Park comprising the north and northwest of Lot 512 DP1210126, east of Lot 2996 DP1259914, and parts of Lot 25 DP258940.

The DSI concludes that considering the current and historical use of the site, whilst there is potential for some localised domestic waste to have been produced and entered the environment at the site, the likelihood of any significant waste being produced at the site and discharged into the local environment is low.

4. Previous Contamination Assessment Reports

4.1 Detailed Site Investigation (DP 2020)

The DSI investigation included excavation of 54 testpits and associated soil sampling through the various stages, including 24 testpits within Stage 5, 21 testpits within Stage 6A and 9 testpits within Stage 6B. Test pit locations are shown on **Figure 4**. The investigation also included three soil bores (one Stage 6A and two Stage 5) and installation and groundwater assessment of one monitoring well (in Stage 6A). Summary Tables are provided as **Appendix A** and borelogs are provided as **Appendix B**.

DP (2020) found some isolated copper, nickel, and zinc exceedances in Stage 5. While statistical analysis for these sample results indicated these metals at the site do not pose an actual risk to site receptors, leachate data undertaken on samples showed elevated copper, nickel, and zinc concentrations suggesting metals that are potentially leachable.

Asbestos as ACM and AF/FA were observed /reported as follows (and shown on **Figure 6**):

- ACM fragments were observed on site surfaces at TP143, TP148, TP155 (Stage 6A) and TP158 (Stage 6B). Additionally, review of the figures in DP (2020) report ACM on the surface at TP157 (Stage 6B), TP130 (Stage 5) and three unlabelled locations (Stages 6A and 6B), this was not reported in the text of the report.
- ACM was observed in surface fill at TP143, TP148, TP166 (Stage 6A), TP178 and TP187 (Stage 5). Additionally, review of laboratory reports and summary tables reports ACM above the site assessment criteria at TP126 (Stage 6A), this was not reported in the text of the report.
- ACM was observed in fill at depth at TP137 (Davis Park Stage 6A), including multiple ACM fragments identified between 1.0 – 1.2 m bgs.
- Laboratory results identified AF/FA above the adopted site criteria at TP137 (Davis Park Stage 6A).
- Laboratory results identified AF/FA below the adopted site criteria at TP143 (Stage 6A) and TP150 and TP187 (Stage 5). Additionally, review of laboratory reports and summary tables reports ACM in poor condition at TP178 (Stage 5).

DP (2020) suggested that, given the presence of ACM and AF/FA, the identified locations will require further assessment/delineation. The presence of both ACM and AF/FA at TP137, within Davis Park, and based on anecdotal information that Davis Park was previously utilised as a landfill for demolition waste (as identified in over 2.5m of fill at TP137), it is likely that fill material within Davis Park will require some form of remediation.

Copper in groundwater was reported above the site assessment criteria at BH1/GW1 (within Davis Park in Stage 6A), reported to potentially be indicative of regional copper trends and / or may also be sourced from copper impact in fill in Davis Park (although elevated copper in fill in Davis Park has not been identified to date). Due to elevated copper in Davis Park (BH1/GW1) and reported uncontrolled landfilling of heterogenous materials in the area, delineation of impacts in Davis Park should be completed including the assessment of copper in fill. Depending on the findings further groundwater assessment may be warranted in Davis Park.

DP (2020) also recommended the following:

- Footprints of remaining structures and roadways across the whole site should be inspected by a suitably qualified Environmental Consultant following demolition. If fill and/or residual demolition material is present, the residual building material should be removed and a targeted investigation of the fill and/or surface soils should be undertaken prior to bulk earthworks.

- Any asbestos clearance to be undertaken as part of remediation works is to be supplemented with soil samples to be analysed for AF/FA. Building footprints should be cleared by an NSW licenced asbestos assessor prior to earthworks. Taking into consideration the heterogenous nature of fill observed in the current investigation, and the adopted sampling density, some sampling and analysis of fill within select building footprints will be required;
- A delineation investigation should be completed to define asbestos impacts and to inform the most appropriate remediation strategy;
- Asbestos service trenches and redundant electrical crossings containing asbestos should also be removed and validated prior to bulk earthworks. The RAP should provide the management procedures should buried ACM pipes (such as Telstra conduits) be encountered during earthworks.

DP (2020) conclude further assessment and/or remediation of asbestos at the site is required to make the site suitable for the proposed development. Construction, demolition and domestic refuse on the site surface will also require management to ensure that identified aesthetic risks are appropriately managed.

5. Contamination Status

Based on environmental data from previous assessments undertaken at the site (DP 2020), identified contamination issues that require remediation for the site to be considered suitable for the proposed land uses include the following:

- Bonded ACM fragments on site surfaces;
- Bonded ACM within surface/subsurface soils; and
- AF/FA within surface/subsurface soils.

Where asbestos concentrations were generally below the adopted health screening levels (Residential A with garden/accessible soil) for asbestos contamination in soil, according to NEPC (2013), surface soils (0 – 0.1 m) require to be free of visible asbestos in both assessment and remediation phases for residential land use. For the purpose of this RAP, surface soils containing bonded asbestos require remediation.

Based on the analytical data reviewed as part of the DSI (DP 2020), bonded asbestos impacts below 0.1 m and below adopted criteria are considered to not pose a risk to current and future users at the site under the proposed land uses, however may pose an aesthetic issue. ACM in subsurface soils will require remediation where above adopted criteria and/or where it may pose an aesthetic issue, such as in proposed residential areas. Subsurface ACM in proposed public open space areas or below roads may not require remediation where it can be managed appropriately in-situ.

Based on the analytical data reviewed as part of the DSI (DP 2020), bonded asbestos impacts and AF/FA in surface/subsurface soils above the adopted site criteria require remediation.

Additional impacts as may be identified by data gap investigations discussed below, will also require management where above adopted site criteria.

5.1 Affected Media

As discussed in above, the available environmental data indicate that surface and subsurface soils in a number of areas at the site represent an unacceptable risk and require remediation. Soil media has been identified to be contaminated with bonded ACM and AF/FA. Approximate remedial extents are shown on **Figure 7**. Each of the areas of affected soils are discussed as follows:

- Bonded ACM fragments were identified on site surfaces at TP130, TP143, TP148, TP155 (Stage 6A), TP157 and TP158 (Stage 6B) and three unlabelled locations (Stages 6A and 6B) which presents an unacceptable risk to current and future users at the site.
- Bonded ACM fragments were identified in surface fill (0 to 0.2 m bgs) at TP126, TP143, TP148, TP166 (Stage 6A), TP178 and TP187 (Stage 5), which presents an unacceptable risk to current and future users at the site.
- Bonded ACM and AF/FA was identified in fill at depth (1.0 to 2.3 m bgs) at TP137 (Davis Park Stage 6A), including multiple ACM fragments (34) identified between 1.0 – 1.2 m bgs, which presents an unacceptable risk to current and future users at the site.
- AF/FA was identified below the adopted site criteria in surface fill (0 to 0.2 m bgs) at TP143 (Stage 6A) and TP150 and TP187 (Stage 5). Additionally, ACM in poor condition was identified in surface fill (0 to 0.2 m bgs) at TP178 (Stage 5), this does not present an unacceptable risk to current and future users at the site, however, needs to be considered during the earthworks from an OH&S perspective.
- Asbestos service trenches and redundant electrical crossings containing asbestos should be removed and validated prior to bulk earthworks.

- Construction, demolition and domestic refuse on the site surface will also require management to ensure that identified aesthetic risks are appropriately managed.

No other media (i.e. surface or ground water or gas/vapour) are considered to be impacted based on JBS&G 2022 findings.

5.1.1 Human and Ecological Receptors

Potential receptors of environmental impact within the site which will need to be addressed with respect to the suitability of the site for the proposed use include:

- Current and future site users, occupants and landowners who may potentially be exposed to COPCs through inhalation of fibres associated with impacted soils; and/or
- Excavation/ construction/ maintenance workers conducting activities at the site, who may potentially be exposed to COPCs through inhalation of fibres associated with impacted soils; and
- Existing and/ or future users/ occupants of adjoining residential/ commercial properties, educational facilities and open space areas should airborne respirable asbestos fibres be identified to be migrating from the current site.

5.1.2 Potential Exposure Pathways

Based on the COPCs identified in various media as discussed above, the exposure pathways for the site includes potential inhalation of airborne asbestos fibres and/or impacted dust.

5.1.3 Preferential Pathways

Preferential pathways have been identified as natural and/or man-made pathways through soils that results in the preferential migration of contaminants as either solids or dust.

Limited man-made preferential pathways may be present at the site, generally associated with fill materials present across the site and in current or former service trenches.

5.1.4 Data Gaps

Prior to development-related earthworks and civil works and to confirm the suitability of inaccessible portions of the site for the intended land uses, further investigation works are required to assess potential impacts within inaccessible areas and building footprints following demolition of the remaining site structures (**Figure 5**).

Additionally, due to elevated copper in groundwater in BH1/GW1 and reported uncontrolled landfilling of heterogenous materials in the area, delineation of impacts in Davis Park should be completed including the assessment of copper in fill. Depending on the findings further groundwater assessment may be warranted in Davis Park.

Data gap requirements are discussed further in **Section 7.3**.

6. Remedial Options

6.1 Remediation Objectives

The remediation objectives are outlined as follows:

- Remove or manage potentially unacceptable human health and aesthetic issues for the medium density residential land use proposed;
- Ensure unexpected contamination finds are assessed, managed and validated appropriately for the proposed land use;
- Validate the remedial works in accordance with relevant NSW EPA guidelines and with reference to the site-specific validation assessment criteria; and
- Document the validation process.

The RAP has been prepared with reference to the following guidelines:

- Planning guidelines for remediation of land supporting the R&H SEPP;
- *Contaminated Land Guidelines, Sampling design part 1 – application*, NSW EPA, 2022 (EPA 2022a);
- *Contaminated Land Guidelines, Sampling design part 2 – interpretation*, NSW EPA, 2022 (EPA 2022b);
- *Contaminated Land Management: Consultants Reporting on Contaminated Land*, NSW EPA, May 2020 (EPA 2020);
- *Contaminated Land Management: Guidelines for NSW Site Auditor Scheme (3rd Edition)*, October 2017 NSW EPA (EPA 2017);
- *National Environment Protection (Assessment of Site Contamination Measure) Measure 1999, as amended 2013*, National Environment Protection council (NEPC 2013); and
- *Waste Classification Guidelines. Part 1: Classifying Waste, NSW EPA*, November 2014 (EPA 2014).

6.2 Extent of Remediation

Based on the findings of the previous investigations (**Section 4**) and subject to the limitations of these investigations, the anticipated extent of the proposed remedial works for currently identified impacts is shown in **Figure 7**. The vertical extent of the remediation is limited to the surface (0 – 0.2 m bgs) for soils impacted with bonded ACM and surface/subsurface (0 – 2.3 m bgs) for soils impacted with AF/FA. Remediation is required to address the following contamination risks to ensure the suitability of the site for residential land use with areas of public open space, infrastructure and community facilities:

- Bonded ACM fragments were identified on site surfaces at TP130 (Stage 5), TP143, TP148 and TP155 (Stage 6A), TP157 and TP158 (Stage 6B) and three unlabelled locations (Stages 6A and 6B).
- Bonded ACM fragments were identified in surface fill (0 to 0.2 m bgs) at TP126, TP143, TP148, TP166 (Stage 6A), TP178 and TP187 (Stage 5).
- Bonded ACM and AF/FA was identified in fill at depth (1.0 to 2.3 m bgs) at TP137 (Davis Park Stage 6A), including multiple ACM fragments (34) identified between 1.0 – 1.2 m bgs.
- AF/FA was identified below the adopted site criteria in surface fill (0 to 0.2 m bgs) at TP143 (Stage 6A) and TP150 and TP187 (Stage 5). Additionally, ACM in poor condition was

identified in surface fill (0 to 0.2 m bgs) at TP178 (Stage 5), this does not present an unacceptable risk to current and future users at the site, however, needs to be considered during the earthworks from an OH&S perspective.

- Asbestos service trenches and redundant electrical crossings containing asbestos should be removed and validated prior to bulk earthworks.
- Construction, demolition and domestic refuse on the site surface will also require management to ensure that identified aesthetic risks are appropriately managed.

Pending demolition of existing building structures, there is the potential for impacts within building footprints where hazardous materials including asbestos may have been used. Data gap assessment requirements are addressed in **Section 7.3** and the potential for unexpected contamination finds is addressed in the Contingency Plan in **Section 9**.

Based on the identified contamination, the estimated volume of asbestos impacted material requiring management is presented in **Table 6.1**. It is understood that Davis Park may be addressed outside of the Stage 5/6 assessment and remediation works discussed herein, and therefore has been shown separately.

The volume estimate has been calculated based on the percentage of sample locations where ACM in fill was identified, the areas of each stage and assumed depth of impact. Where asbestos was identified in fill the assumed depth of impact is 0.2 m bgs (the current maximum depth of asbestos impacts, excluding Davis Park). Where asbestos was identified on the surface the assumed depth of asbestos impacted material is 0.1 m bgs. The depth of impacted fill in Davis Park is assumed to be 2.5 m bgs (however this is unknown). Considering the extensive data gaps that are on the site a contingency of +100% has been included to calculate a range of potential asbestos impacted soils for a total estimated volume of asbestos impacted material ranging from 13,800 m^3 to 27,600 m^3.

Table 6.1: Asbestos Impacted Material Volume Estimate

Stage	Total Sample Locations	Sample Locations with ACM Fill	Sample Locations with ACM on Surface	Site Area (ha)	Preliminary Estimated volume asbestos impacted soil (m^3)	Estimated volume range of asbestos impacted soil (m^3)
5	27	3 (11%)	3 (11%)	5.5	1800	1800 to 3600
6A and 6B (excluding Davis Park)	29	4 (13.8 %)	8 (27.5%)	10.1	5500	5500 to 11,100
Davis Park	5	1 (20%)	0	1.3	6500	6500 to 13,000
Total Est. Volume	-	-	-	16.9	13,800	13,800 to 27,600

6.3 Remedial Options Assessment

EPA (2017) adopts the NEPC (2013) ASC NEPM preferred remediation hierarchy as follows:

- on-site treatment of the contamination so that it is destroyed or the associated risk is reduced to an acceptable level; and
- off-site treatment of excavated soil, so that the contamination is destroyed or the associated risk is reduced to an acceptable level, after which soil is returned to the site; or,

if the above are not practicable,

- consolidation and isolation of the soil on site by containment with a properly designed barrier; and
- removal of contaminated material to an approved site or facility, followed, where necessary, by replacement with appropriate material;

or,

- where the assessment indicates remediation would have no net environmental benefit or would have a net adverse environmental effect, implementation of an appropriate management strategy.

The remedial options evaluated in **Table 6.2** below.

Table 6.2: Remediation Options Assessment Matrix

Remedial Option	Applicability	Assessment
Option 1: On-site treatment of the soil so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level.	AF/FA impacted soils AF/FA are considered to be heterogeneously distributed through the impacted areas (where encountered) and are not readily visible to the naked eye. On this basis., there is no option considered appropriate to remove asbestos fibres from impacted soils on site. Furthermore, attempted removal of AF/FA from impacted soil would result in increased disturbance of AF/FA impacted soils. Furthermore, emu picking of asbestos where asbestos is in friable condition or defined as asbestos fines or fibrous asbestos is not permitted in alignment with the NSW EPA position (EPA 2022[10]) on asbestos remediation.	Not a suitable option.
	Bonded ACM impacted soils Reuse of asbestos contaminated soils following removal of asbestos fragments is not permitted in NSW (EPA 2022). However, non-friable ACM at surface and within the surface (<10 cm) soils present from poor/incomplete demolition can be removed by hand-picking. Hand picking of ACM from the ground surface and within surface soils can be labour intensive and costly and time consuming where there is a large extent of ACM or where ACM is embedded in soil and difficult to 'pick', but is otherwise a suitable approach to removing ACM impacts from ground surfaces and surface soils.	**The preferred option subject to asbestos being exclusively bonded ACM and limited to surfaces and shallow soils (<10 cm) associated with poor/incomplete demolition of former asbestos structures.** Where substantial surface impact is identified that makes emu-picking not feasible, Option 3 is preferred whereby surface impact is moved to containment areas, otherwise Option 4 where material cannot be contained as surplus to containment areas.
Option 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.	AF/FA impacted soils As with Option 1, treatment of these materials offsite is not a viable option. There are no offsite licensed facilities for such treatment.	Not a suitable option.
	Bonded ACM impacted soils Offsite treatment and re-use of asbestos contaminated soils is not permitted in NSW.	Not a suitable option.

[10] Position statement — WA guidelines for the assessment, remediation and management of asbestos contaminated sites (nsw.gov.au) accessed 27 October 2022.

Remedial Option	Applicability	Assessment
Option 3: Consolidation and isolation of the soil on-site by containment within a properly designed barrier.	AF/FA impacted soils Onsite containment is a cost effective method for remediating AF/FA impacted soils. Due to the nature of the contamination (fibrous asbestos) additional health and safety measures will be required during handling and transport of these materials on-site. However, on-site containment would require implementation of an ongoing environmental / asbestos management plan (EMP/AMP), potentially inclusive of ongoing costs associated with its management, or otherwise contributions to compensate council should it occur on land to be dedicated to council. On-site containment is not suitable for low-density residential land use areas, but is appropriate for open space areas and roads largely due to reduced disposal costs subject to acceptance by council where council is the owner and/or responsible for maintenance. It is understood Council will accept containment beneath roads but not in open space areas at this time.	**Preferred option where material can be contained in proposed road areas** as permitted by Council. May require combination of Option 4 to achieve suitable physical separation thickness below finished ground levels where there is surplus to containment capacity.
	Bonded ACM impacted soils Onsite containment is suitable the material can be placed beneath roads or open space areas. In this case it is understood Council will permit containment below roads.	**Preferred option where material can be contained in proposed road areas** as permitted by Council. May require combination of Option 4 to achieve suitable physical separation thickness below finished ground levels where there is surplus to containment capacity.
Option 4: Removal of contaminated soil to an approved site or facility, followed where necessary by replacement with clean fill	AF/FA impacted soils There are currently suitably licensed waste facilities in the region capable of accepting AF/FA impacted soils. Given the relatively minor amount of AF/FA contaminated soils identified, this option is likely the fastest and most cost-effective method of remediating the AF/FA impacted soils.	Not the preferred option where adequate containment capacity beneath roads is available. Where there is material surplus to containment capacity, Option 4 is the next preferred option.
	Bonded ACM impacted soils There are currently suitably licensed waste facilities in the region capable of accepting ACM impacted soils. This is a suitable option for ACM impacted surface soils at the site where there may be substantial amounts of surficial ACM that would make Option 1 not cost-effective or practicably achievable. Suitable option for subsurface ACM in residential areas, and for open space areas where required to facilitate containment (Option 3) or where containment is not feasible.	Not the preferred option where adequate containment capacity beneath roads is available. Where there is material surplus to containment capacity, Option 4 is the next preferred option.

6.4 Proposed Remedial Approach

Potential remedial options have been outlined in **Table 6.2**. Based on assessment of those options, giving consideration to the proposed residential and open space land use with roads, the preferred remedial strategies are summarised following:

- Hand-picking of non-friable ACM at surface and within surface soils (<10 cm) where the source was identified to be from poor/incomplete demolition (current identified locations TP130 and TP155 (Stage 6A), TP157 and TP158 (Stage 6B) and three unlabelled locations (Stages 6A and 6B)); or
- Onsite containment of ACM impacted soils below proposed road areas if significant amounts of surface ACM are identified, or impacts are below surface above criteria (current identified locations TP126, TP148 and TP166 (Stage 6A) and TP178 (Stage 5)); and
- Onsite containment of AF/FA impacted soils below proposed road areas (current identified locations TP137 and TP143, (Stage 6A) and TP150 and TP187 (Stage 5)).

Additionally, asbestos service trenches and redundant electrical crossings containing asbestos are required to be removed and validated prior to bulk earthworks. Construction, demolition and domestic refuse on the site surface will also require management to ensure that identified aesthetic risks are appropriately managed.

As a contingency, where material surplus to containment capacity exists, asbestos impacts will be remediated by excavation and offsite disposal to landfill. Contingency including unexpected finds is dealt with in **Section 9**.

7. Remedial Plan

The remedial scope of works is provided in the following sections:

7.1 Preliminary Works

7.2 Approvals, Licences and Notices

Protection of the Environment Operations Act 1997 (POEO 1997)

The proposed remediation/validation activities are not required to be licensed under POEO Act as detailed in **Section 12.2**

State Environment Planning Policy (Resilience and Hazards) 2021 (R&H SEPP)

From review of the site location and proposed activities, and consideration to the mapping of "significant vegetation" in areas of the site as described in Section 3 and presented in **Appendix C**, the remediation works are considered Category 1 Remediation Works requiring consent (**Section 12.1**) as per the meaning provided in R&H SEPP. As such, application for consent to complete remediation works separately or ancillary to other development works is required, unless communication with Campbelltown Council confirms the "significant vegetation" within the site as shown on the Campbelltown LEP Terrestrial Biodiversity Map does not constitute 'habitat area, habitat protection area, habitat or wildlife corridor' or ' environment protection' area as per clause 4.8(e) of the R&H SEPP.

Notice is also required to be provided to Council within 30 days after completion of remediation, as per the R&H SEPP.

Asbestos Works

Asbestos impacted fill-based soils have been reported DP (2020). The asbestos appears to have been identified in bonded form (ACM) and AF/FA (equivalent to 'friable' asbestos as per NEPC (2013)). To this extent, all asbestos management works will require the implementation of friable asbestos controls such as donning person protective equipment (PPE), air monitoring for friable asbestos (to be completed by a Licensed Asbestos Assessor (LAA)) and dust suppression in accordance with relevant Codes of Practice (SWNSW 2019a[11] and 2019b[12]), as further described in **Section 10.**

A Class A friable asbestos removal contractor must be engaged to supervise or perform the works and obtain a site-specific permit from SafeWork NSW.

Remediation works shall not commence until all required approvals, licences and notifications have been granted and/or received.

7.2.1 Site Establishment

All safety and environmental controls are to be implemented as the first stage of remediation works. These controls will include, but not be limited to:

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

[11] *How to safely remove asbestos - Code of Practice*, Safe Work NSW, 2019 (SWNSW 2019a)
[12] *How to manage and control asbestos in the workplace - Code of Practice*, Safe Work NSW, 2019 (SWNSW 2019b)

- Stormwater runoff sediment controls.

Environmental controls are outlined in **Section 10**.

7.3 Remedial Works

Areas requiring remediation are discussed in **Section 6.2**. The remedial works are required to be undertaken by a remedial contractor with appropriate qualifications, licences, and experience, under the supervision of an Environmental Consultant who will complete monitoring and validation requirements. Pre-remediation investigation and inspection is required to be completed by the Environmental Consultant. The scope of remedial works will broadly comprise:

- Pre-remediation site investigation activities to address existing data daps;
- Remediation of surface soils impacted with bonded ACM; and
- Containment of soils impacted with bonded ACM and AF/FA beneath roads.

Each of the remedial work stages are described in more details in the following sections. Contingency actions, such as excavation and disposal where there is material surplus to containment capacity, are dealt with in **Section 9**.

7.3.1 Pre-remediation Data Gap Assessment

7.3.1.1 Inaccessible Areas and Building Footprints

Prior to development-related earthworks and civil works and to confirm the suitability of previously inaccessible portions of the site for the intended land uses or the extent of any additional impacts requiring remediation, further investigation works are required to assess potential impacts within inaccessible areas and building footprints following demolition of the remaining site structures (**Figure 5**).

A data gap assessment report shall be prepared to document the results of the investigation and where additional impacts are identified, or existing impacted areas refined, the RAP will be amended accordingly.

Data gap assessment requirements are presented in **Section 8.2.7** (**Table 8.3**).

7.3.1.2 Davis Park and Asbestos Impacts

Prior to the remediation activities further assessment will be completed to assess and delineate asbestos impacts and the fill material within Davis Park (location TP137). Additional sample locations will be advance via test pit on a systematic grid in accordance with the EPA (2022) guidance..

The test pit investigation and sample collection will be conducted in accordance with **Section 8.3** and samples will be analysed in accordance with validation activities as per **Table 8.3**. Following completion of the works the outcomes will be presented in a stand alone advice for the information of the clients and their contractors in establishing the anticipated scope of remedial works at the site.

Data gap assessment requirements are presented in **Section 8.2.7** (**Table 8.3**).

7.3.2 Site Wide Pre-Remediation Inspection

Bonded ACM has been identified within surface/near-surface soils sporadically across the broad site area, likely associated with poor/incomplete demolition of former site structures and/or fly-tipping. Prior to earthworks activities and following vegetation removal (i.e. slashing) across the vegetated areas of the site, an inspection of the exposed ground surface shall be undertaken by a LAA to identify and mark out areas impacted with bonded ACM fragments, or in close proximity of such. The areas of soils impacted with surface ACM will then be subject to remediation.

It is noted that any vegetation slashing prior to inspection should avoid disturbance of surface soil due to the identified and potential presence of surface ACM. Slashing is recommended to be completed to no lower than 5 cm above ground level.

7.3.3 Surface Picking of Bonded ACM Impacts from Demolition

If asbestos is exclusively bonded ACM and limited to surface and shallow soils (< 0.1 m) and associated with poor/incomplete demolition of former asbestos structures (i.e. excludes open space areas where ACM cannot be linked to historical structures), hand-picking of asbestos fragments is a suitable option until the soil meets the validation criteria i.e. no visible asbestos in surface soils (**Section 8.4**). Bonded ACM within surface soils (<0.1 m depth) at the site may be removed via the following methodology:

- Collection of ACM fragments by raking and hand picking of the surface soils by the Contractor;
- Offsite disposal of the collected ACM fragments to an appropriately licensed waste facility;
- Each area of picked material will be inspected by the environmental consultant by walking two sets of 1 m spaced transects set at right angles, to observe the presence of remaining ACM fragments; and
- If bonded ACM is identified, surface soils are required to be walked and picked, and re-inspected, until such time as visual validation is obtained.

Careful removal and inspection of grass cover will be required where present to enable raking and picking of surface soils.

7.3.4 Containment Surface/Subsurface ACM Beneath Roads

The following remediation shall be undertaken for surface ACM where picking is not viable (where too substantial to pick) and for subsurface ACM to facilitate containment:

- Where impact exists in a proposed road alignment and can be contained in-situ, marker layer will be placed directly over existing ground levels prior to placement of capping material (**Section 7.3.6**);
- Where material requires to be relocated for containment beneath proposed road alignments, excavation of impacted soils to lateral and vertical extent by the contractor, until the environmental consultant confirms soil meets the validation criteria (**Section 8.4**);
- Excavation shall be undertaken under the direction and supervision of the Remediation Consultant to assist in determination of the excavation extent and depth required;
- Excavated soils shall be stockpiled on a hardstand/plastic liner or similar, pending relocation for containment, or loaded directly onto the back of a truck for placement in the containment area; and
- Any unexpected finds will be managed as per **Section 9**.

7.3.5 Containment of AF/FA Impacted Materials

The following remediation shall be undertaken for containment of AF impacted surface/subsurface soils is required:

- Where impact exists in a proposed road alignment and can be contained in-situ, marker layer will be placed directly over existing ground levels prior to placement of capping material (**Section 7.3.6**);
- Where material requires to be relocated for containment beneath proposed road alignments, excavation of impacted soils to lateral and vertical extent by the contractor,

until the environmental consultant confirms the soil meets the validation criteria (**Section 8.4**);

- Excavation shall be undertaken under the direction and supervision of the Remediation Consultant to assist in determination of the excavation extent and depth required;
- Excavated soils shall be stockpiled on a hardstand/plastic liner or similar, pending relocation for containment, or loaded directly onto the back of a truck for placement in the containment area; and
- Any unexpected finds will be managed as per **Section 9**.

7.3.6 On-site Containment of Asbestos Impacted Soils Beneath Proposed Roads

It is understood Council will permit asbestos impacts to be contained in proposed roads where asbestos can be capped and managed with appropriate controls. Design plans showing the proposed location of the containment is provided as **Appendix D**. JBS&G understand it is not councils' preference to contain materials in open space areas.

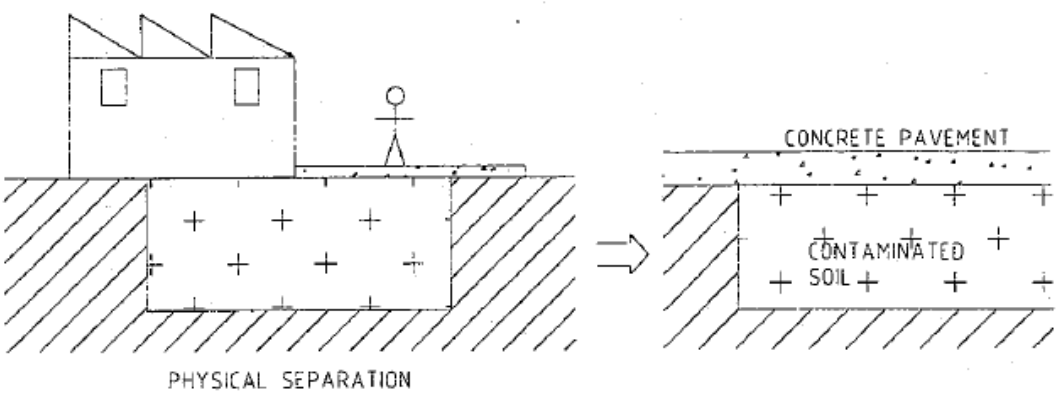
The principle of the on-site management approach is to contain materials in-situ or by placement such that there is physical separation between impacted fill/soil materials and receptors (e.g., site users/maintainers). The management approach prevents exposure to contaminants via permanent pavements/minimum soil thickness capping arrangement (i.e., physical separation), and implementation of a long-term environmental/asbestos management plan (EMP/AMP) to maintain the physical separation arrangements.

This is a feasible approach to managing asbestos in soil consistent with ANZECC (1999[13]) guidance. Therefore, implementation of a 'physical separation' strategy as indicated in ANZECC (1999), in conjunction with appropriate control measures, is appropriate with respect to management of the health risk.

The minimum typical requirements in ANZECC (1999) for capping arrangement include:

- Permanent concrete or asphalt surfaced pavement (e.g. roads); or
- A thickness of soil that is unlikely to be penetrated by future users of the site under the intended land use, underlain by a layer of 'marker layer'. A minimum soil cover thickness of 0.5m is commonly adopted however thinner soil cover may be acceptable where site constraints limit separation thickness or permanent paved areas are present.

These are shown schematically below.



Source: ANZECC (1999)

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

The following capping arrangements are recommended to be implemented within roads where feasible:

- Cover of fill materials by permanent paved areas (includes concrete, asphalt) – installation of a marker layer overlying potentially contaminated material, with clean (validated) material over the marker layer and below the road surface such that there is at least 0.5m separation between the pavement and the contaminated material, noting:
    - The capping thickness above the marker layer and contaminated material could include the thickness of subbase materials below the road pavement, such that the 0.5m capping thickness includes the subbase and a layer of clean (validated) soil, alternately, but more conservatively.
    - The capping thickness could include the subbase thickness and a layer of 0.5m clean (validated) material over the marker layer and contaminated material.
- Within underground services trenches – in the event underground services are to be installed, the service infrastructure will require to be installed above a marker layer within suitable materials for potential human and/or ecological exposure. The marker layer is to be placed at the base and covering the walls of the trenches to the elevation of the surrounding area marker layer.

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

Material above the marker layer extending to the final finished ground level will be required to be environmentally suitable material for human and/or ecological exposure (as appropriate). These physical separation (capping) arrangements shall comprise one or more of the following:

- Beneficial reuse of material originating from within the site; and/or
- Imported Virgin Excavated Natural Material (VENM); and/or
- Excavated Natural Material (ENM) as defined in the ENM Exemption/Order.

7.3.7 Decommissioning of Infrastructure

Existing assessment of site conditions has not identified specific impacts associated with the existing infrastructure, however given that they comprise potentially contaminating features, a conservative approach has been adopted with regard to these areas of the site, such that during removal it can be demonstrated the underlying soils have not been impacted as a result of previous site activities.

It is anticipated that the works will include:

- Demolition of existing infrastructure (e.g. roads, stormwater, sewer services, telecommunication pits);
- Visual inspection by the Environmental Consultant following these works to verify the absence of site contamination indicators, including staining, odorous soils, etc.; and
- Should any indicators of potential impact be identified, these will be managed via implementation of the unexpected finds protocol as per **Section 9**.

7.4 Material Importation

Based on the scope of remedial works described herein, it is anticipated that if materials are required to be imported to site, it will generally be as a result of construction requirements or

otherwise to ensure appropriate growing media are established within the planter boxes / garden areas as proposed on the site. Little if any imported material is anticipated to reinstate excavation of shallow asbestos impacts at the site. The requirements here are provided in the event some imported material is required for reinstatement of remedial excavations as well as for some earthworks or civil works for development prior to completion of validation to ensure suitability for the intended land use.

Prior to importation of all material, appropriate assessment of such materials must be completed to demonstrate the material is both fit for purpose and suitable from a contamination viewpoint. In accordance with EPA requirements, the extent of assessment will be determined by the type of material proposed to be imported.

Where material proposed to be imported is Virgin Excavated Natural Material (VENM), an assessment must demonstrate that the material is compliant with the definition of VENM as presented in the POEO Act 1997, adopting in the minimum requirements for characterisation of fill material as presented in EPA (2022a).

Where material proposed to be imported has been characterised under the Resource Recovery Framework (Order/Exemption), the material must firstly be demonstrated by the supplier as suitable for use in accordance with the requirements of the Order via provision of a statement of compliance. Suitable materials are anticipated to comprise but will not necessarily be limited to: excavated natural material – ENM, recycled aggregate, basalt fines, compost, mixed organic waste, pasteurised garden organics and recovered fines, with reference to the list of current orders and exemptions on the NSW EPA website.

In addition to the testing completed by the supplier, given the low frequency of compliance testing required under these Exemptions, the specific material proposed to be imported will require an additional compliance assessment prior to approval to import. The additional assessment is required to ensure that the incoming material does not pose an unacceptable risk to human health and/or environment at the placement site and is therefore suitable for use. It is anticipated that such assessment activities will include visual inspections, representative sampling and laboratory analysis of material to demonstrate the material meets the requirements of this RAP. As for VENM assessments, it is considered suitable to define such requirements on a specific site basis given the potential variability of project site requirements.

Material tracking records in addition to the import assessment report are required to be included in the final validation report for the site.

7.5 Surveying

The contractor will be required to provide survey drawings of excavations, stockpiles and remedial extent as required such that the remedial/validation objectives can be achieved. This will include surveying the extents of any containment areas including marker and capping layer extents and depths and final surfaces to confirm any capping arrangements have been installed appropriately and can be included in subsequent EMP/AMP documentation.

7.6 Validation

Validation of the remedial works will be conducted by the Environmental Consultant to demonstrate the remediation/management objectives have been achieved and to document the final condition of the site at the completion of remediation works (including importing of materials at time of validation) such that conclusions may be drawn on the end use suitability of the site for the proposed development. Details of the validation program are provided in **Section 8**.

7.7 Offsite Disposal of Material

Any contaminated soils or other waste generated during remediation that requires to be disposed off-site shall be classified by the Environmental Consultant in accordance with EPA (2014) *Waste Classification Guidelines.*

Should natural soils/bedrock require off-site disposal then these shall also be classified in accordance with EPA (2014) *Waste Classification Guidelines* or an appropriate exemption as created under the *Protection of the Environment Operations (Waste) Regulation 2014*.

Waste certificates will be prepared for each stockpile and/or material type that is to be disposed. Disposal of waste to licensed waste facilities in accordance with relevant waste regulations will be undertaken by the Remediation Contractor and the waste facility must be lawfully licensed to receive the material sent to it for disposal.

All waste tracking documentation including disposal dockets must be maintained by the remedial contractor and must be provided to JBS&G/the client for inclusion in the validation report.

7.8 Site Disestablishment

On completion of the remediation works all plant/equipment and safety/environmental controls should be removed from the site. If encountered, equipment used during asbestos remediation works will need to be appropriately decontaminated or disposed of as asbestos waste by the Remediation Contractor, in accordance with SWNSW (2019a), EPA (2014) and relevant waste regulations.

Details are provided in **Section 10**.

7.9 Contingency Plan

The DSI identified asbestos service trenches and redundant electrical crossings containing asbestos on the site (DP 2020). During removal of redundant service trenches, infrastructure will be inspected by a Competent Person or LAA to confirm the presence or absence of ACM. If ACM is identified, services are required to be remediated in accordance with **Section 7.3.3** (bonded ACM) or **Section 7.3.4** (friable ACM) and validated in accordance with **Table 8.3**.

Additionally, given the available site history information, consideration has been given to the potential for additional small-scale issues that may arise during works (from a contamination viewpoint). Should further impacted material (i.e. not previously identified in historical investigations) be identified as part of an Unexpected Find during construction works, the remedial options screening matrix in **Table 6.2** will be required to be reviewed. Notwithstanding, due to the site history and relatively shallow depth of fill it is anticipated that any impacts will be relatively isolated and could be appropriately managed through either on site treatment/management or controlled excavation and off-site disposal. Details are provided in **Section 9**.

8. Validation Plan

8.1 General

Data will be required to be collected during remediation/management and construction works to assess the effectiveness of the implemented management actions and document the final condition of the site at the completion of all works. Such information will allow conclusions to be drawn on the end suitability of the site for the proposed use. The general principles to be implemented with regard to the validation assessment are discussed in accordance with EPA (2017) requirements in the following sections.

It is anticipated that the validation assessment will be required to address the following broad issues:

- Confirm the extent of impact through data gap site investigation activities as documented herein;
- Validation that soil remediation works has managed / removed risks associated with asbestos contaminated soils at the site; and
- Validation that the final site surface does not contain visually identifiable bonded asbestos impacts or other unacceptable aesthetic issues.

8.2 Data Quality Objectives

Data quality objectives (DQOs) have been developed for the validation assessment, as discussed in the following sections.

8.2.1 State the Problem

DP (2020) has identified asbestos to be the main contaminants of concern at the site which require to be remediated to make the site suitable for the proposed development.

To appropriately demonstrate that the remedial/management works have been completed in accordance with this RAP, sufficient data in the form of observations, sample analytical data, material tracking records, survey data, disposal docket, etc. are required to be collected and assessed in a defensible manner.

8.2.2 Identify the Decision

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

- Are there any unacceptable risks to future human site receptors, associated with asbestos impacts in site media, following the remediation of soils?
- Are there any aesthetic issues following remediation works?
- Has all material imported to site to achieve development objectives been demonstrated as suitable for use?
- Was excess excavated soil classified and disposed of offsite to a facility licensed to accept the classified waste?
- Have the works been completed in accordance with the RAP, or where variations to the works were required, have these met the objectives of the RAP?
- Is the site suitable for the proposed land uses?

8.2.3 Identify Inputs to the Decision

The inputs to the decision are:

- Previous investigation results as discussed in **Section 4**;
- The proposed development and final proposed landform and site features;
- Field observations in relation to inspection of all excavation bases, walls, stockpiles and final site surfaces for signs of asbestos impacts or other indicators of potential contamination;
- Environmental data as collected from pre-remediation investigations and the validation of remedial areas/excavations, and any unexpected find);
- Material characterisation data obtained during assessment of contaminated material for off-site disposal and/or surplus material prior to off-site beneficial re-use or disposal;
- Disposal dockets and relevant documents in relation to appropriate disposal of material (if required) to be removed from site as part of the remediation works (landfill dockets, EPA Waste Locate, beneficial reuse / recycling dockets, trade waste disposal, etc.);
- Material characterisation data (including field observations, sampling and analytical data) obtained during assessment of material proposed to be imported to the site;
- Survey data of marker layer installation to validate the physical separation (capping arrangement) from site users to in-situ/contained materials;
- Relevant guideline criteria for validation and waste classification; and
- Data quality indicators (DQIs) as assessed by quality assurance / quality control (QA/QC).

8.2.4 Define the Study Boundaries

The site boundaries are defined in **Section 2.1** and presented on **Figures 1**, **2** and **3**. The vertical extent of the works will be the maximum depth of remedial excavations (refer to **Section 5**).

Validation works will be completed over the course of remedial works and any earthworks or civil works completed up to the time of validation.

8.2.5 Develop a Decision Rule

The decision rules adopted to answer the decisions identified in **Section 8.2.2** are discussed below in **Table 8.1** following.

Table 8.1: Summary of Decision Rules

Decision Required to be Made	Decision Rule
1. Are there any unacceptable risks to future human site receptors, associated with asbestos impacts in site media, following the remediation of soils?	Soil validation data shall be collected of the walls and base of excavations and soil proposed for reuse onsite with comparison of the subsequent laboratory data with adopted site validation criteria relevant for the proposed land use. If the soils validation results meet the adopted validation criteria, then the answer to the question is No. If the soil validation results fail the adopted validation criteria, then the answer to the question is Yes. Further remedial works may be undertaken in this instance, with a subsequent repeat of the validation process.
2. Are there any aesthetic issues following remediation works?	If the final site surface and near surface soils are free of aesthetic impacts, asbestos impacts and absent of significant petroleum odours or otherwise visual indicators of petroleum hydrocarbon impact (i.e. sheens), the answer to the decision will be No. Otherwise, the answer to the decision will be Yes, subject to implementation of further remedial actions.

Decision Required to be Made	Decision Rule
3. Was excess excavated soil classified and disposed of offsite to a facility licensed to accept the classified waste?	All material disposed from the site will require to be accompanied by adequate characterisation data (as appropriate) and waste classification (for soils). Documentation from the operation receiving the material including the dates, tonnage/volume and classification of the accepted material will be required to facilitate the decision. If the criteria stated above are satisfied, the decision is Yes, and if receipts are provided recording the disposal of material to an off-site licensed facility, the decision is Yes. If the material exceeds the criteria, and no disposal receipts are provided, the answer is No.
4. Where material is imported to site for development purposes is it considered environmentally suitability for use?	Analytical data sets and inspection data will be reviewed for each proposed material type/source against established definitions for acceptable material (i.e. VENM, resource recovery exemptions, etc) and EPA endorsed criteria as established in the RAP as validation criteria. If the complete data set for the applicable material meet the requirements relevant to the material type, the answer to the decision is Yes and material may be imported to site. If the data set exceeds the adopted criterion, the answer to the decision is No and the material cannot be imported to site for use in development activities.
5. Have remedial and validation works met the requirements of the RAP?	Evaluation of the RAP requirements and completed scope of works will be completed on a qualitative basis. If the completed works are inconsistent with the RAP objectives, the answer will be No. In this instance, evaluation of the works will be undertaken with consideration to the RAP objectives. If the works are inconsistent with the stated objectives, the answer is No. Otherwise, the answer to the decision is Yes.
6. Is the site suitable for the proposed land uses?	If the answer to Questions 4 and 5 is Yes, then the answer to the decision is also Yes. Otherwise, the answer to the decision is No. In this instance further remediation/ management actions will require to be implemented and appropriately documented such that a future review of the above decisions results in a Yes decision outcome.

8.2.6 Specify Limits of Decision Error

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

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

To assess the usability of the data prior to making decisions, the data will be assessed against pre-determined DQIs established for the project as discussed below in relation to precision, accuracy, representativeness, comparability and completeness (PARCCS parameters). The acceptable limit on decision error is 95% compliance with DQIs.

The DQIs and data assessment criteria are summarised as presented in **Table 8.2**.

- **Precision** – measures the reproducibility of measurements under a given set of conditions. The precision of the laboratory data and sampling techniques is assessed by calculating the Relative Percent Difference (RPD) of duplicate samples.
- **Accuracy** – measures the bias in a measurement system. The accuracy of the laboratory data that are generated during this study is a measure of the closeness of the analytical results obtained by a method to the 'true' value. Accuracy is assessed by reference to the analytical results of laboratory control samples, laboratory spikes and analyses against reference standards.
- **Representativeness** – expresses the degree which sample data accurately and precisely represent a characteristic of a population or an environmental condition. Representativeness is achieved by collecting samples on a representative basis across the site, and by using an adequate number of sample locations to characterise the site to the required accuracy.
- **Comparability** – expresses the confidence with which one data set can be compared with another. This is achieved through maintaining a level of consistency in techniques used to collect samples; ensuring analysing laboratories use consistent analysis techniques and reporting methods.
- **Completeness** – is defined as the percentage of measurements made which are judged to be valid measurements. The completeness goal is set at there being sufficient valid data generated during the study.
- **Sensitivity** – expresses the appropriateness of the chosen field and laboratory methods, including the limits of reporting, in producing reliable data in relation to the adopted site assessment criteria.

Table 8.2: Summary of Quality Assurance/Quality Control Program

Data Quality Objectives	Frequency	Data Quality Indicator
Precision		
Blind duplicates (intra laboratory)	1 / 20 primary samples	1-10x LOR – no limit; 10x-30x LOR - <50% relative percent difference (RPD)[1] >30x LOR - <30% RPD
Blind duplicates (inter laboratory)	1 / 20 primary samples	
Laboratory duplicates	1 / 20 primary samples	
Accuracy		
Surrogate spikes	All organic samples	70-130 %
Laboratory control samples	1 per lab batch	70-130 %
Matrix spikes	1 per lab batch	70-130 %
Representativeness		
Sampling appropriate for media and analytes	All samples	-[2]
Samples extracted within holding times.	All samples	Soil: organics (14 days), inorganics (6 months), asbestos – no limit
Trip spike (BTEX only)	1 per sampling event	70-130% recovery
Rinsate blank	1 per sampling event	<LOR
Method blank	1 per lab batch	<LOR
Comparability		
Standard operating procedures for sample collection & handling	All Samples	All samples
Standard analytical methods used for all analyses	All Samples	NATA accredited methods
Consistent field conditions, sampling staff and laboratory analysis	All Samples	All samples[2]
Limits of reporting appropriate and consistent	All Samples	All samples[2]
Completeness		
Sample description and COCs completed and appropriate	All Samples	All samples[2]
Appropriate documentation	All Samples	All samples[2]
Satisfactory frequency and result for QC samples	All QA/QC samples	95% compliance
Data from critical samples is considered valid	-	Critical samples valid
Sensitivity		
Analytical methods and limits of recovery appropriate for media and adopted Site assessment criteria	All samples	LOR ≤ site assessment criteria

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

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

If any of the DQIs are not met, further assessment will be necessary to determine whether the non-conformance will significantly affect the usefulness of the data. Corrective actions may include requesting further information from samplers and/ or analytical laboratories, downgrading of the quality of the data or alternatively, re-collection of the data.

8.2.7 Optimise the Design for Obtaining Data

The purpose of this step is to identify a resource-effective field validation sampling design that generates data that are expected to satisfy the decision performance criteria, as specified in the preceding steps of the DQO process. The output of this step is the sampling design that will guide development of the field sampling and analysis plan. This step provides a general description of the activities necessary to generate and select data collection designs that satisfy decision performance criteria.

The remediation validation and subsequent laboratory analysis program as outlined in the following sections will need to be implemented during site remediation activities to demonstrate the

successful completion of works in compliance with the RAP goals. The validation/characterisation sampling and analytical program for the site is outlined in **Table 7.3** below.

Table 8.3: Characterisation/Remediation Validation Program

Item	Sampling Frequency			Analytical Suite / Action
	Excavation Floors	Excavation Walls	Materials /Other	
Pre-remediation Investigation				
Pre-remediation data gaps – validation of impacted sub-surface soil post demolition	Consider previous investigations, any post demolition from other and EPA (2022) guidance.	N/A	Consider previous investigations, any post demolition from other and EPA (2022) guidance.	Visual inspection of surfaces by LAA following demolition Heavy Metals (As, Cd, Cr, Cu, Hg, Ni, Pb, Zn), TPH/BTEX PAHs OCPs Asbestos (quantification and 500mL NEPM)
Site wide pre-remediation inspection	N/A	N/A	N/A	Visual inspection of surfaces by Competent Person or LAA following vegetation removal
Asbestos delineation	N/A	N/A	Minimum 4 sample locations (north, south, east and west) per identified asbestos impact, further described in **Section 8.3.1**	10 L asbestos quantification + asbestos (500 mL NEPM) for friable impacts
David Park assessment /delineation	N/A	N/A	Systematic grid based on EPA (2022) guidance, further described in **Section 8.3.1**	Heavy Metals (As, Cd, Cr, Cu, Hg, Ni, Pb, Zn), TPH/BTEX PAHs OCPs 10 L asbestos quantification + asbestos (500 mL NEPM) for friable impacts)
Validation / Characterisation				
Removal of bonded ACM fragments from surface soils	N/A	N/A	Bonded ACM within surface soils (< 0.1 m)	Visual inspection of surfaces by Competent Person
Validation of Bonded Asbestos impacted sub-surface soil	N/A	N/A	Bonded ACM within sub-surface soils	Visual inspection of surfaces by Competent Person
Validation of AF/FA impacted sub-surface soil	1/25 m^2	1 per 10 linear m	1/25 m^3 to 200 m^3, then as per Table 4 *Sampling design part 1 - application* (EPA, 2022a)	Visual inspection of surfaces by LAA 10 L asbestos quantification + asbestos (500 mL NEPM) for friable impacts
Inspection of infrastructure removal	N/A	N/A	N/A	Visual for potential impacts
Aesthetic impacts	N/A	N/A	N/A	Visual for aesthetic impacts
Soil/Fill Requiring Off-Site Disposal				

Item	Sampling Frequency			Analytical Suite / Action
	Excavation Floors	Excavation Walls	Materials /Other	
Waste classification of material requiring off-site disposal where required (i.e. if existing site data insufficient).	Sampling in-situ or as stockpiles consistent with EPA (2022a) sampling design guidelines			Heavy metals TPH/BTEX PAHs OCPs/PCBs Asbestos TCLP (as required)
Unexpected Finds				
Assessment of unexpected find and/or validation of excavations formed by unexpected finds	1/25 m^2	1 per 10 linear m	1/25 m^3 to 200 m^3, then as per Table 4 *Sampling design part 1 - application* (EPA, 2022a)	Relevant contaminants of concern determined by Environmental Consultant
Asbestos service trenches and electrical crossings – bonded ACM	N/A	N/A	N/A	Visual inspection of surfaces by Competent Person
Asbestos service trenches and electrical crossings – friable ACM	1/25 m^2	1 per 10 linear m	1/25 m^3 to 200 m^3, then as per Table 4 *Sampling design part 1 - application* (EPA, 2022a)	Visual inspection of surfaces by LAA 10 L asbestos quantification + asbestos (500 mL NEPM) for friable impacts
Material Importation				
Imported VENM, if required for remedial excavation reinstatement	N/A	N/A	If adequate documentation is not available, generally up to 10 samples per source site should be analysed as appropriate based on proposed import volumes	Heavy metals TPH/BTEX PAHs OCPs/PCBs Asbestos (500 mL)
Imported ENM, if required for remedial excavation reinstatement	N/A	N/A	As per EPA ENM Order	Heavy metals TPH/BTEX PAHs pH EC RTA 276 (foreign materials) Asbestos
Site-won soils for remedial excavation reinstatement	N/A	N/A	Minimum 3 soil samples per site source area, and/or use of existing data, to be determined by Environmental Consultant.	Heavy metals TPH/BTEX PAHs OCPs/PCBs Asbestos (500 mL)

The nominated sampling densities and analytical program have considered sample density guidance provided in EPA made and endorsed guidelines.

8.3 Sampling Methodology

8.3.1 Soil Sampling Methodology

8.3.1.1 Test Pit Investigation (Data Gaps/Unexpected Finds)

Sample locations will be advanced via test pit, with samples collected at regular intervals from the ground surface (0-0.1 m), 0.3 m, 0.5 m and then at 0.5 m intervals to a maximum depth of 3 m or 0.5 m into natural materials (or prior refusal), whichever is shallower.

Soil samples will be screened for potential organic compounds (VOCs) using a portable photo-ionisation detector (PID). During the collection of soil samples, features such as seepage,

discolouration, staining, odours and other indicators of contamination, if present, will be noted, including observations of the presence of ash and / or coal wash fines / gravels.

Soils obtained for PID screening will be placed in a sealed plastic bag for a period of approximately 5 minutes to equilibrate, prior to a PID being attached to the bag. Readings will then be monitored for a period of approximately 1 minute or until values stabilised and the stabilised/highest reading will be recorded on the borehole logs.

For asbestos, sampling should consider the procedure in **Section 8.3.1.5** below.

8.3.1.2 Validation of Excavation(s)

Samples will need to be collected by an appropriately trained and experienced environmental scientist/engineer using a hand trowel (shallow/surficial excavations) or from the bucket of mechanical excavation equipment, at the required densities to meet the project DQOs.

Prior to collection of each sample, hand tools will need to be thoroughly decontaminated using phosphate free detergent and distilled water as per **Section 8.3.4**.

During the collection of soil samples, features such as seepage, discolouration, staining, odours and other indicators of contamination will need to be noted on the field documentation.

Where validation involves sampling for asbestos, sampling should consider the procedure in **Section 8.3.1.5** below.

8.3.1.3 Materials Tracking

The movement of all materials to or from the site or for reuse or containment within the site, is required to be subject to a Material Tracking Plan (MTP). The MTP shall be administered by the environmental consultant with the provision of all required information by the remediation contractor and will generally contain the following elements:

- Date (yyyy/mm/dd);
- Site figure showing source (cut) and placement (fill);
- Estimated volume (cubic metres);
- Type of material (e.g. VENM etc);
- Depth of source (RL);
- Depth of placement (RL);
- Source (from) information in terms of MGA56 co-ordinates as established by site GPS and/or survey;
- Placement (to) information in terms of MGA56 co-ordinates as established by site GPS and/or survey;
- Source (from) information in terms of site feature (e.g. Building X);
- Placement (to) information in terms of site feature (e.g. under future basement);
- Reference document (where necessary, i.e. virgin excavated natural material / excavated natural material classification);
- Purpose of placement (i.e. containment, surplus to site requirements etc); and
- Comments (when required).

8.3.1.4 Stockpile Sampling

For stockpile sampling, material will be obtained from a minimum depth of 0.3 m below the surface of the stockpile at the time of sampling. Appropriate decontamination activities shall be followed following the collection of each sample.

During the collection of soil samples, features such as seepage, discolouration, staining, odours and other indications of contamination will be noted on the field documentation.

8.3.1.5 Sampling for Asbestos Assessment

Where assessment of the quantity of ACM in soil is required for comparison with validation criteria, consistent with NEPC (2013) guidance, bulk soil samples (minimum 10 L) will be collected at each sampling location. Collected bulk sample will be sieved in the field (≤7 mm passing) and separated fragments retained and weighed in the field, or spread out on contrasting plastic. The asbestos concentration as ACM in soil will be calculated in accordance with NEPC (2013) and based on the weight of collected fragment/s (assuming 15% asbestos content) divided by the weight of the collected 10 L soil sample, providing a w/w%.

A separate 500 mL soil sample will be collected from the same location as a bulk sample, labelled and sent to the laboratory for asbestos analysis according to NEPC (2013) protocol.

Validation criteria will be adopted in accordance with NEPC (2013) for the permissible land use, noting that all visually asbestos impacted fill will be excavated for off-site disposal to manage WHS considerations during development and the absence of ongoing asbestos management requirements upon completion of remediation works.

8.3.2 Sample Handling

Collected samples will be immediately transferred to sample containers of appropriate composition (glass jars for chemical analysis, plastic bags for asbestos). Sample labels recorded: job number; sample identification number; and date of sampling.

Sample containers will be transferred to a chilled ice box for sample preservation prior to and during shipment to the testing laboratory. A chain-of-custody form will be completed and forwarded with the samples to the testing laboratory.

8.3.3 Duplicate and Triplicate Sample Preparation and QA/QC Requirements

Field duplicate and triplicate samples for the characterisation/validation assessment will be obtained during sampling using the procedures outlined at a frequency outlined in **Table 7.2**. The primary sample will be divided laterally into three samples with minimal disturbance to reduce the potential for loss of volatiles and placed in three clean glass jars and / or plastic bags. All jars will be filled completely with no headspace to reduce the potential for loss of volatiles and separately labelled as the primary, duplicate and triplicate samples before being placed in the same chilled esky for laboratory transport.

Trip spike, storage blank and rinsate samples will be collected where analysis for volatile compounds is required.

8.3.4 Sampling Equipment Decontamination

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

- Scrubbing with a wire brush to remove gross contamination;
- Pressure spray with Decon 90 detergent and potable water mix;
- Pressure spray rinse with potable water; and

- Air drying.

Rinsate samples will be obtained during the field decontamination procedures at regular intervals during characterisation/validation sampling activities (which include reusable equipment). Each rinsate sample will be obtained by rinsing the trowel with laboratory grade demineralised water following the decontamination procedure. The water sample will be appropriately preserved and stored with the site samples prior to transport to the laboratory for chemical analysis.

8.3.5 Laboratory Analyses

All laboratories are National Association of Testing Authorities (NATA) registered for the relevant analyses. In addition, the laboratories are required to meet JBS&G's internal QA/QC requirements.

8.3.6 Validation of Removal of Aesthetic Materials

Validation inspection is required to be undertaken to demonstrate that, if any aesthetic impacts are identified during earthworks/remedial works, have been remediated by removal of aesthetic impacts to a standard suitable for the proposed land use.

Once impacted soils are confirmed to have been removed, the material will be inspected by the Environmental Consultant to confirm visual aesthetic issues are no longer evident, based on the NEPC (2013) discussion of aesthetics as adopted herein for validation criteria.

A clearance inspection shall be conducted by a suitably qualified Environmental Consultant following completion of removal of unacceptable aesthetic material, including photographic records for inclusion in the validation report.

8.3.7 Structure Footprints Following Demolition

As discussed in **Section 7.3.1**, the potential remains that demolition of remaining site structures may result in impacts to surficial fill material from hazardous building materials (e.g. asbestos, heavy metals, PAHs). Consistent with methodologies described in ADE (2021-2022), following demolition of site structures including ground slabs, visual confirmation that no ACM is present within surficial soils is to be undertaken. A soil characterisation assessment shall comprise 2 samples from in-situ soils via test pitting to 0.3 m bgs and 1 sample from the resulting stockpiled soil material, with samples analysed for COPCs outlined in **Table 8.3**.

Any identified signs of contamination will be managed under the Unexpected Finds Protocol (**Section 9.1**).

8.3.8 Validation of Unexpected Finds

The procedure described below shall be required if unexpected, impacted soils requiring remediation and validation are identified during the works, consistent with the unexpected find protocol presented in **Section 9.1** and **Figure 9.1**.

Samples will be collected and analysed in accordance with the analytical schedule (**Table 8.3**) by NATA accredited laboratories.

A suitably qualified Environmental Consultant will be required to assess unexpected finds and undertake the validation inspections and sampling to verify such finds have been addressed and the areas meet the validation criteria in this RAP.

8.4 Validation Criteria

8.4.1 Soil Validation Criteria

As discussed, it is anticipated that the site will be developed for medium density residential purposes and in accordance with the decision process for assessment of urban redevelopment sites (EPA 2017), validation criteria sourced from the publications have been adopted:

- NEPC (2013) Health-based Investigation Levels (HILs) for residential land use (HIL- A);
- NEPC (2013) Health Screening Levels (HSLs) for petroleum hydrocarbons considering potential for vapour intrusion, sand, for residential land use (HSL A) land use at 0.0-1.0 m depth;
- NEPC (2013) Health Screening Levels (HSLs) for asbestos in soils;
- NEPC (2013) site specific ecological investigation levels (EILs) derived through the added contaminant limits for residential land use;
- NEPC (2013) Management Limits for TRH, coarse grained soils for residential / parkland land use;
- NEPC (2013) Ecological Screening Levels (ESLs) for TRH fractions, BTEX and benzo(a)pyrene in coarse grained soil for residential land use; and
- Where there are no NSW EPA endorsed thresholds the laboratory LOR will be adopted as an initial screening value for the purposes of this validation assessment.

Reference will be made to NEPC (2013) under a residential land use setting to establish what constitutes an aesthetics issue. It is anticipated that the criteria will comprise, but not necessarily be limited to, confirming the absence of:

- Inclusions that may cause injury to people, including metal, glass or other sharp objects;
- Soil discolouration associated with chemical causes and/or the presence of large quantities of inert refuse within the fill matrix; and
- Odorous and/or otherwise unpleasant olfactory characteristics of the fill material.

8.4.2 Offsite Disposal Criteria

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

8.4.3 Imported Soil Criteria

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

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

All material imported onto the site are required to be accompanied by appropriate documentation that has been verified by the appointed site contamination (environmental) consultant. All materials will be required to be inspected upon import to the site by the appointed site contamination (environmental) consultant to confirm consistency with provided documents and/or consistency with observations made at the source site.

Sampling of materials as per an EPA exemption (recycled products) is required to be undertaken by the facility in accordance with the relevant exemption. In addition, where materials are proposed for beneficial reuse under a NSW EPA exemption (i.e. imported to the site), fill material will need to be further assessed by an Environmental Consultant for land use suitability

8.4.4 Statistical Criteria

Statistical analysis of the data will be completed, where necessary, in accordance with relevant EPA made/endorsed guidance, to facilitate data assessment. The statistical criteria below are noted:

- Either:
  - the reported concentrations are all below the site criteria;
- Or:
  - no single analyte concentration exceeds 250 % of the adopted site criterion; and
  - the standard deviation of the results is less than 50 % of the site criterion; and
  - the 95 % UCL of the average concentration for each relevant analyte is below the adopted site criterion.

Statistical assessment will not be undertaken for asbestos in soil.

8.5 Validation Reporting

At the completion of the remedial works a Validation Report will be prepared in general accordance with the *NSW EPA Guidelines for Consultants Reporting on Contaminated Land* (EPA 2020), documenting the works as completed. This report will contain information including:

- Results of previous investigations conducted at the site;
- Details of the remediation works conducted;
- Information demonstrating that the objectives of the RAP have been achieved, in particular the validation sample results and assessment of the data against both the pre-defined DQO and the remediation acceptance (validation) criteria;
- All material tracking data;
- Any variations to the strategy undertaken during the implementation of the remedial works; and
- Results of all environmental monitoring undertaken during the course of the remedial works;
- Details of any environmental incidents occurring during the remedial works and the actions undertaken in response to these incidents;
- Verification of regulatory compliance;
- Details on waste classification, tracking and off-site disposal including landfill dockets;
- The extent of impacted materials as retained on the site and subject to the long-term management provisions (as required); and
- Clear statement of the suitability of the site with respect to permissible land uses.

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

9. Contingency Plan

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

Additionally, the associated remedial works health and environmental risks/hazards and their minimisation/mitigation are further discussed in **Sections 10** and **11**.

9.1 Unexpected Finds Protocol

It is acknowledged that previous works have been undertaken to identify contaminants of potential concern. However, ground conditions between sampling points may vary, and further hazards may arise from unexpected sources and/or in unexpected locations during remediation. The nature of any residual hazards which may be present at the site are generally detectable through visual or olfactory means, for example:

- friable asbestos and other contamination encountered outside the extent of known impacts, such as from hazardous building materials including asbestos and lead-based paints in building footprints following demolition;
- construction / demolition waste (visible) outside the known extent;
- other previously unidentified contaminated soils / fill materials (visible);
- bottles / containers of chemicals (visible); and
- odorous or discoloured soils.

As a precautionary measure to ensure the protection of the workforce and surrounding community, should any of the abovementioned materials be identified (or any other unexpected potentially hazardous substance), the procedure summarised in **Figure 9.1** and detailed in the following sections is to be followed.

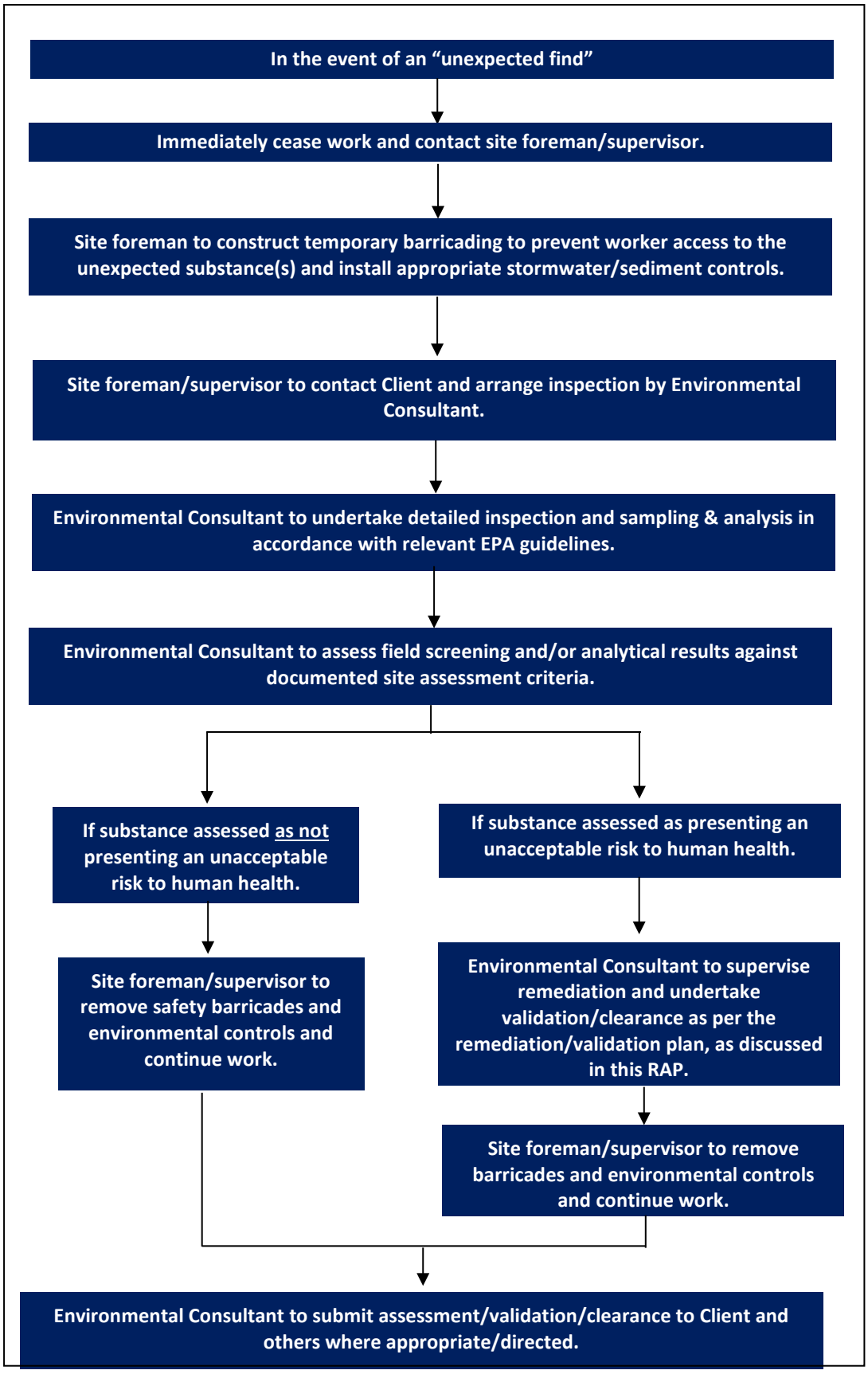
An enlarged version of the unexpected finds protocol, suitable for use on site, should be posted on site by the Client or Contractor.

The sampling strategy for each “unexpected find” shall be designed by a suitably qualified Environmental Consultant and should aim to determine the nature of the substance and whether it is at concentrations which pose an unacceptable risk to human health or the environment.

The sampling frequency of the identified substance/materials shall meet the minimum requirements outlined in EPA (2022a).

Where the preferred or contingent remedial strategies presented in this RAP may not be feasible based on assessment of an unexpected find, an alternate remedial strategy will require documentation, including any additional/alternate site management controls and validation requirements.

Figure 9.1 – Unexpected Finds Protocol



9.2 Contingency Scenarios

9.2.1 Excavation and Disposal of Asbestos Impacts

The following remediation shall be undertaken for asbestos impacts (bonded ACM and AF/FA) where impacts are surplus to the containment capacity at the site:

- Excavation of impacted soils to lateral and vertical extent by the contractor, until the environmental consultant confirms soil meets the validation criteria (**Section 8.4**);
- Excavation shall be undertaken under the direction and supervision of the Remediation Consultant to assist in determination of the excavation extent and depth required; and
- Excavated soils shall be stockpiled on a hardstand/plastic liner or similar, or placed into a lined skip bind, pending offsite disposal or loaded directly onto the back of a truck for disposal (with appropriate waste classification provided by the consultant);

9.2.2 Non-Asbestos Impacts

Soils identified as requiring remediation (non-asbestos impacts) by the data gap investigation or as an unexpected find will be remediated as follows:

- The area will be designated by the Environmental Consultant, and the contractor will commence excavating soils;
- Excavation of impacted soils will occur to lateral and vertical extent designated by the consultant, at which point the consultant will take validation samples as per **Table 8.3**;
- Should validation samples fail, the excavation will be extended approximately 0.5m laterally and 0.1m vertically around the failed sample location(s) and additional validation samples taken consistent with **Table 8.3**; and
- Impacted soils transferred to a temporary soil stockpiling area on the site or directly loaded into a truck for offsite disposal.

Once validation is achieved, the consultant will advise the contractor that the excavation area can be reinstated with validated site-won or imported soil (**Section 7.4**), or reinstatement is not required for development levels the area can be made safe.

9.2.3 Remedial Strategy Failure

In the event that the proposed remediation works do not meet the validation criteria, or if the selected remedial strategy is not able to proceed, the following actions will be considered to ensure firstly the safety and health of people and the environment and secondly that the overall project objectives are achieved.

1. Reassessment of remedial and validation options for the proposed development area.
2. Continued controlled surface picking for on-site remediation or controlled excavation for off-site disposal until validation is achieved.

10. Site Management Plan

10.1 Contact Persons

Contact details for key personnel involved in remediation and validation works are summarised in **Table 10.1.**

Table 10.1 Contact Details

Client's Supervisor/Manager	Details
Name	To be advised
Company	Landcom
Contact Phone	To be advised
Remediation Contractor	**Details**
Name	To be advised
Company	To be advised
Contact Phone	To be advised
Environmental Consultant	**Details**
Name	To be advised
Company	JBS&G
Contact Phone	To be advised

10.2 Hours of Operation

Remediation works shall only be permitted during the following hours, or as approved by the Wollongong City Council within the consent:

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

Emergency work is permitted to be completed outside of these hours.

10.3 Soil and Water Management

All works shall be conducted in general accordance with Landcom (2004)[14] guidance (the Blue Book), which outlines the general requirements for the preparation of a soil and water management plan.

All remedial works shall be conducted in accordance with a soil and water management plan, which is to be kept onsite and made available to council officers on request. All erosion and sediment measures must be maintained in a functional condition through the remediation works by the remedial contractor.

To prevent the migration of impacted soil off site, silt fences shall be constructed at the down-gradient site boundaries by the remedial contractor. Any material which is collected behind the sediment control structures shall be removed off site to a licensed waste facility after waste classification.

In storm or extended rainfall event, the structures located on site for sediment control shall be monitored and replaced or altered if necessary by the contractor. Collected material shall be managed in accordance with remediation works by the contractor.

10.3.1 Site Access

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

[14] *Managing Urban Stormwater: Soils and Construction*, Landcom 4th Edition, March 2004.

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

10.3.2 Stockpiles

The following procedures will be implemented:

- No stockpiles or other materials shall be placed on footpaths or roadways and will be away from all stormwater infrastructure (including drainage lines, stormwater pits, gutters, etc) where possible. Where this is not possible, sediment controls will be placed over stormwater grates to prevent ingress of sediment to stormwater drainage lines.
- Stockpiles shall be formed with sediment control structures placed immediately down slope to protect other lands and waters from sediment pollution.
- All asbestos impacted soils will be covered with plastic or geotechnical fabric.

10.3.3 Excavation Pump out

Excavation pump out water (if any) shall be pumped from the excavation by a licensed contractor and disposed of off-site as "liquid waste" in accordance with EPA (2014). It is considered this will not be likely as part of the remedial works proposed.

10.4 Noise

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

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

10.5 Air Quality

10.5.1 Air Monitoring

Airborne asbestos fibre monitoring is recommended to be conducted during the works in accordance with requirements of the National Occupational Health and Safety Commission (NOHSC) *Asbestos Code of Practice and Guidance Notes*, in particular the guidance note for the estimated of airborne dust [NOHSC 3002:2005].

The consultant shall undertake airborne asbestos fibres monitoring at a minimum of five static locations daily during remediation works that will disturb asbestos impacted or contaminated materials. Monitoring locations will include site perimeter locations and downwind locations. Wind Rose information available from the Bureau of Meteorology (BOM) for the nearest weather stations will be used to determine common prevailing winds in the area.

Air filters shall be analysed by a NATA accredited laboratory and results shall be required to be below 0.01 fibres/mL. All detections of fibres shall be further analysed by scanning electron microscope (SEM) to confirm the fibres are asbestos.

If respirable asbestos fibres are confirmed and present between 0.01 and 0.02 fibres/mL, the following controls must be implemented by the licensed asbestos removalist, in accordance with SWNSW (2019a):

- Review control measures;
- Investigate the cause; and
- Implement controls to eliminate or minimise exposure and prevent further release.

If respirable asbestos fibres are confirmed and present above 0.02 fibres/mL, the following controls must be implemented by the licensed asbestos removalist, in accordance with SWNSW (2019a):

- Stop removal work;
- Notify SafeWork NSW by phone, then by fax or written statement that work has ceased;
- Investigate the cause;
- Implement controls to eliminate or minimise exposure and prevent further release; and
- Do not recommence removal work until further air monitoring is conducted and fibre levels are detected below 0.01 fibres/mL.

A daily report air monitoring report will be prepared documenting the previous/same days airborne asbestos fibre air monitoring results. This report will be made available to all relevant stakeholders and site workers.

10.5.2 Dust Control

During the remediation, dust levels will be monitored and minimised as necessary by using mist sprays or water spray application on the ground surface via watercart. Dust shall also be controlled by ensuring vehicles leave via the designated (stabilised) site access point.

10.5.3 Odour

No odours should be detectable at the site boundary. Appropriate actions will be taken to reduce the odours, which may include increasing the amount of covering of excavations / stockpiles, mist sprays, odour suppressants or maintenance of equipment.

Records of volatile emissions and odours shall be kept by the remediation manager. Equipment and machinery will be adequately maintained to minimise exhaust emissions. No materials shall be burnt on the site.

10.6 Groundwater

No groundwater remediation or dewatering is proposed as part of the works. No approvals are required under the Water Management Act 2000.

Seepage water controls may be required to prevent shallow seepage water accumulation.

10.7 Material Transportation

The transporting contractor shall ensure there is no material tracked out onto the street and that the load is securely covered. In addition, all site vehicles must leave the site in a forward direction.

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

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

10.8 Hazardous Materials

All hazardous and/or intractable wastes (if any) shall be removed and disposed of in accordance with the relevant regulatory requirements. In particular, any hazardous wastes will be transported by a licensed transporter.

10.9 Disposal of Contaminated Soil

All soil will be classified, managed and disposed in accordance with the *Waste Classification Guidelines Part 1: Classifying Waste* (EPA 2014), and *Protection of the Environment Operation (Waste) Regulation* (Waste Regulation).

10.10 Site Signage and Contact Numbers

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

10.11 Complaint Reporting and Resolution

Complaints from adjoining site occupants or workers on site will be directed initially to the civil/remediation contractor on site. Following that, discussion with the Environmental Consultant and the Client, and the complaint will be investigated and the issue remedied as required or applicable.

11. Health and Safety Plan

This health and safety plan contains procedures and requirements that are to be implemented as a minimum during the remediation works.

The objectives of the health and safety plan are:

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

These objectives will be achieved by:

- Assignment of responsibilities;
- An evaluation of hazards;
- Establishment of personal protection standards and mandatory safety practices and procedures; and
- Provision for contingencies that may arise while operations are being conducted at the site.

This health and safety plan does not provide safety information specific to construction or excavation activities carried out by contractors, such as the safe operation, maintenance and inspection of plant, etc. Contractors will be required to prepare their own Safe Work Method Statements for their work activities. All parties working on the site shall comply with all applicable Health and Safety legislation, regulations, codes and guidelines.

11.1 Responsibilities

Remediation Supervisor

The remediation supervisor is responsible for ensuring that the work is carried out in accordance with the health and safety plan. This will include:

- Ensuring a copy of the health and safety plan is available at the site during the remediation/validation activities;
- Confirming individuals are competent in performing allotted tasks;
- Liaison with the contractor representatives, as appropriate, regarding safety matters; and
- Investigation and reporting of incidents and accidents.

Other Members of the Site Workforce

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

11.2 Hazards

Job Risk Assessments (JRAs) and Safe Work Method Statements (SWMS) will need to be supplied by the Remediation Contractor and incorporated into the Health and Safety plan detailing all the known or potential hazards associated with the work activities some are listed below.

11.2.1 Inhalation Hazards

The main inhalation hazards from the remediation/validation works are consequent of the presence of asbestos. Measures are required to be put in place to prevent/ minimise the generation of

airborne fibres. These have been described in the environmental controls for the works. Where there is a potential for airborne emissions to be generated, PPE shall be required to be worn to prevent potential exposure, as described in **Section 11.3**.

11.2.2 Chemical Hazards

In addition to the previously identified asbestos hazards, chemical hazards may be identified at the site during remediation activities such as hydrocarbon impacts.

When working with contaminated materials in general, care must be taken to ensure that the contamination is not introduced to the worker via ingestion, inhalation or absorption. PPE and decontamination requirements related to asbestos remedial works and summarised in **Sections 11.3** and **11.5** are sufficient for managing any potential exposure to hydrocarbons in soils.

11.2.3 Physical Hazards

Operating Machinery

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

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

Work In or Near Excavations

All excavations shall be shored, sloped or otherwise constructed so as to minimise the potential for collapse. Appropriate physical barriers should be erected during and on completion of excavations to prevent any personal entering the excavation area.

Cuts and Abrasions

The manual work associated with the remediation works may give rise to the risk of cuts and abrasions to personnel working in the area. As well as the direct consequences of any cut or abrasion, such injuries can lead to the possibility of exposure to contaminants through the wound as well as diseases such as tetanus. To minimise the risk of direct or indirect injury, personnel will wear the personal protective equipment described in **Section 11.3**.

Heat Stress and UV Exposure

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

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

Underground Services

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

Aboveground Electrical Hazards

All electrical plant and equipment must comply with the requirements of Australian Standard AS 3000. Hand held portable tools shall comply with AS/NZS 3160 "hand-held portable electric tools" and shall be double insulated. Cord connected portable hand lamps shall comply with AS/NZS 3118. A Residual Current Device (RCD) shall protect plug-in portable equipment, which is connected to a supply above Extra Low Voltage - 12-24volts (including equipment supplied from a generator or welding set). RCD protection shall be provided during maintenance of portable electrical equipment at all times while the equipment is connected to a power supply above Extra Low Voltage, irrespective of whether power is switched ON or OFF. RCD's shall comply with AS 3190 and shall be type II units, rated to trip at or below 30 milliamps within 40 milliseconds.

No excavator, drill rig or crane may work within 6 m of overhead distribution power lines.

Manual Handling

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

Noise

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

11.3 Personal Protective Equipment

All workers who may come into direct contact with contaminated soil will wear the following minimum personal protective equipment (PPE):

- Overalls or long sleeved collared shirt;
- Heavy duty outer gloves (e.g. leather) where there is a risk of cuts or abrasions, otherwise PVC outer gloves if in direct contact with contaminated soil;
- Steel capped boots;
- Safety glasses;
- High visibility vest or jacket; and
- Hard hat.

11.4 Asbestos Air Monitoring Procedures

Friable (AF/FA) and non-friable ACM have been identified at the site. As discussed in **Section 10.5.1**, monitoring is required for movement and removal of friable asbestos. Air monitoring for asbestos removal work can be beneficial as the results can be used:

- To identify failures in containment;
- To identify poor work practices; and
- To provide proof of containment for occupiers and regulatory authorities and to provide evidence of good work practices for both present and future needs.

Where undertaken, monitoring will be conducted in accordance with the National Occupational Health & Safety Commission (NOHSC) membrane filter method as approved by the National Association of Testing Authorities (NATA).

The appropriate TWA (NOHSC) levels are:

- Amosite - 0.1 fibre/mL;
- Chrysotile – 0.1 fibre/mL;
- Crocidolite - 0.1 fibre/mL;
- Other forms of asbestos - 0.1 fibre/mL; and
- Any mixture of these, or where the composition is unknown - 0.1 fibre/mL.

With consideration to these levels the following trigger levels have been developed:

- If airborne fibre levels reach 0.01 fibres/mL the source of fibre release is to be found and rectified. Work in the affected area does not have to stop; and
- If airborne fibre levels reach 0.02 fibres/mL work in the work area should stop and additional controls measures employed. This will involve additional water spraying during excavations.

Air monitoring results will be obtained within 24 hours of sample collection. While this precludes "real time" monitoring, inspections will be made during excavation works and, if there are any visible dusts, light water spays will be used to wet the excavation and prevent the release of any airborne asbestos fibres.

11.5 Decontamination Procedures

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

Personnel

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

3. Disposal of coveralls and respirator;
4. Wash boots in clean water;
5. Remove outer gloves and store for reuse;
6. Remove overalls (if used) and store for reuse;
7. Remove respirator and goggles (if used) and store clean for reuse or decontamination, as appropriate; and
8. Thoroughly wash hands and face.

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

Vehicle, Plant and Equipment

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

11.6 Asbestos Management

Notwithstanding any part of the proposed requirements for occupational health and safety as outlined here – all works on the remedial site must be undertaken in accordance with relevant SafeWork NSW codes of practice.

Based on the available characterisation information as discussed in **Section 4**, fill materials in portions of the site are impacted with asbestos. Asbestos contaminated soil necessitating management for potential asbestos exposure is defined in SWNSW (2019b) as:

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

Environmental, health and safety management requirements for the handling of these materials will need to comply with the requirements provided for asbestos-related works in SWNSW (2019b), inclusive of preparation of an asbestos removal control/management plan.

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

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

11.7 Emergency Response

The remediation contractor will be responsible for preparing an emergency response plan, which will provide details on appropriate action and evacuation procedures in the event of an emergency.

In the event of an emergency arising on the site, appropriate action should be taken. Site evacuation procedures should be followed, as necessary.

In the event of an accident: evaluate the seriousness of the injury, and contact emergency services via 000, if necessary; provide first aid, as appropriate, and if safe to do so evacuate the injured person via the Decontamination Zone; make the area as safe as possible without jeopardising safety.

Following the above, if a serious accident occurs, do not disturb the scene, except to make safe and prevent further injury or damage, and keep all unauthorised people out, and report all accidents to the client's representative.

12. Regulatory Approvals/Licensing

12.1 Remediation of Land - State Environment Planning Policy (Resilience and Hazards) 2021

Development consent for remediation works is addressed by reference to Remediation of Land requirements of the R&H SEPP and associated Planning Guidelines (DUAP 1998).

According to Chapter 4 Remediation of Land of the R&H SEPP, and noting the presence of "significant vegetation" mapped at the site per Campbelltown LEP, works at the site are considered to be Category 1: work requiring consent. As such, application for consent will need to be made to Campbelltown Council for remediation works either on their own or ancillary to other development works.

Notice is also required to be provided to Council within 30 days after completion of remediation, as per R&H SEPP.

12.2 Protection of the Environment Operations Act 1997 (POEO 1997)

The proposed remediation/validation activities are not required to be licensed under the *Protection of the Environment Operation Act 1997*, which is based on the following:

- The proposed remediation works will not treat more than 1,000 m^3 per year of contaminated soil received from off-site.
- The proposed remediation works will not involve the treatment of contaminated soil originating on-site with the capacity: (i) to incinerate more than 1,000 m^3 per year of contaminated soil, or (ii) to treat (otherwise than by incineration) and store more than 30,000 m^3 of contaminated soil, or (iii) disturb an aggregate area of 3 hectares of contaminated soil.

12.3 Protection of the Environment Operations (Waste) Regulation 2014

The regulations make requirements relating to non-licensed waste activities and waste transporting. The Waste Regulation stipulates special transportation, reporting, re-use and recycling requirements relating to soil and asbestos waste and must be complied with regardless whether the activity is licensed.

The requirements for the transportation of asbestos waste include:

- Bonded asbestos material must be securely packaged at all times;
- Friable asbestos material must be kept in a sealed container;
- Asbestos-contaminated soils must be wetted down; and
- All asbestos waste must be transported in a covered, leak-proof vehicle.

The transporter of asbestos waste must cause the following information to be given to the EPA prior to the transportation of asbestos waste loads:

- Source site details including address, name and contact details;
- Date of proposed transportation commencement;
- Name, address and contact details of disposal site; and
- Approximate weight of each class of asbestos in each load.

The transporter of asbestos waste must ensure the following information is given to the disposal site before or at delivery:

- Unique consignment code issued by EPA in relation to that load; and

- Any other information specified in the Asbestos and Waste Tyres Guidelines (EPA 2015).

The requirements relating to the off-site disposal of asbestos waste are as follows:

- Asbestos waste in any form must be disposed of only at a landfill site that may lawfully receive the waste,
- When asbestos waste is delivered to a landfill site, the occupier of the landfill site must be informed by the person delivering the waste that the waste contains asbestos,
- When unloading and disposing of asbestos waste at a landfill site, the waste must be unloaded and disposed of in such a manner as to prevent the generation of dust or the stirring up of dust,
- Asbestos waste disposed of at a landfill site must be covered with virgin excavated natural material or other material as approved in the facility's environment protection licence.

The Waste Regulation requires that wastes are stored in an environmentally safe manner. It also stipulates that vehicles used to transport waste must be covered when loaded.

Provision is provided in the Regulation and EPA (2014) guidelines for the NSW EPA to approve the immobilisation of contaminants in waste (if required).

The proximity principle from POEO Waste Regulation states that it is an offense for waste to be transported more than 150 km from its place of generation.

12.4 Waste Classification Guidelines (EPA 2014)

All wastes generated shall be assessed, classified and managed in accordance with EPA (2014) guideline. Where wastes require immobilisation prior to off-site disposal (to reduce waste classifications) an immobilisation approval shall be sought in accordance with Part 2 of this guideline, or otherwise General Approvals for the immobilisation of wastes in soils as historically issued by the NSW EPA. Immobilisations are only anticipated to be potentially required with unexpected finds.

12.5 Asbestos Removal Regulations and Code of Practice

The removal and disposal of asbestos will be managed in accordance with the Work Health and Safety Act (2011) and Work Health and Safety Regulation (2017), *Code of Practice How to Safely Remove Asbestos* (SWNSW 2019a), *Code of Practice How to Manage and Control Asbestos in the Workplace* (SWNSW 2019b), NSW SafeWork Guidelines, the NSW EPA (2014) *Waste Classification Guidelines*, and requirements under the *Protection of the Environment Operations (Waste) Regulation* (2014) for asbestos waste monitoring.

Excavation, hand-picking of bonded asbestos fragments from surfaces and removal of asbestos impacted soils are required to be conducted by a Class A (Friable) or B (Bonded) Asbestos Removal licensed contractor.

13. Conclusions

Subject to the successful implementation of the measures detailed in this RAP and subject to the limitations in **Section 14**, it is considered the site can be made suitable for the proposed land use.

14. Limitations

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

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

JBS&G accepts no liability for use or interpretation by any person or body other than the client who commissioned the works. This report should not be reproduced without prior approval by the client, or amended in any way without prior approval by JBS&G, and should not be relied upon by other parties, who should make their own enquiries.

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

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

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

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

Figures

Legend

- Approximate Site Boundary
- Stage Boundary

Scale 1:10,000 — 0 80 160 metres

Coord. Sys. GDA 1994 MGA Zone 56

Job No: 63965

Client: Landcom

Version: R01 Rev A | Date 11/11/2022

Drawn By: EP | Checked By: EH

Stage 5 and 6 Claymore
Dobell Road
Claymore, NSW

SITE LOCATION

FIGURE 1

JBS&G

File Name: N:\Projects\Landcom\63956 Stage 5 and 6 Claymore RAP\GIS\ArcGISProTemplate\02_MapProjects\63965_ClaymoreStage5_R01_Rev0.aprx

Legend

- Approximate Site Boundary
- Stage Boundary

Site Features (Douglas Partners, 2020)

- Approximate Gully and Dam Fill Area
- Approximate Historical Dam Locations
- Approximate Historical Creek Line

Scale 1:3,500

0 30 60

metres

Coord. Sys. GDA 1994 MGA Zone 56

Job No: 63965

Client: Landcom

Version: R01 Rev A | Date 11/11/2022

Drawn By: EP | Checked By: EH

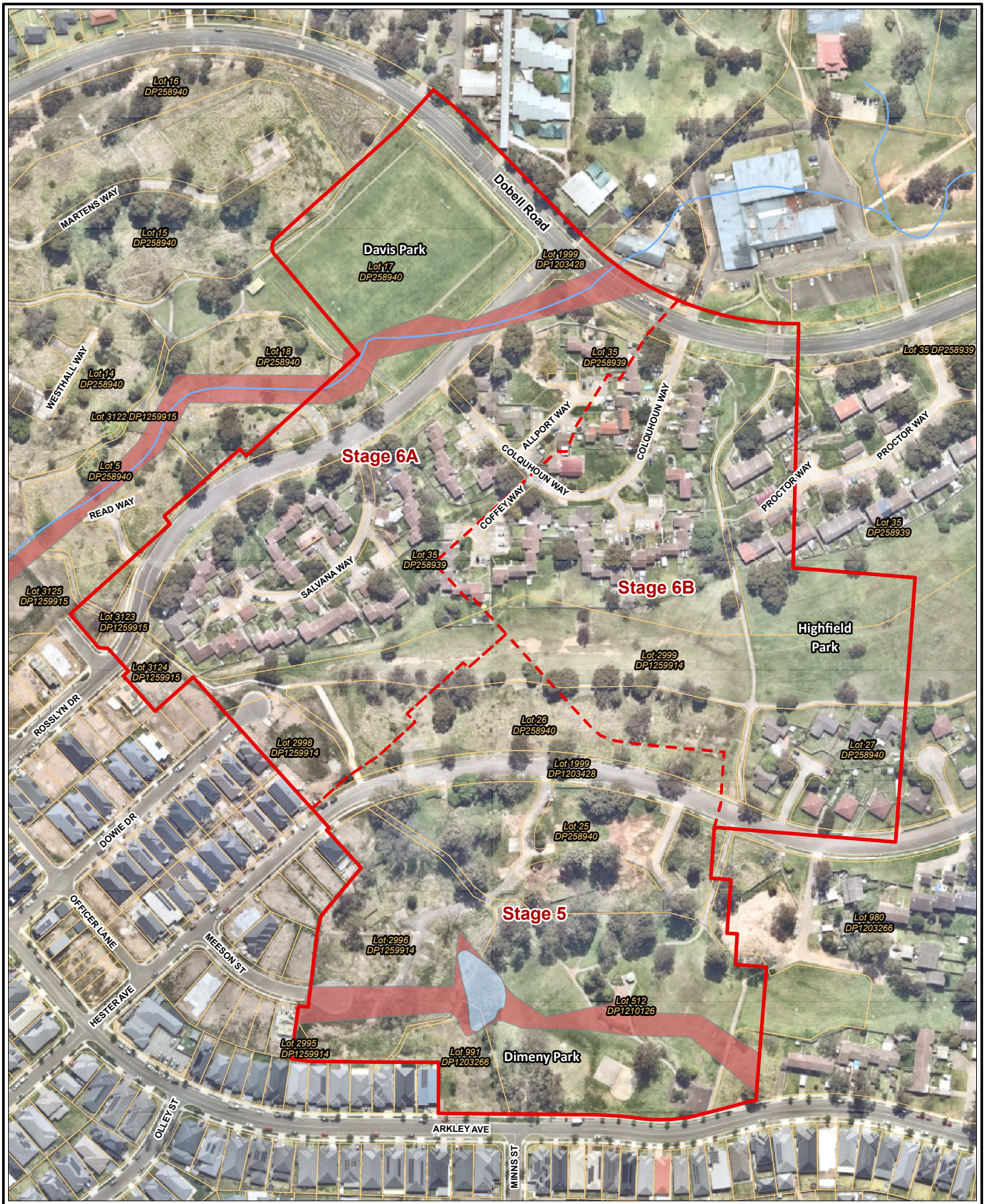
Stage 5 and 6 Claymore
Dobell Road
Claymore, NSW

SITE LAYOUT

FIGURE 2

JBS&G

File Name: N:\Projects\Landcom\63956 Stage 5 and 6 Claymore RAP\GIS\ArcGISProTemplate\02_MapProjects\63965_ClaymoreStage5_R01_Rev0.aprx
Reference: Nearmap - www.nearmap.com (Capture Date: 10/04/2022)



Legend

- Approximate Site Boundary
- Stage Boundary
- NSW Cadastre (2022)

Site Features (Douglas Partners, 2020)

- Approximate Gully and Dam Fill Area
- Approximate Historical Dam Locations
- Approximate Historical Creek Line

Scale 1:3,000 (0 25 50 metres)

Coord. Sys. GDA 1994 MGA Zone 56

Job No: 63965

Client: Landcom

Version: R01 Rev A | Date 11/11/2022

Drawn By: EP | Checked By: EH

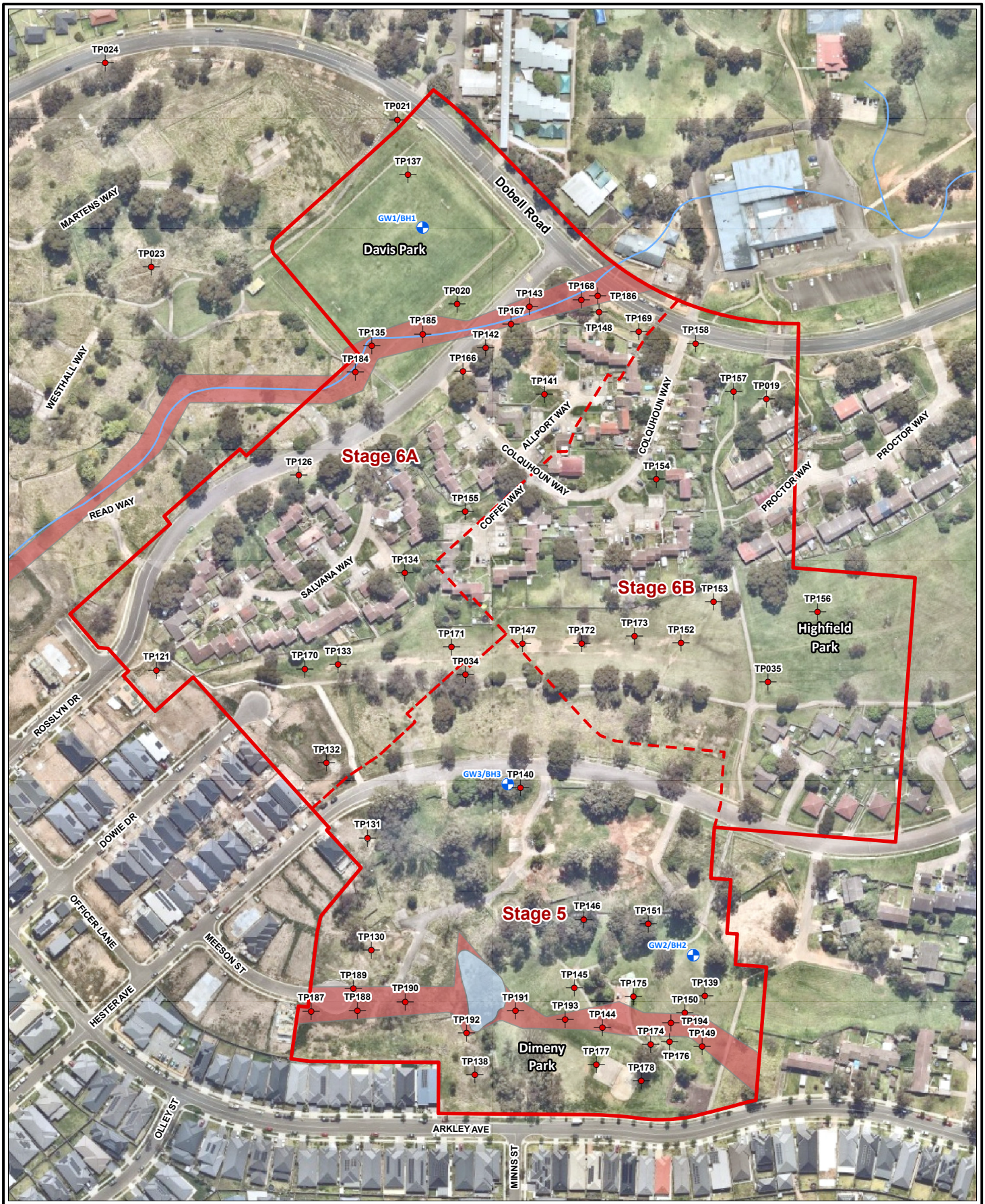
Stage 5 and 6 Claymore
Dobell Road
Claymore, NSW

SITE BOUNDARIES

FIGURE 3

JBS&G

File Name: N:\Projects\Landcom\63956 Stage 5 and 6 Claymore RAP\GIS\ArcGISProTemplate\02_MapProjects\63965_ClaymoreStage5_R01_Rev0.aprx
Reference: Nearmap - www.nearmap.com (Capture Date: 04/10/2022)



Legend

- Approximate Site Boundary
- Stage Boundary

Site Features (Douglas Partners, 2020)

- Approximate Gully and Dam Fill Area
- Approximate Historical Dam Locations
- Approximate Historical Creek Line

Historical Sample Locations (Douglas Partners, 2020)

- Test Pit Location
- Monitoring Well/Borhole Location

Scale 1:3,000 (0, 25, 50 metres)

Coord. Sys. GDA 1994 MGA Zone 56

Job No: 63965

Client: Landcom

Version: R01 Rev A | Date 11/11/2022

Drawn By: EP | Checked By: EH

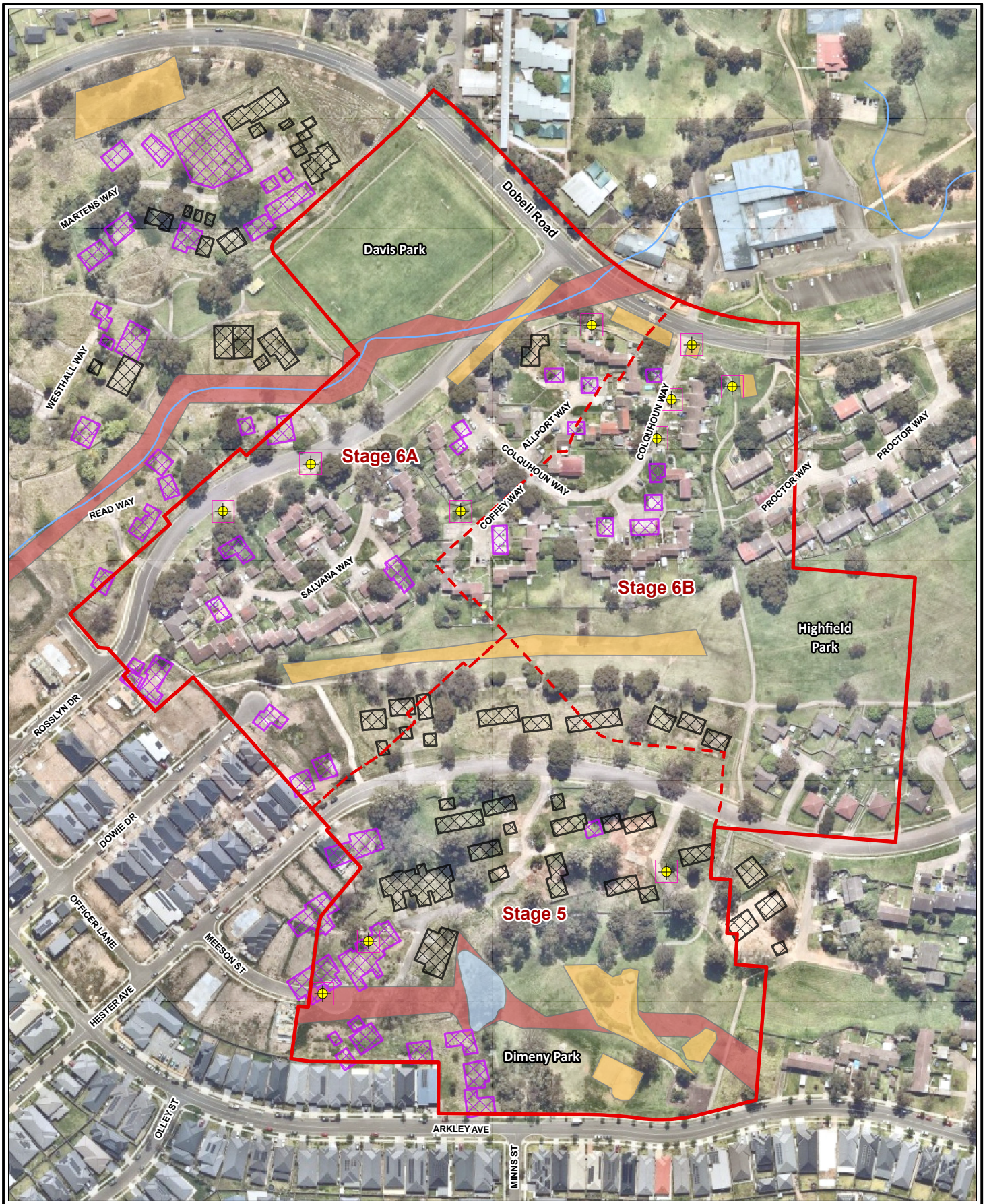
Stage 5 and 6 Claymore
Dobell Road
Claymore, NSW

TEST PIT LOCATIONS
(DSI DP 2020)

FIGURE 4

JBS&G

File Name: N:\Projects\Landcom\63956 Stage 5 and 6 Claymore RAP\GIS\ArcGISProTemplate\02_MapProjects\63965_ClaymoreStage5_R01_Rev0.aprx
Reference: Nearmap - www.nearmap.com (Capture Date: 10/04/2022)



Legend

- Approximate Site Boundary
- Stage Boundary

Site Features (JBS&G, 2022)

- Former Building Footprint

Site Features (Douglas Partners, 2020)

- Former Building Footprint
- Approximate Areas of Fill
- Approximate Gully and Dam Fill Area
- Approximate Historical Dam Locations
- Approximate Historical Creek Line
- ACM Locations

Scale 1:3,000

0 25 50

metres

Coord. Sys. GDA 1994 MGA Zone 56

Job No: 63965

Client: Landcom

Version: R01 Rev A | Date 11/11/2022

Drawn By: EP | Checked By: EH

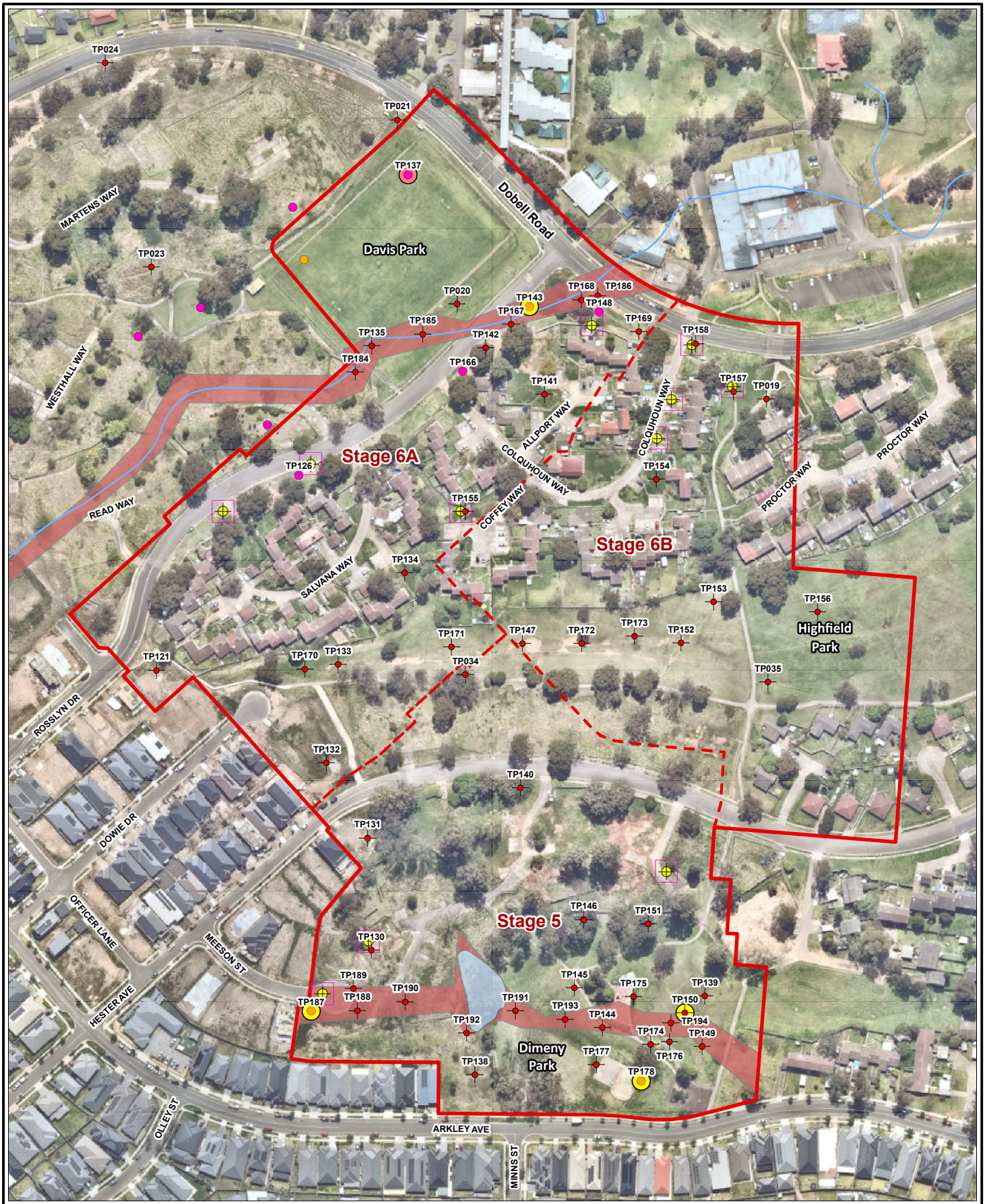
Stage 5 and 6 Claymore
Dobell Road
Claymore, NSW

SITE FEATURES
(DSI DP 2020)

FIGURE 5

JBS&G

File Name: N:\Projects\Landcom\63956 Stage 5 and 6 Claymore RAP\GIS\ArcGISProTemplate\02_MapProjects\63965_ClaymoreStage5_R01_Rev0.aprx
Reference: Nearmap - www.nearmap.com (Capture Date: 10/04/2022)



Legend

- Approximate Site Boundary
- Stage Boundary

Site Features (Douglas Partners, 2020)

- Approximate Gully and Dam Fill Area
- Approximate Historical Dam Locations
- Approximate Historical Creek Line

Sample Locations (Douglas Partners, 2020)

- Test Pit Location
- Surface ACM Locations
- ACM below SAC
- ACM above SAC
- AF/FA below SAC
- AF/FA above SAC

Scale 1:3,000 (0, 25, 50 metres)

Coord. Sys. GDA 1994 MGA Zone 56

Job No: 63965

Client: Landcom

Version: R01 Rev A | Date 11/11/2022

Drawn By: EP | Checked By: EH

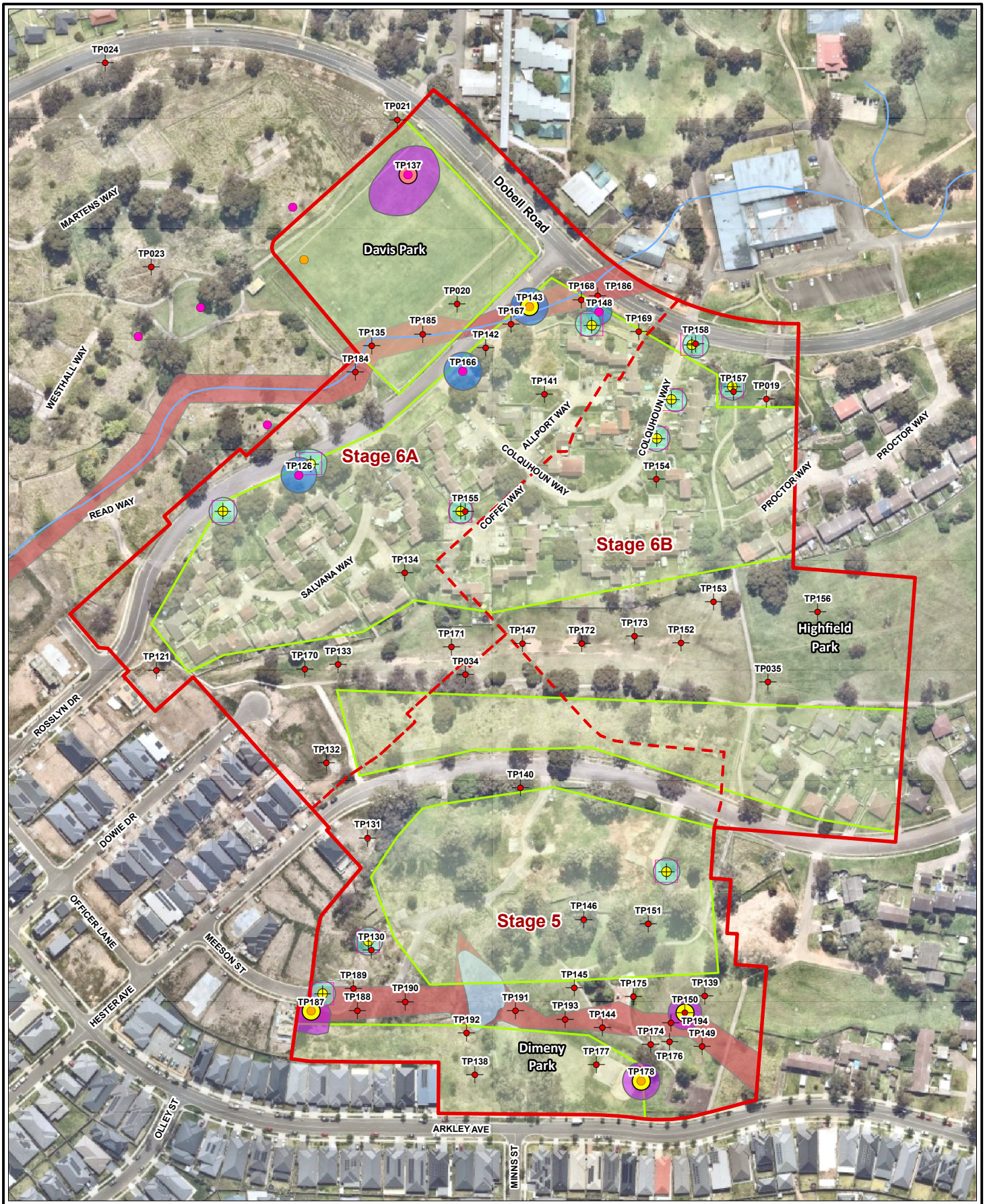
Stage 5 and 6 Claymore
Dobell Road
Claymore, NSW

ASBESTOS OBSERVATIONS AND RESULTS (DSI DP 2020)

FIGURE 6

JBS&G

File Name: N:\Projects\Landcom\63956 Stage 5 and 6 Claymore RAP\GIS\ArcGISProTemplate\02_MapProjects\63965_ClaymoreStage5_R01_Rev0.aprx
Reference: Nearmap - www.nearmap.com (Capture Date: 10/04/2022)



Legend

- Approximate Site Boundary
- Stage Boundary

Site Features (Douglas Partners, 2020)

- Approximate Gully and Dam Fill Area
- Approximate Historical Dam Locations
- Approximate Historical Creek Line

Remedial Area Extents

- ACM in Surface Soils
- ACM in Soil
- AF/FA in Soil
- Data Gap Investigation Area

Sample Locations (Douglas Partners, 2020)

- Test Pit Location
- Surface ACM Locations
- ACM below SAC
- ACM above SAC
- AF/FA below SAC
- AF/FA above SAC

Scale 1:3,000 — 0 25 50 metres

Coord. Sys. GDA 1994 MGA Zone 56

Job No: 63965

Client: Landcom

Version: R01 Rev A | Date 11/11/2022

Drawn By: EP | Checked By: EH

Stage 5 and 6 Claymore
Dobell Road
Claymore, NSW

REMEDIATION AREAS

FIGURE 7

JBS&G

File Name: N:\Projects\Landcom\63956 Stage 5 and 6 Claymore RAP\GIS\ArcGISProTemplate\02_MapProjects\63965_ClaymoreStage5_R01_Rev0.aprx
Reference: Nearmap - www.nearmap.com (Capture Date: 10/04/2022)

Appendix A DP (2020) Summary Tables

Table E1: Summary of Laboratory Results – Metals, TRH, BTEX, PAH

			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
Sample ID	Depth	Sampled 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	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
TP121	0 - 0.2m	23/01/2020	12 100 100	<0.4 20 NC	11 100 640	17 6000 210	17 300 1100	<0.1 40 NC	6 400 170	30 7400 470	<25 NC NC	<50 NC NC	<25 50 180	<50 280 120	<100 NC 1300	<100 NC 5600	<0.2 0.7 65	<0.5 480 105	<1 NL 125	<1 110 45	<1 5 170	<0.05 NC 0.7	<0.5 3 NC	<0.05 300 NC
TP126	0 - 0.1m	23/01/2020	**9** 100 100	<0.4 20 NC	**9** 100 640	**20** 6000 210	**13** 300 1100	<0.1 40 NC	**7** 400 170	**40** 7400 470	<25 NC NC	<50 NC NC	<25 50 180	<50 280 120	**130** NC 1300	**100** NC 5600	<0.2 0.7 65	<0.5 480 105	<1 NL 125	<1 110 45	<1 5 170	<0.05 NC 0.7	<0.5 3 NC	<0.05 300 NC
TP130	0 - 0.2m	31/01/2020	**25** 100 100	**0.7** 20 NC	**5** 100 640	**64** 6000 210	**27** 300 1100	**0.3** 40 NC	**580** 400 170	**1100** 7400 470	<25 NC NC	<50 NC NC	<25 50 180	<50 280 120	<100 NC 1300	<100 NC 5600	<0.2 0.7 65	<0.5 480 105	<1 NL 125	<1 110 45	<1 5 170	<0.05 NC 0.7	<0.5 3 NC	<0.05 300 NC
TP131	0 - 0.2m	29/01/2020	**7** 100 100	<0.4 20 NC	**15** 100 640	**20** 6000 210	**17** 300 1100	<0.1 40 NC	**9** 400 170	**34** 7400 470	<25 NC NC	<50 NC NC	<25 50 180	<50 280 120	<100 NC 1300	<100 NC 5600	<0.2 0.7 65	<0.5 480 105	<1 NL 125	<1 110 45	<1 5 170	<0.05 NC 0.7	<0.5 3 NC	<0.05 300 NC
TP132	0 - 0.2m	23/01/2020	**8** 100 100	<0.4 20 NC	**11** 100 640	**9** 6000 210	**19** 300 1100	<0.1 40 NC	**4** 400 170	**38** 7400 470	<25 NC NC	<50 NC NC	<25 50 180	<50 280 120	<100 NC 1300	<100 NC 5600	<0.2 0.7 65	<0.5 480 105	<1 NL 125	<1 110 45	<1 5 170	<0.05 NC 0.7	<0.5 3 NC	<0.05 300 NC
TP133	0 - 0.2m	23/01/2020	**7** 100 100	<0.4 20 NC	**11** 100 640	**12** 6000 210	**17** 300 1100	<0.1 40 NC	**6** 400 170	**28** 7400 470	<25 NC NC	<50 NC NC	<25 50 180	<50 280 120	<100 NC 1300	<100 NC 5600	<0.2 0.7 65	<0.5 480 105	<1 NL 125	<1 110 45	<1 5 170	<0.05 NC 0.7	<0.5 3 NC	<0.05 300 NC
TP1342	0 - 0.2m	29/01/2020	**9** 100 100	<0.4 20 NC	**10** 100 640	**24** 6000 210	**19** 300 1100	<0.1 40 NC	**9** 400 170	**63** 7400 470	<25 NC NC	<50 NC NC	<25 50 180	<50 280 120	<100 NC 1300	<100 NC 5600	<0.2 0.7 65	<0.5 480 105	<1 NL 125	<1 110 45	<1 5 170	<0.05 NC 0.7	<0.5 3 NC	<0.05 300 NC
TP135	0.4 - 0.5m	23/01/2020	**8** 100 100	<0.4 20 NC	**9** 100 640	**18** 6000 210	**13** 300 1100	<0.1 40 NC	**7** 400 170	**34** 7400 470	<25 NC NC	<50 NC NC	<25 50 180	<50 280 120	<100 NC 1300	<100 NC 5600	<0.2 0.7 65	<0.5 480 105	<1 NL 125	<1 110 45	<1 5 170	<0.05 NC 0.7	<0.5 3 NC	<0.05 300 NC
TP136	0 - 0.6m	23/01/2020	**4** 100 100	<0.4 20 NC	**4** 100 640	**16** 6000 210	**7** 300 1100	<0.1 40 NC	**4** 400 170	**28** 7400 470	<25 NC NC	<50 NC NC	<25 50 180	<50 280 120	<100 NC 1300	<100 NC 5600	<0.2 0.7 65	<0.5 480 105	<1 NL 125	<1 110 45	<1 5 170	<0.05 NC 0.7	<0.5 3 NC	<0.05 300 NC
TP137	1.2 - 1.4m	23/01/2020	**7** 100 100	<0.4 20 NC	**7** 100 640	**25** 6000 210	**15** 300 1100	<0.1 40 NC	**4** 400 170	**38** 7400 470	<25 NC NC	<50 NC NC	<25 90 180	<50 NL 120	<100 NC 1300	<100 NC 5600	<0.2 1 65	<0.5 NL 105	<1 NL 125	<1 310 45	<1 NL 170	<0.05 NC 0.7	<0.5 3 NC	<0.05 300 NC
TP138	0 - 0.2m	31/01/2020	**10** 100 100	<0.4 20 NC	**13** 100 640	**22** 6000 210	**27** 300 1100	<0.1 40 NC	**8** 400 170	**56** 7400 470	<25 NC NC	<50 NC NC	<25 50 180	<50 280 120	<100 NC 1300	<100 NC 5600	<0.2 0.7 65	<0.5 480 105	<1 NL 125	<1 110 45	<1 5 170	<0.05 NC 0.7	<0.5 3 NC	<0.05 300 NC
TP139	0 - 0.2m	31/01/2020	**9** 100 100	<0.4 20 NC	**18** 100 640	**11** 6000 210	**20** 300 1100	<0.1 40 NC	**5** 400 170	**18** 7400 470	<25 NC NC	<50 NC NC	<25 50 180	<50 280 120	<100 NC 1300	<100 NC 5600	<0.2 0.7 65	<0.5 480 105	<1 NL 125	<1 110 45	<1 5 170	<0.05 NC 0.7	<0.5 3 NC	<0.05 300 NC
TP140	0 - 0.2m	29/01/2020	**8** 100 100	<0.4 20 NC	**12** 100 640	**14** 6000 210	**17** 300 1100	<0.1 40 NC	**6** 400 170	**27** 7400 470	<25 NC NC	<50 NC NC	<25 50 180	<50 280 120	<100 NC 1300	<100 NC 5600	<0.2 0.7 65	<0.5 480 105	<1 NL 125	<1 110 45	<1 5 170	<0.05 NC 0.7	<0.5 3 NC	<0.05 300 NC
TP141	0 - 0.2m	29/01/2020	**7** 100 100	<0.4 20 NC	**7** 100 640	**19** 6000 210	**12** 300 1100	<0.1 40 NC	**5** 400 170	**26** 7400 470	<25 NC NC	<50 NC NC	<25 50 180	<50 280 120	<100 NC 1300	<100 NC 5600	<0.2 0.7 65	<0.5 480 105	<1 NL 125	<1 110 45	<1 5 170	<0.05 NC 0.7	<0.5 3 NC	<0.05 300 NC
TP142	0 - 0.1m	23/01/2020	**8** 100 100	<0.4 20 NC	**8** 100 640	**16** 6000 210	**12** 300 1100	<0.1 40 NC	**5** 400 170	**30** 7400 470	<25 NC NC	<50 NC NC	<25 50 180	<50 280 120	<100 NC 1300	<100 NC 5600	<0.2 0.7 65	<0.5 480 105	<1 NL 125	<1 110 45	<1 5 170	<0.05 NC 0.7	<0.5 3 NC	<0.05 300 NC
TP143	0 - 0.2m	23/01/2020	**7** 100 100	<0.4 20 NC	**13** 100 640	**19** 6000 210	**14** 300 1100	<0.1 40 NC	**7** 400 170	**48** 7400 470	<25 NC NC	**82** NC NC	<25 50 180	**82** 280 120	**210** NC 1300	<100 NC 5600	<0.2 0.7 65	<0.5 480 105	<1 NL 125	<1 110 45	<1 5 170	<0.05 NC 0.7	<0.5 3 NC	<0.05 300 NC
TP144	0 - 0.15m	30/01/2020	**11** 100 100	<0.4 20 NC	**12** 100 640	**17** 6000 210	**20** 300 1100	<0.1 40 NC	**7** 400 170	**38** 7400 470	<25 NC NC	<50 NC NC	<25 50 180	<50 280 120	<100 NC 1300	<100 NC 5600	<0.2 0.7 65	<0.5 480 105	<1 NL 125	<1 110 45	<1 5 170	<0.05 NC 0.7	<0.5 3 NC	<0.05 300 NC
TP145	0 - 0.15m	30/01/2020	**11** 100 100	<0.4 20 NC	**12** 100 640	**13** 6000 210	**17** 300 1100	<0.1 40 NC	**7** 400 170	**27** 7400 470	<25 NC NC	<50 NC NC	<25 50 180	<50 280 120	<100 NC 1300	<100 NC 5600	<0.2 0.7 65	<0.5 480 105	<1 NL 125	<1 110 45	<1 5 170	<0.05 NC 0.7	<0.5 3 NC	<0.05 300 NC
TP146	0 - 0.2m	30/01/2020	**6** 100 100	<0.4 20 NC	**10** 100 640	**10** 6000 210	**15** 300 1100	<0.1 40 NC	**6** 400 170	**25** 7400 470	<25 NC NC	<50 NC NC	<25 50 180	<50 280 120	<100 NC 1300	<100 NC 5600	<0.2 0.7 65	<0.5 480 105	<1 NL 125	<1 110 45	<1 5 170	<0.05 NC 0.7	<0.5 3 NC	<0.05 300 NC
TP147	0 - 0.2m	23/01/2020	**5** 100 100	<0.4 20 NC	**11** 100 640	**15** 6000 210	**14** 300 1100	<0.1 40 NC	**8** 400 170	**36** 7400 470	<25 NC NC	<50 NC NC	<25 50 180	<50 280 120	<100 NC 1300	<100 NC 5600	<0.2 0.7 65	<0.5 480 105	<1 NL 125	<1 110 45	<1 5 170	<0.05 NC 0.7	<0.5 3 NC	<0.05 300 NC
TP148	0 - 0.2m	29/01/2020	**10** 100 100	<0.4 20 NC	**9** 100 640	**20** 6000 210	**15** 300 1100	<0.1 40 NC	**9** 400 170	**51** 7400 470	<25 NC NC	<50 NC NC	<25 50 180	<50 280 120	<100 NC 1300	<100 NC 5600	<0.2 0.7 65	<0.5 480 105	<1 NL 125	<1 110 45	<1 5 170	<0.05 NC 0.7	<0.5 3 NC	<0.05 300 NC
TP149	0 - 0.2m	30/01/2020	**5** 100 100	<0.4 20 NC	**7** 100 640	**150** 6000 210	**15** 300 1100	<0.1 40 NC	**6** 400 170	**41** 7400 470	<25 NC NC	<50 NC NC	<25 50 180	<50 280 120	<100 NC 1300	<100 NC 5600	<0.2 0.7 65	<0.5 480 105	<1 NL 125	<1 110 45	<1 5 170	<0.05 NC 0.7	<0.5 3 NC	<0.05 300 NC
TP150	0 - 0.1m	30/01/2020	**9** 100 100	<0.4 20 NC	**15** 100 640	**12** 6000 210	**19** 300 1100	<0.1 40 NC	**6** 400 170	**30** 7400 470	<25 NC NC	<50 NC NC	<25 50 180	<50 280 120	<100 NC 1300	<100 NC 5600	<0.2 0.7 65	<0.5 480 105	<1 NL 125	<1 110 45	<1 5 170	<0.05 NC 0.7	<0.5 3 NC	<0.05 300 NC

Table E1: Summary of Laboratory Results – Metals, TRH, BTEX, PAH

			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
Sample ID	Depth	Sampled 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	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
TP151	0 - 0.2m	30/01/2020	**10** 100 100	<0.4 20 NC	**10** 100 640	**21** 6000 210	**16** 300 1100	<0.1 40 NC	**9** 400 170	**38** 7400 470	<25 NC NC	<50 NC NC	<25 50 180	<50 280 120	<100 NC 1300	<100 NC 5600	<0.2 0.7 65	<0.5 480 105	<1 NL 125	<1 110 45	<1 5 170	<0.05 NC 0.7	<0.5 3 NC	<0.05 300 NC
TP152	0 - 0.2m	23/01/2020	**5** 100 100	<0.4 20 NC	**8** 100 640	**10** 6000 210	**16** 300 1100	<0.1 40 NC	**5** 400 170	**18** 7400 470	<25 NC NC	<50 NC NC	<25 50 180	<50 280 120	<100 NC 1300	<100 NC 5600	<0.2 0.7 65	<0.5 480 105	<1 NL 125	<1 110 45	<1 5 170	<0.05 NC 0.7	<0.5 3 NC	<0.05 300 NC
TP153	0 - 0.2m	23/01/2020	**7** 100 100	<0.4 20 NC	**12** 100 640	**7** 6000 210	**16** 300 1100	<0.1 40 NC	**5** 400 170	**18** 7400 470	<25 NC NC	<50 NC NC	<25 50 180	<50 280 120	<100 NC 1300	<100 NC 5600	<0.2 0.7 65	<0.5 480 105	<1 NL 125	<1 110 45	<1 5 170	<0.05 NC 0.7	<0.5 3 NC	<0.05 300 NC
TP154	0 - 0.2m	29/01/2020	**7** 100 100	<0.4 20 NC	**12** 100 640	**13** 6000 210	**19** 300 1100	<0.1 40 NC	**7** 400 170	**41** 7400 470	<25 NC NC	<50 NC NC	<25 50 180	<50 280 120	<100 NC 1300	<100 NC 5600	<0.2 0.7 65	<0.5 480 105	<1 NL 125	<1 110 45	<1 5 170	<0.05 NC 0.7	<0.5 3 NC	<0.05 300 NC
TP155	0 - 0.2m	29/01/2020	**8** 100 100	<0.4 20 NC	**10** 100 640	**18** 6000 210	**13** 300 1100	<0.1 40 NC	**5** 400 170	**26** 7400 470	<25 NC NC	<50 NC NC	<25 50 180	<50 280 120	<100 NC 1300	<100 NC 5600	<0.2 0.7 65	<0.5 480 105	<1 NL 125	<1 110 45	<1 5 170	<0.05 NC 0.7	<0.5 3 NC	<0.05 300 NC
TP156	0 - 0.2m	23/01/2020	**5** 100 100	<0.4 20 NC	**7** 100 640	**9** 6000 210	**14** 300 1100	<0.1 40 NC	**4** 400 170	**20** 7400 470	<25 NC NC	<50 NC NC	<25 50 180	<50 280 120	<100 NC 1300	<100 NC 5600	<0.2 0.7 65	<0.5 480 105	<1 NL 125	<1 110 45	<1 5 170	<0.05 NC 0.7	<0.5 3 NC	<0.05 300 NC
TP157	0 - 0.1m	29/01/2020	**8** 100 100	<0.4 20 NC	**9** 100 640	**19** 6000 210	**12** 300 1100	<0.1 40 NC	**6** 400 170	**29** 7400 470	<25 NC NC	<50 NC NC	<25 50 180	<50 280 120	<100 NC 1300	<100 NC 5600	<0.2 0.7 65	<0.5 480 105	<1 NL 125	<1 110 45	<1 5 170	<0.05 NC 0.7	<0.5 3 NC	<0.05 300 NC
TP158	0 - 0.2m	29/01/2020	**8** 100 100	<0.4 20 NC	**12** 100 640	**20** 6000 210	**20** 300 1100	<0.1 40 NC	**11** 400 170	**34** 7400 470	<25 NC NC	<50 NC NC	<25 50 180	<50 280 120	<100 NC 1300	<100 NC 5600	<0.2 0.7 65	<0.5 480 105	<1 NL 125	<1 110 45	<1 5 170	<0.05 NC 0.7	<0.5 3 NC	<0.05 300 NC
TP166	0 - 0.2m	23/01/2020	**8** 100 100	<0.4 20 NC	**9** 100 640	**18** 6000 210	**26** 300 1100	<0.1 40 NC	**6** 400 170	**37** 7400 470	<25 NC NC	<50 NC NC	<25 50 180	<50 280 120	<100 NC 1300	<100 NC 5600	<0.2 0.7 65	<0.5 480 105	<1 NL 125	<1 110 45	<1 5 170	<0.05 NC 0.7	<0.5 3 NC	<0.05 300 NC
TP167	0 - 0.3m	23/01/2020	**8** 100 100	<0.4 20 NC	**10** 100 640	**23** 6000 210	**20** 300 1100	<0.1 40 NC	**10** 400 170	**41** 7400 470	<25 NC NC	**53** NC NC	<25 50 180	**53** 280 120	<100 NC 1300	<100 NC 5600	<0.2 0.7 65	<0.5 480 105	<1 NL 125	<1 110 45	<1 5 170	<0.05 NC 0.7	<0.5 3 NC	<0.05 300 NC
TP168	0 - 0.2m	29/01/2020	**6** 100 100	<0.4 20 NC	**10** 100 640	**15** 6000 210	**17** 300 1100	<0.1 40 NC	**8** 400 170	**38** 7400 470	<25 NC NC	<50 NC NC	<25 50 180	<50 280 120	<100 NC 1300	<100 NC 5600	<0.2 0.7 65	<0.5 480 105	<1 NL 125	<1 110 45	<1 5 170	<0.05 NC 0.7	<0.5 3 NC	<0.05 300 NC
TP169	0 - 0.2m	29/01/2020	**9** 100 100	<0.4 20 NC	**9** 100 640	**18** 6000 210	**17** 300 1100	<0.1 40 NC	**9** 400 170	**44** 7400 470	<25 NC NC	<50 NC NC	<25 50 180	<50 280 120	<100 NC 1300	<100 NC 5600	<0.2 0.7 65	<0.5 480 105	<1 NL 125	<1 110 45	<1 5 170	<0.05 NC 0.7	<0.5 3 NC	<0.05 300 NC
TP170	0.1 - 0.2m	23/01/2020	<4 100 100	<0.4 20 NC	**9** 100 640	**10** 6000 210	**13** 300 1100	<0.1 40 NC	**5** 400 170	**32** 7400 470	<25 NC NC	**67** NC NC	<25 50 180	**67** 280 120	**280** NC 1300	<100 NC 5600	<0.2 0.7 65	<0.5 480 105	<1 NL 125	<1 110 45	<1 5 170	<0.05 NC 0.7	<0.5 3 NC	<0.05 300 NC
TP171	0 - 0.15m	23/01/2020	**5** 100 100	<0.4 20 NC	**10** 100 640	**12** 6000 210	**18** 300 1100	<0.1 40 NC	**8** 400 170	**39** 7400 470	<25 NC NC	<50 NC NC	<25 50 180	<50 280 120	**140** NC 1300	<100 NC 5600	<0.2 0.7 65	<0.5 480 105	<1 NL 125	<1 110 45	<1 5 170	<0.05 NC 0.7	<0.5 3 NC	<0.05 300 NC
TP172	0 - 0.2m	23/01/2020	**4** 100 100	<0.4 20 NC	**8** 100 640	**15** 6000 210	**20** 300 1100	<0.1 40 NC	**5** 400 170	**17** 7400 470	<25 NC NC	<50 NC NC	<25 50 180	<50 280 120	<100 NC 1300	<100 NC 5600	<0.2 0.7 65	<0.5 480 105	<1 NL 125	<1 110 45	<1 5 170	<0.05 NC 0.7	<0.5 3 NC	<0.05 300 NC
TP173	0 - 0.2m	23/01/2020	**7** 100 100	<0.4 20 NC	**12** 100 640	**15** 6000 210	**21** 300 1100	<0.1 40 NC	**8** 400 170	**29** 7400 470	<25 NC NC	<50 NC NC	<25 50 180	<50 280 120	<100 NC 1300	<100 NC 5600	<0.2 0.7 65	<0.5 480 105	<1 NL 125	<1 110 45	<1 5 170	<0.05 NC 0.7	<0.5 3 NC	<0.05 300 NC
TP174	0 - 0.2m	30/01/2020	**8** 100 100	<0.4 20 NC	**16** 100 640	**13** 6000 210	**21** 300 1100	<0.1 40 NC	**7** 400 170	**27** 7400 470	<25 NC NC	<50 NC NC	<25 50 180	<50 280 120	<100 NC 1300	<100 NC 5600	<0.2 0.7 65	<0.5 480 105	<1 NL 125	<1 110 45	<1 5 170	<0.05 NC 0.7	<0.5 3 NC	<0.05 300 NC
TP175	0 - 0.2m	30/01/2020	**9** 100 100	<0.4 20 NC	**13** 100 640	**14** 6000 210	**23** 300 1100	<0.1 40 NC	**7** 400 170	**37** 7400 470	<25 NC NC	<50 NC NC	<25 50 180	<50 280 120	<100 NC 1300	<100 NC 5600	<0.2 0.7 65	<0.5 480 105	<1 NL 125	<1 110 45	<1 5 170	<0.05 NC 0.7	<0.5 3 NC	<0.05 300 NC
TP176	0 - 0.2m	30/01/2020	**9** 100 100	<0.4 20 NC	**11** 100 640	**11** 6000 210	**23** 300 1100	<0.1 40 NC	**6** 400 170	**34** 7400 470	<25 NC NC	<50 NC NC	<25 50 180	<50 280 120	<100 NC 1300	<100 NC 5600	<0.2 0.7 65	<0.5 480 105	<1 NL 125	<1 110 45	<1 5 170	<0.05 NC 0.7	<0.5 3 NC	<0.05 300 NC
TP177	0 - 0.2m	30/01/2020	**8** 100 100	<0.4 20 NC	**13** 100 640	**45** 6000 210	**26** 300 1100	<0.1 40 NC	**10** 400 170	**45** 7400 470	<25 NC NC	<50 NC NC	<25 50 180	<50 280 120	<100 NC 1300	<100 NC 5600	<0.2 0.7 65	<0.5 480 105	<1 NL 125	<1 110 45	<1 5 170	<0.05 NC 0.7	<0.5 3 NC	<0.05 300 NC
TP178	0 - 0.2m	30/01/2020	**7** 100 100	<0.4 20 NC	**14** 100 640	**15** 6000 210	**33** 300 1100	<0.1 40 NC	**10** 400 170	**65** 7400 470	<25 NC NC	<50 NC NC	<25 50 180	<50 280 120	<100 NC 1300	<100 NC 5600	<0.2 0.7 65	<0.5 480 105	<1 NL 125	<1 110 45	<1 5 170	<0.05 NC 0.7	<0.5 3 NC	<0.05 300 NC
TP180	0 - 0.15m	22/01/2020	NT 100 100	NT 20 NC	NT 100 640	NT 6000 210	NT 300 1100	NT 40 NC	NT 400 170	NT 7400 470	NT NC NC	NT NC NC	NT 50 180	NT 280 120	NT NC 1300	NT NC 5600	NT 0.7 65	NT 480 105	NT NL 125	NT 110 45	NT 5 170	NT NC 0.7	NT 3 NC	NT 300 NC
TP181	0 - 0.15m	22/01/2020	**8** 100 100	<0.4 20 NC	**12** 100 640	**38** 6000 210	**19** 300 1100	<0.1 40 NC	**8** 400 170	**54** 7400 470	NT NC NC	NT NC NC	NT 50 180	NT 280 120	NT NC 1300	NT NC 5600	NT 0.7 65	NT 480 105	NT NL 125	NT 110 45	NT 5 170	NT NC 0.7	NT 3 NC	NT 300 NC
TP182	0 - 0.15m	21/01/2020	**8** 100 100	<0.4 20 NC	**14** 100 640	**10** 6000 210	**19** 300 1100	<0.1 40 NC	**7** 400 170	**18** 7400 470	NT NC NC	NT NC NC	NT 50 180	NT 280 120	NT NC 1300	NT NC 5600	NT 0.7 65	NT 480 105	NT NL 125	NT 110 45	NT 5 170	NT NC 0.7	NT 3 NC	NT 300 NC

Table E1: Summary of Laboratory Results – Metals, TRH, BTEX, PAH

			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
Sample ID	Depth	Sampled 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	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
TP183	0 - 0.15m	22/01/2020	**10** 100 100	<0.4 20 NC	**13** 100 640	**13** 6000 210	**16** 300 1100	<0.1 40 NC	**6** 400 170	**26** 7400 470	NT NC NC	NT NC NC	NT 50 180	NT 280 120	NT NC 1300	NT NC 5600	NT 0.7 65	NT 480 105	NT NL 125	NT 110 45	NT 5 170	NT NC 0.7	NT 3 NC	NT 300 NC
TP184	0 - 0.2m	23/01/2020	**9** 100 100	<0.4 20 NC	**15** 100 640	**11** 6000 210	**16** 300 1100	<0.1 40 NC	**6** 400 170	**24** 7400 470	NT NC NC	NT NC NC	NT 50 180	NT 280 120	NT NC 1300	NT NC 5600	NT 0.7 65	NT 480 105	NT NL 125	NT 110 45	NT 5 170	NT NC 0.7	NT 3 NC	NT 300 NC
TP185	0 - 0.2m	23/01/2020	**8** 100 100	<0.4 20 NC	**15** 100 640	**11** 6000 210	**23** 300 1100	<0.1 40 NC	**7** 400 170	**28** 7400 470	NT NC NC	NT NC NC	NT 50 180	NT 280 120	NT NC 1300	NT NC 5600	NT 0.7 65	NT 480 105	NT NL 125	NT 110 45	NT 5 170	NT NC 0.7	NT 3 NC	NT 300 NC
TP186	0 - 0.1m	29/01/2020	**8** 100 100	<0.4 20 NC	**8** 100 640	**17** 6000 210	**18** 300 1100	<0.1 40 NC	**9** 400 170	**36** 7400 470	NT NC NC	NT NC NC	NT 50 180	NT 280 120	NT NC 1300	NT NC 5600	NT 0.7 65	NT 480 105	NT NL 125	NT 110 45	NT 5 170	NT NC 0.7	NT 3 NC	NT 300 NC
TP187	0 - 0.2m	29/01/2020	**5** 100 100	<0.4 20 NC	**9** 100 640	**22** 6000 210	**15** 300 1100	<0.1 40 NC	**7** 400 170	**33** 7400 470	NT NC NC	NT NC NC	NT 50 180	NT 280 120	NT NC 1300	NT NC 5600	NT 0.7 65	NT 480 105	NT NL 125	NT 110 45	NT 5 170	NT NC 0.7	NT 3 NC	NT 300 NC
TP188	0 - 0.2m	31/01/2020	**8** 100 100	<0.4 20 NC	**11** 100 640	**19** 6000 210	**18** 300 1100	<0.1 40 NC	**10** 400 170	**41** 7400 470	NT NC NC	NT NC NC	NT 50 180	NT 280 120	NT NC 1300	NT NC 5600	NT 0.7 65	NT 480 105	NT NL 125	NT 110 45	NT 5 170	NT NC 0.7	NT 3 NC	NT 300 NC
TP189	0 - 0.2m	31/01/2020	**6** 100 100	<0.4 20 NC	**10** 100 640	**14** 6000 210	**14** 300 1100	<0.1 40 NC	**5** 400 170	**26** 7400 470	NT NC NC	NT NC NC	NT 50 180	NT 280 120	NT NC 1300	NT NC 5600	NT 0.7 65	NT 480 105	NT NL 125	NT 110 45	NT 5 170	NT NC 0.7	NT 3 NC	NT 300 NC
TP190	0 - 0.15m	31/01/2020	**8** 100 100	<0.4 20 NC	**12** 100 640	**13** 6000 210	**38** 300 1100	<0.1 40 NC	**6** 400 170	**34** 7400 470	NT NC NC	NT NC NC	NT 50 180	NT 280 120	NT NC 1300	NT NC 5600	NT 0.7 65	NT 480 105	NT NL 125	NT 110 45	NT 5 170	NT NC 0.7	NT 3 NC	NT 300 NC
TP191	0 - 0.2m	31/01/2020	**9** 100 100	<0.4 20 NC	**13** 100 640	**14** 6000 210	**16** 300 1100	<0.1 40 NC	**7** 400 170	**22** 7400 470	NT NC NC	NT NC NC	NT 50 180	NT 280 120	NT NC 1300	NT NC 5600	NT 0.7 65	NT 480 105	NT NL 125	NT 110 45	NT 5 170	NT NC 0.7	NT 3 NC	NT 300 NC
TP192	0 - 0.2m	31/01/2020	**9** 100 100	<0.4 20 NC	**10** 100 640	**22** 6000 210	**24** 300 1100	<0.1 40 NC	**7** 400 170	**56** 7400 470	NT NC NC	NT NC NC	NT 50 180	NT 280 120	NT NC 1300	NT NC 5600	NT 0.7 65	NT 480 105	NT NL 125	NT 110 45	NT 5 170	NT NC 0.7	NT 3 NC	NT 300 NC
TP193	0 - 0.2m	31/01/2020	**8** 100 100	<0.4 20 NC	**14** 100 640	**27** 6000 210	**25** 300 1100	<0.1 40 NC	**16** 400 170	**100** 7400 470	NT NC NC	NT NC NC	NT 50 180	NT 280 120	NT NC 1300	NT NC 5600	NT 0.7 65	NT 480 105	NT NL 125	NT 110 45	NT 5 170	NT NC 0.7	NT 3 NC	NT 300 NC
TP194	0 - 0.1m	30/01/2020	**9** 100 100	<0.4 20 NC	**14** 100 640	**15** 6000 210	**12** 300 1100	<0.1 40 NC	**8** 400 170	**27** 7400 470	NT NC NC	NT NC NC	NT 50 180	NT 280 120	NT NC 1300	NT NC 5600	NT 0.7 65	NT 480 105	NT NL 125	NT 110 45	NT 5 170	NT NC 0.7	NT 3 NC	NT 300 NC

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 below the PQL, refer to the lab report **Blue** = DC exceedance

Bold = Lab detections NT = Not tested NL = Non limiting NC = No criteria NA = Not applicable NAD = No asbestos detected

Notes:

HIL/HSL/DC	NEPC, Schedule B1 - HIL A (Residential / Low - High Density), HSL A/B (Residential / Low - High Density), DC HSL A (Direct contact HSL A Residential (Low density))
EIL/ESL	NEPC, Schedule B1 - EIL UR/POS (Urban Residential and Public Open Space), ESL UR/POS (Urban Residential and Public Open Space)
ML	NEPC, Schedule B1 - ML R/P/POS (Residential, Parkland and Public Open Space)
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

Table E2: Summary of Laboratory Results – Phenol, OCP, OPP and PCB

			Phenol	OCP														OPP	PCB							
			Phenol	DDT+DDE+DDD c	DDD	DDE	DDT	Aldrin & Dieldrin	Total Chlordane	Total Endosulfan	Endosulfan I	Endosulfan II	Endosulfan Sulphate	Endrin	Heptachlor	HCB	Methoxychlor	Chlorpyriphos	Arochlor 1016	Total PCB	Arochlor 1221	Arochlor 1232	Arochlor 1242	Arochlor 1248	Arochlor 1254	Arochlor 1260
		PQL	5	0.1	0.1	0.1	0.1	0.1	0.1	0.05	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	0.1
Sample ID	Depth	Sampled 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	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
TP121	0 - 0.2m	23/01/2020	<5 100 NC	<0.1 240 180	<0.1 NC NC	<0.1 NC NC	<0.1 NC 180	**2** 6 NC	<0.1 50 NC	NT 270 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 10 NC	<0.1 6 NC	<0.1 10 NC	<0.1 300 NC	<0.1 160 NC	<0.1 NC NC	NT 1 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC
TP126/0-0.1	0 - 0.1m	23/01/2020	NT 100 NC	<0.1 240 180	<0.1 NC NC	<0.1 NC NC	<0.1 NC 180	<0.1 6 NC	<0.1 50 NC	NT 270 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 10 NC	<0.1 6 NC	<0.1 10 NC	<0.1 300 NC	<0.1 160 NC	NT NC NC	NT 1 NC	NT NC NC	NT NC NC	NT NC NC	NT NC NC	NT NC NC	NT NC NC
TP130/0-0.2	0 - 0.2m	31/01/2020	<5 100 NC	<0.1 240 180	<0.1 NC NC	<0.1 NC NC	<0.1 NC 180	<0.1 6 NC	<0.1 50 NC	NT 270 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 10 NC	<0.1 6 NC	<0.1 10 NC	<0.1 300 NC	<0.1 160 NC	<0.1 NC NC	NT 1 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC
TP131/0-0.2	0 - 0.2m	29/01/2020	NT 100 NC	<0.1 240 180	<0.1 NC NC	<0.1 NC NC	<0.1 NC 180	<0.1 6 NC	<0.1 50 NC	NT 270 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 10 NC	<0.1 6 NC	<0.1 10 NC	<0.1 300 NC	<0.1 160 NC	<0.1 NC NC	NT 1 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC
TP132	0 - 0.2m	23/01/2020	<5 100 NC	<0.1 240 180	<0.1 NC NC	<0.1 NC NC	<0.1 NC 180	<0.1 6 NC	<0.1 50 NC	NT 270 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 10 NC	<0.1 6 NC	<0.1 10 NC	<0.1 300 NC	<0.1 160 NC	<0.1 NC NC	NT 1 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC
TP133	0 - 0.2m	23/01/2020	NT 100 NC	<0.1 240 180	<0.1 NC NC	<0.1 NC NC	<0.1 NC 180	<0.1 6 NC	<0.1 50 NC	NT 270 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 10 NC	<0.1 6 NC	<0.1 10 NC	<0.1 300 NC	<0.1 160 NC	<0.1 NC NC	NT 1 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC
TP134/0-0.2	0 - 0.2m	29/01/2020	NT 100 NC	<0.1 240 180	<0.1 NC NC	<0.1 NC NC	<0.1 NC 180	**1.5** 6 NC	**0.1** 50 NC	NT 270 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 10 NC	<0.1 6 NC	<0.1 10 NC	<0.1 300 NC	<0.1 160 NC	<0.1 NC NC	NT 1 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC
TP135/0.4-0.5	0.4 - 0.5m	23/01/2020	NT 100 NC	<0.1 240 180	<0.1 NC NC	<0.1 NC NC	<0.1 NC 180	<0.1 6 NC	<0.1 50 NC	NT 270 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 10 NC	<0.1 6 NC	<0.1 10 NC	<0.1 300 NC	<0.1 160 NC	<0.1 NC NC	NT 1 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC
TP136/0.4-0.6	0 - 0.6m	23/01/2020	NT 100 NC	<0.1 240 180	<0.1 NC NC	<0.1 NC NC	<0.1 NC 180	<0.1 6 NC	<0.1 50 NC	NT 270 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 10 NC	<0.1 6 NC	<0.1 10 NC	<0.1 300 NC	<0.1 160 NC	<0.1 NC NC	NT 1 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC
TP137/1.2-1.4	1.2 - 1.4m	23/01/2020	NT 100 NC	<0.1 240 180	<0.1 NC NC	<0.1 NC NC	<0.1 NC 180	<0.1 6 NC	<0.1 50 NC	NT 270 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 10 NC	<0.1 6 NC	<0.1 10 NC	<0.1 300 NC	<0.1 160 NC	<0.1 NC NC	NT 1 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC
TP138/0-0.2	0 - 0.2m	31/01/2020	NT 100 NC	<0.1 240 180	<0.1 NC NC	<0.1 NC NC	<0.1 NC 180	<0.1 6 NC	<0.1 50 NC	NT 270 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 10 NC	<0.1 6 NC	<0.1 10 NC	<0.1 300 NC	<0.1 160 NC	NT NC NC	NT 1 NC	NT NC NC	NT NC NC	NT NC NC	NT NC NC	NT NC NC	NT NC NC
TP139/0-15	0 - 0.2m	31/01/2020	<5 100 NC	<0.1 240 180	<0.1 NC NC	<0.1 NC NC	<0.1 NC 180	<0.1 6 NC	<0.1 50 NC	NT 270 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 10 NC	<0.1 6 NC	<0.1 10 NC	<0.1 300 NC	<0.1 160 NC	<0.1 NC NC	NT 1 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC
TP140/0-0.2	0 - 0.2m	29/01/2020	NT 100 NC	<0.1 240 180	<0.1 NC NC	<0.1 NC NC	<0.1 NC 180	<0.1 6 NC	<0.1 50 NC	NT 270 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 10 NC	<0.1 6 NC	<0.1 10 NC	<0.1 300 NC	<0.1 160 NC	<0.1 NC NC	NT 1 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC
TP141/0-0.2	0 - 0.2m	29/01/2020	NT 100 NC	<0.1 240 180	<0.1 NC NC	<0.1 NC NC	<0.1 NC 180	**0.2** 6 NC	<0.1 50 NC	NT 270 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 10 NC	<0.1 6 NC	<0.1 10 NC	<0.1 300 NC	<0.1 160 NC	<0.1 NC NC	NT 1 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC
TP142/0-0.1	0 - 0.1m	23/01/2020	<5 100 NC	<0.1 240 180	<0.1 NC NC	<0.1 NC NC	<0.1 NC 180	<0.1 6 NC	<0.1 50 NC	NT 270 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 10 NC	<0.1 6 NC	<0.1 10 NC	<0.1 300 NC	<0.1 160 NC	<0.1 NC NC	NT 1 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC
TP143/0-0.2	0 - 0.2m	23/01/2020	NT 100 NC	<0.1 240 180	<0.1 NC NC	<0.1 NC NC	<0.1 NC 180	<0.1 6 NC	<0.1 50 NC	NT 270 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 10 NC	<0.1 6 NC	<0.1 10 NC	<0.1 300 NC	<0.1 160 NC	NT NC NC	NT 1 NC	NT NC NC	NT NC NC	NT NC NC	NT NC NC	NT NC NC	NT NC NC
TP144/0-0.15	0 - 0.15m	30/01/2020	<5 100 NC	<0.1 240 180	<0.1 NC NC	<0.1 NC NC	<0.1 NC 180	<0.1 6 NC	<0.1 50 NC	NT 270 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 10 NC	<0.1 6 NC	<0.1 10 NC	<0.1 300 NC	<0.1 160 NC	<0.1 NC NC	NT 1 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC
TP145/0-0.15	0 - 0.15m	30/01/2020	NT 100 NC	<0.1 240 180	<0.1 NC NC	<0.1 NC NC	<0.1 NC 180	<0.1 6 NC	<0.1 50 NC	NT 270 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 10 NC	<0.1 6 NC	<0.1 10 NC	<0.1 300 NC	<0.1 160 NC	<0.1 NC NC	NT 1 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC
TP146/0-0.2	0 - 0.2m	30/01/2020	<5 100 NC	<0.1 240 180	<0.1 NC NC	<0.1 NC NC	<0.1 NC 180	<0.1 6 NC	<0.1 50 NC	NT 270 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 10 NC	<0.1 6 NC	<0.1 10 NC	<0.1 300 NC	<0.1 160 NC	<0.1 NC NC	NT 1 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC
TP147	0 - 0.2m	23/01/2020	NT 100 NC	<0.1 240 180	<0.1 NC NC	<0.1 NC NC	<0.1 NC 180	<0.1 6 NC	<0.1 50 NC	NT 270 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 10 NC	<0.1 6 NC	<0.1 10 NC	<0.1 300 NC	<0.1 160 NC	NT NC NC	NT 1 NC	NT NC NC	NT NC NC	NT NC NC	NT NC NC	NT NC NC	NT NC NC
TP148/0-0.2	0 - 0.2m	29/01/2020	<5 100 NC	<0.1 240 180	<0.1 NC NC	<0.1 NC NC	<0.1 NC 180	<0.1 6 NC	<0.1 50 NC	NT 270 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 10 NC	<0.1 6 NC	<0.1 10 NC	<0.1 300 NC	<0.1 160 NC	<0.1 NC NC	NT 1 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC
TP149/0-0.2	0 - 0.2m	30/01/2020	NT 100 NC	<0.1 240 180	<0.1 NC NC	<0.1 NC NC	<0.1 NC 180	<0.1 6 NC	<0.1 50 NC	NT 270 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 10 NC	<0.1 6 NC	<0.1 10 NC	<0.1 300 NC	<0.1 160 NC	<0.1 NC NC	NT 1 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC
TP150/0-0.1	0 - 0.1m	30/01/2020	<5 100 NC	<0.1 240 180	<0.1 NC NC	<0.1 NC NC	<0.1 NC 180	<0.1 6 NC	<0.1 50 NC	NT 270 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 10 NC	<0.1 6 NC	<0.1 10 NC	<0.1 300 NC	<0.1 160 NC	<0.1 NC NC	NT 1 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC
TP151/0-0.2	0 - 0.2m	30/01/2020	NT 100 NC	<0.1 240 180	<0.1 NC NC	<0.1 NC NC	<0.1 NC 180	<0.1 6 NC	<0.1 50 NC	NT 270 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 10 NC	<0.1 6 NC	<0.1 10 NC	<0.1 300 NC	<0.1 160 NC	<0.1 NC NC	NT 1 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC
TP152	0 - 0.2m	23/01/2020	<5 100 NC	<0.1 240 180	<0.1 NC NC	<0.1 NC NC	<0.1 NC 180	<0.1 6 NC	<0.1 50 NC	NT 270 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 10 NC	<0.1 6 NC	<0.1 10 NC	<0.1 300 NC	<0.1 160 NC	<0.1 NC NC	NT 1 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC
TP153	0 - 0.2m	23/01/2020	NT 100 NC	<0.1 240 180	<0.1 NC NC	<0.1 NC NC	<0.1 NC 180	<0.1 6 NC	<0.1 50 NC	NT 270 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 10 NC	<0.1 6 NC	<0.1 10 NC	<0.1 300 NC	<0.1 160 NC	NT NC NC	NT 1 NC	NT NC NC	NT NC NC	NT NC NC	NT NC NC	NT NC NC	NT NC NC
TP154/0-0.2	0 - 0.2m	29/01/2020	<5 100 NC	<0.1 240 180	<0.1 NC NC	<0.1 NC NC	<0.1 NC 180	**1** 6 NC	<0.1 50 NC	NT 270 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 10 NC	<0.1 6 NC	<0.1 10 NC	<0.1 300 NC	<0.1 160 NC	<0.1 NC NC	NT 1 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC

Table E2: Summary of Laboratory Results – Phenol, OCP, OPP and PCB

			Phenol	OCP														OPP	PCB							
			Phenol	DDT+DDE+DDD c	DDD	DDE	DDT	Aldrin & Dieldrin	Total Chlordane	Total Endosulfan	Endosulfan I	Endosulfan II	Endosulfan Sulphate	Endrin	Heptachlor	HCB	Methoxychlor	Chlorpyriphos	Arochlor 1016	Total PCB	Arochlor 1221	Arochlor 1232	Arochlor 1242	Arochlor 1248	Arochlor 1254	Arochlor 1260
		PQL	5	0.1	0.1	0.1	0.1	0.1	0.1	0.05	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	0.1
Sample ID	Depth	Sampled 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	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
TP155/0-0.2	0 - 0.2m	29/01/2020	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
			100 NC	240 180	NC NC	NC NC	NC 180	6 NC	50 NC	270 NC	NC NC	NC NC	NC NC	10 NC	6 NC	10 NC	300 NC	160 NC	NC NC	1 NC	NC NC	NC NC	NC NC	NC NC	NC NC	NC NC
TP156	0 - 0.2m	23/01/2020	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	NT	NT	NT	NT	NT	NT	NT
			100 NC	240 180	NC NC	NC NC	NC 180	6 NC	50 NC	270 NC	NC NC	NC NC	NC NC	10 NC	6 NC	10 NC	300 NC	160 NC	NC NC	1 NC	NC NC	NC NC	NC NC	NC NC	NC NC	NC NC
TP157/0-0.1	0 - 0.1m	29/01/2020	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
			100 NC	240 180	NC NC	NC NC	NC 180	6 NC	50 NC	270 NC	NC NC	NC NC	NC NC	10 NC	6 NC	10 NC	300 NC	160 NC	NC NC	1 NC	NC NC	NC NC	NC NC	NC NC	NC NC	NC NC
TP158/0-0.2	0 - 0.2m	29/01/2020	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
			100 NC	240 180	NC NC	NC NC	NC 180	6 NC	50 NC	270 NC	NC NC	NC NC	NC NC	10 NC	6 NC	10 NC	300 NC	160 NC	NC NC	1 NC	NC NC	NC NC	NC NC	NC NC	NC NC	NC NC
TP166/0-0.2	0 - 0.2m	23/01/2020	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
			100 NC	240 180	NC NC	NC NC	NC 180	6 NC	50 NC	270 NC	NC NC	NC NC	NC NC	10 NC	6 NC	10 NC	300 NC	160 NC	NC NC	1 NC	NC NC	NC NC	NC NC	NC NC	NC NC	NC NC
TP167/0-0.3	0 - 0.3m	23/01/2020	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	NT	NT	NT	NT	NT	NT	NT
			100 NC	240 180	NC NC	NC NC	NC 180	6 NC	50 NC	270 NC	NC NC	NC NC	NC NC	10 NC	6 NC	10 NC	300 NC	160 NC	NC NC	1 NC	NC NC	NC NC	NC NC	NC NC	NC NC	NC NC
TP168/0-0.2	0 - 0.2m	29/01/2020	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
			100 NC	240 180	NC NC	NC NC	NC 180	6 NC	50 NC	270 NC	NC NC	NC NC	NC NC	10 NC	6 NC	10 NC	300 NC	160 NC	NC NC	1 NC	NC NC	NC NC	NC NC	NC NC	NC NC	NC NC
TP169/0-0.2	0 - 0.2m	29/01/2020	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
			100 NC	240 180	NC NC	NC NC	NC 180	6 NC	50 NC	270 NC	NC NC	NC NC	NC NC	10 NC	6 NC	10 NC	300 NC	160 NC	NC NC	1 NC	NC NC	NC NC	NC NC	NC NC	NC NC	NC NC
TP170	0.1 - 0.2m	23/01/2020	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
			100 NC	240 180	NC NC	NC NC	NC 180	6 NC	50 NC	270 NC	NC NC	NC NC	NC NC	10 NC	6 NC	10 NC	300 NC	160 NC	NC NC	1 NC	NC NC	NC NC	NC NC	NC NC	NC NC	NC NC
TP171	0 - 0.15m	23/01/2020	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
			100 NC	240 180	NC NC	NC NC	NC 180	6 NC	50 NC	270 NC	NC NC	NC NC	NC NC	10 NC	6 NC	10 NC	300 NC	160 NC	NC NC	1 NC	NC NC	NC NC	NC NC	NC NC	NC NC	NC NC
TP172	0 - 0.2m	23/01/2020	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	NT	NT	NT	NT	NT	NT	NT
			100 NC	240 180	NC NC	NC NC	NC 180	6 NC	50 NC	270 NC	NC NC	NC NC	NC NC	10 NC	6 NC	10 NC	300 NC	160 NC	NC NC	1 NC	NC NC	NC NC	NC NC	NC NC	NC NC	NC NC
TP173	0 - 0.2m	23/01/2020	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
			100 NC	240 180	NC NC	NC NC	NC 180	6 NC	50 NC	270 NC	NC NC	NC NC	NC NC	10 NC	6 NC	10 NC	300 NC	160 NC	NC NC	1 NC	NC NC	NC NC	NC NC	NC NC	NC NC	NC NC
TP174/0-0.2	0 - 0.2m	30/01/2020	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
			100 NC	240 180	NC NC	NC NC	NC 180	6 NC	50 NC	270 NC	NC NC	NC NC	NC NC	10 NC	6 NC	10 NC	300 NC	160 NC	NC NC	1 NC	NC NC	NC NC	NC NC	NC NC	NC NC	NC NC
TP175/0-0.2	0 - 0.2m	30/01/2020	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
			100 NC	240 180	NC NC	NC NC	NC 180	6 NC	50 NC	270 NC	NC NC	NC NC	NC NC	10 NC	6 NC	10 NC	300 NC	160 NC	NC NC	1 NC	NC NC	NC NC	NC NC	NC NC	NC NC	NC NC
TP176/0-0.2	0 - 0.2m	30/01/2020	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
			100 NC	240 180	NC NC	NC NC	NC 180	6 NC	50 NC	270 NC	NC NC	NC NC	NC NC	10 NC	6 NC	10 NC	300 NC	160 NC	NC NC	1 NC	NC NC	NC NC	NC NC	NC NC	NC NC	NC NC
TP177/0-0.2	0 - 0.2m	30/01/2020	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
			100 NC	240 180	NC NC	NC NC	NC 180	6 NC	50 NC	270 NC	NC NC	NC NC	NC NC	10 NC	6 NC	10 NC	300 NC	160 NC	NC NC	1 NC	NC NC	NC NC	NC NC	NC NC	NC NC	NC NC
TP178/0-0.2	0 - 0.2m	30/01/2020	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
			100 NC	240 180	NC NC	NC NC	NC 180	6 NC	50 NC	270 NC	NC NC	NC NC	NC NC	10 NC	6 NC	10 NC	300 NC	160 NC	NC NC	1 NC	NC NC	NC NC	NC NC	NC NC	NC NC	NC NC
TP180/0-0.15	0 - 0.15m	22/01/2020	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
			100 NC	240 180	NC NC	NC NC	NC 180	6 NC	50 NC	270 NC	NC NC	NC NC	NC NC	10 NC	6 NC	10 NC	300 NC	160 NC	NC NC	1 NC	NC NC	NC NC	NC NC	NC NC	NC NC	NC NC
TP181/0-0.15	0 - 0.15m	22/01/2020	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	NT	NT	NT	NT	NT	NT	NT
			100 NC	240 180	NC NC	NC NC	NC 180	6 NC	50 NC	270 NC	NC NC	NC NC	NC NC	10 NC	6 NC	10 NC	300 NC	160 NC	NC NC	1 NC	NC NC	NC NC	NC NC	NC NC	NC NC	NC NC
TP182/0-0.15	0 - 0.15m	21/01/2020	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	NT	NT	NT	NT	NT	NT	NT
			100 NC	240 180	NC NC	NC NC	NC 180	6 NC	50 NC	270 NC	NC NC	NC NC	NC NC	10 NC	6 NC	10 NC	300 NC	160 NC	NC NC	1 NC	NC NC	NC NC	NC NC	NC NC	NC NC	NC NC
TP183/0-0.15	0 - 0.15m	22/01/2020	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	NT	NT	NT	NT	NT	NT	NT
			100 NC	240 180	NC NC	NC NC	NC 180	6 NC	50 NC	270 NC	NC NC	NC NC	NC NC	10 NC	6 NC	10 NC	300 NC	160 NC	NC NC	1 NC	NC NC	NC NC	NC NC	NC NC	NC NC	NC NC
TP184/0-0.2	0 - 0.2m	23/01/2020	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	NT	NT	NT	NT	NT	NT	NT
			100 NC	240 180	NC NC	NC NC	NC 180	6 NC	50 NC	270 NC	NC NC	NC NC	NC NC	10 NC	6 NC	10 NC	300 NC	160 NC	NC NC	1 NC	NC NC	NC NC	NC NC	NC NC	NC NC	NC NC
TP185/0-0.2	0 - 0.2m	23/01/2020	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	NT	NT	NT	NT	NT	NT	NT
			100 NC	240 180	NC NC	NC NC	NC 180	6 NC	50 NC	270 NC	NC NC	NC NC	NC NC	10 NC	6 NC	10 NC	300 NC	160 NC	NC NC	1 NC	NC NC	NC NC	NC NC	NC NC	NC NC	NC NC
TP186/0-0.1	0 - 0.1m	29/01/2020	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
			100 NC	240 180	NC NC	NC NC	NC 180	6 NC	50 NC	270 NC	NC NC	NC NC	NC NC	10 NC	6 NC	10 NC	300 NC	160 NC	NC NC	1 NC	NC NC	NC NC	NC NC	NC NC	NC NC	NC NC
TP187/0-0.2	0 - 0.2m	29/01/2020	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	NT	NT	NT	NT	NT	NT	NT
			100 NC	240 180	NC NC	NC NC	NC 180	6 NC	50 NC	270 NC	NC NC	NC NC	NC NC	10 NC	6 NC	10 NC	300 NC	160 NC	NC NC	1 NC	NC NC	NC NC	NC NC	NC NC	NC NC	NC NC
TP188/0-0.2	0 - 0.2m	31/01/2020	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
			100 NC	240 180	NC NC	NC NC	NC 180	6 NC	50 NC	270 NC	NC NC	NC NC	NC NC	10 NC	6 NC	10 NC	300 NC	160 NC	NC NC	1 NC	NC NC	NC NC	NC NC	NC NC	NC NC	NC NC
TP189/0-0.2	0 - 0.2m	31/01/2020	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	NT	NT	NT	NT	NT	NT	NT
			100 NC	240 180	NC NC	NC NC	NC 180	6 NC	50 NC	270 NC	NC NC	NC NC	NC NC	10 NC	6 NC	10 NC	300 NC	160 NC	NC NC	1 NC	NC NC	NC NC	NC NC	NC NC	NC NC	NC NC
TP190/0-0.15	0 - 0.15m	31/01/2020	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
			100 NC	240 180	NC NC	NC NC	NC 180	6 NC	50 NC	270 NC	NC NC	NC NC	NC NC	10 NC	6 NC	10 NC	300 NC	160 NC	NC NC	1 NC	NC NC	NC NC	NC NC	NC NC	NC NC	NC NC

Table E2: Summary of Laboratory Results – Phenol, OCP, OPP and PCB

			Phenol	OCP														OPP	PCB							
			Phenol	DDT+DDE+DDD [c]	DDD	DDE	DDT	Aldrin & Dieldrin	Total Chlordane	Total Endosulfan	Endosulfan I	Endosulfan II	Endosulfan Sulphate	Endrin	Heptachlor	HCB	Methoxychlor	Chlorpyriphos	Arochlor 1016	Total PCB	Arochlor 1221	Arochlor 1232	Arochlor 1242	Arochlor 1248	Arochlor 1254	Arochlor 1260
		PQL	5	0.1	0.1	0.1	0.1	0.1	0.1	0.05	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	0.1
Sample ID	Depth	Sampled 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	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
TP191/0-0.2	0 - 0.2m	31/01/2020	<5 100 NC	<0.1 240 180	<0.1 NC NC	<0.1 NC NC	<0.1 NC 180	<0.1 6 NC	<0.1 50 NC	NT 270 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 10 NC	<0.1 6 NC	<0.1 10 NC	<0.1 300 NC	NT 160 NC	NT NC NC	NT 1 NC	NT NC NC	NT NC NC	NT NC NC	NT NC NC	NT NC NC	NT NC NC
TP192/0-0.2	0 - 0.2m	31/01/2020	NT 100 NC	NT 240 180	NT NC NC	NT NC NC	NT NC 180	NT 6 NC	NT 50 NC	NT 270 NC	NT NC NC	NT NC NC	NT NC NC	NT 10 NC	NT 6 NC	NT 10 NC	NT 300 NC	NT 160 NC	NT NC NC	NT 1 NC	NT NC NC	NT NC NC	NT NC NC	NT NC NC	NT NC NC	NT NC NC
TP193/0-0.2	0 - 0.2m	31/01/2020	<5 100 NC	<0.1 240 180	<0.1 NC NC	<0.1 NC NC	<0.1 NC 180	<0.1 6 NC	<0.1 50 NC	NT 270 NC	<0.1 NC NC	<0.1 NC NC	<0.1 NC NC	<0.1 10 NC	<0.1 6 NC	<0.1 10 NC	<0.1 300 NC	NT 160 NC	NT NC NC	NT 1 NC	NT NC NC	NT NC NC	NT NC NC	NT NC NC	NT NC NC	NT NC NC
TP194/0-0.1	0 - 0.1m	30/01/2020	NT 100 NC	NT 240 180	NT NC NC	NT NC NC	NT NC 180	NT 6 NC	NT 50 NC	NT 270 NC	NT NC NC	NT NC NC	NT NC NC	NT 10 NC	NT 6 NC	NT 10 NC	NT 300 NC	NT 160 NC	NT NC NC	NT 1 NC	NT NC NC	NT NC NC	NT NC NC	NT NC NC	NT NC NC	NT NC NC

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 below the PQL, refer to the lab report **Blue** = DC exceedance

Bold = Lab detections NT = Not tested NL = Non limiting NC = No criteria NA = Not applicable NAD = No asbestos detected

Notes:

HIL/HSL/DC	NEPC, Schedule B1 - HIL A (Residential / Low - High Density), HSL A/B (Residential / Low - High Density), DC HSL A (Direct contact HSL A Residential (Low density))
EIL/ESL	NEPC, Schedule B1 - EIL UR/POS (Urban Residential and Public Open Space), ESL UR/POS (Urban Residential and Public Open Space)
ML	NEPC, Schedule B1 - ML R/P/POS (Residential, Parkland and Public Open Space)
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

Table E3 - Summary of Field and Analytical Result

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 (kg)	Total Asbestos (g)	Concentration of FA and AF in soil ACM (% w/w)**
HSL for Asbestos in soil							0.010			0.001
TP121	0-0.2	18.68	0	-	-	-	<0.01	770.38	<0.1	<0.001
TP126[a]	0-0.2	16.02	1	Good	26	1.3	**0.011**	645.59	<0.1	<0.001
TP130	0-0.2	18.10	0	-	-	-	<0.01	861.59	<0.1	<0.001
TP131	0-0.2	20.51	0	-	-	-	<0.01	799.63	<0.1	<0.001
TP132	0-0.2	19.45	0	-	-	-	<0.01	817.65	<0.1	<0.001
TP133	0-0.2	13.42	0	-	-	-	<0.01	745.43	<0.1	<0.001
TP134	0-0.2	14.84	0	-	-	-	<0.01	949.35	<0.1	<0.001
TP135	0-0.2	12.67	0	-	-	-	<0.01	825.42	<0.1	<0.001
TP137	1.1-1.3	14.40	34	Good	11 - 100	151.9	**1.266**	829.89	**0.4857**	**0.0486**
TP137	2.3-2.5	17.40	0	-	-	-	<0.01	-	<0.1	<0.001
TP138	0-0.2	18.63	0	-	-	-	<0.01	817.14	<0.1	<0.001
TP139	0-0.2	13.62	0	-	-	-	<0.01	822.52	<0.1	<0.001
TP140	0-0.2	17.32	0	-	-	-	<0.01	760.35	<0.1	<0.001
TP141	0-0.2	12.78	0	-	-	-	<0.01	-	<0.1	<0.001
TP142	0-0.2	16.57	0	-	-	-	<0.01	817.92	<0.1	<0.001
TP143	0-0.2	12.65	0	-	-	0.382	**0.003**	628.36	**0.3820*****	<0.001
TP144	0-0.2	13.46	0	-	-	-	<0.01	792.74	<0.1	<0.001
TP145	0-0.2	15.03	0	-	-	-	<0.01	781.96	<0.1	<0.001
TP146	0-0.2	16.14	0	-	-	-	<0.01	811.29	<0.1	<0.001
TP147	0-0.2	14.83	0	-	-	-	<0.01	884.86	<0.1	<0.001
TP148	0-0.2	13.20	1	Good	37	3.1	**0.026**	740.7	<0.1	<0.001
TP149	0-0.2	18.62	0	-	-	-	<0.01	793.59	<0.1	<0.001
TP150	0-0.2	14.78	0	-	-	-	<0.01	822.38	**0.0022**	<0.001
TP152	0-0.2	13.84	0	-	-	-	<0.01	883.36	<0.1	<0.001
TP153	0-0.2	13.80	0	-	-	-	<0.01	351.17	<0.1	<0.001
TP154	0-0.2	13.26	0	-	-	-	<0.01	739.8	<0.1	<0.001
TP155	0-0.2	16.76	0	-	-	-	<0.01	830.77	<0.1	<0.001
TP156	0-0.2	15.98	0	-	-	-	<0.01	655.45	<0.1	<0.001
TP157	0-0.2	12.21	0	-	-	-	<0.01	735.74	<0.1	<0.001
TP158	0.9-1.1	10.88	0	-	-	-	<0.01	857.04	<0.1	<0.001
TP166	0-0.1	16.56	1	good	26	1.3	**0.011**	725.08	<0.1	<0.001
TP167	0-0.2	15.69	0	-	-	-	<0.01	840.53	<0.1	<0.001
TP168	0-0.2	15.87	0	-	-	-	<0.01	727.14	<0.1	<0.001
TP169	0-0.2	11.81	0	-	-	-	<0.01	799.83	<0.1	<0.001
TP170	0-0.2	11.20	0	-	-	-	<0.01	551.56	<0.1	<0.001
TP171	0-0.2	15.91	0	-	-	-	<0.01	853.01	<0.1	<0.001
TP172	0-0.2	18.97	0	-	-	-	<0.01	684.7	<0.1	<0.001
TP173	0-0.2	17.96	0	-	-	-	<0.01	817.17	<0.1	<0.001
TP174	0-0.2	15.82	0	-	-	-	<0.01	870.77	<0.1	<0.001
TP175	0-0.2	15.43	0	-	-	-	<0.01	373.12	<0.1	<0.001
TP176	0-0.4	15.50	0	-	-	-	<0.01	710.48	<0.1	<0.001
TP177	0-0.2	13.35	0	-	-	-	<0.01	774.5	<0.1	<0.001
TP178	0-0.2	12.30	2	poor	8 to 15	1.2	**0.010**	865.84	<0.1	<0.001
TP184	0-0.2	13.42	0	-	-	-	<0.01	665.59	<0.1	<0.001
TP185	0-0.2	15.16	0	-	-	-	<0.01	698.09	<0.1	<0.001
TP186	0-0.1	13.83	0	-	-	-	<0.01	871.62	<0.1	<0.001
TP187	0-0.2	16.29	1	good	9	0.08	**0.001**	970.46	**0.0065**	<0.001
TP188	0-0.3	18.19	0	-	-	-	<0.01	766.75	<0.1	<0.001
TP189	0-0.2	17.45	0	-	-	-	<0.01	375.67	<0.1	<0.001
TP190	0-0.1	18.09	0	-	-	-	<0.01	856.52	<0.1	<0.001
TP191	0-0.2	16.35	0	-	-	-	<0.01	730.7	<0.1	<0.001
TP192	0-0.2	16.86	0	-	-	-	<0.01	848.39	<0.1	<0.001
TP193	0-0.2	17.91	0	-	-	-	<0.01	792.66	<0.1	<0.001
TP194	0-0.2	14.08	0	-	-	-	<0.01	885.31	<0.1	<0.001

Notes

HSL for Asbestos in soil	Table 7 of Schedule B(1), NEPC (2013) for residential use with accessible soil
*	Based on % w/w asbestos in soil (Section 2 of report) assuming 15% asbestos in ACM
**	Based on the weight of asbestos in FA and AF as calculated by Envirolab. Values excludes calcuated weight of bonded ACM greater than > 7mm in samples
***	Weight of ACM in 500 mL bulk sample. Weight of ACM was used to calculate concentration of ACM in bulk sample
a	Refer Envirolab CoA 2335296

Table E4 - Summary of Groundwater Sampling and Chemical Analysis Results (Results in µg/L - unless specified)

Sample Location	Sampling Date	Heavy Metals								PAH					TRH				BTEX				OCPs, OPPs & PCBs									
		As	Cd	Cr	Cu	Pb	Hg	Ni	Zn	B(a)P TEQ	B(a)P	Total PAH	Naphthalene	Phenols	C6-C10 less BTEX [F1]	>C10-C16 (less Naphthalene) [F2]	>C16-C34	>C34-C40	Benzene	Toluene	Ethylbenzene	Total Xylenes	Aldrin + dieldrin	Chlordane	DDT + DDE + DDD	Endosulfan	Endrin	Heptachlor	HCB	Methoxychlor	OPP (Chlorpyrifos)	PCBs
Practical Quantitation Limit		1	0.1	1	1	1	0.05	1	1	5	1	1	1	0.05	10	50	100	100	1	1	1	2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.01
Assessment Criteria																																
ANZG (2018) - DGVs (95% protection)		13	0.2	3.3	1.4	3.4	0.06	11	8	ND	ND	ND	16	320	ND	ND	ND	ND	950	ND	ND	200	ND	0.03	ND	0.03	0.01	0.01	ND	ND	0.01	ND
NHMRC, NRMMC 2011 - Drinking Water Guidelines (Health)		NC	2	50	2000	10	1	20	C	NC	0.01	NC	NC	NC	NC	NC	NC	NC	1	800	300	600	0.3	2	NC	20	NC	0.3	NC	300	10	NC
Hardness Corrected Guideline Values for Metals#		-	3.8	49.7	-	227	-	183	133	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Soil HSL for Vapour Intrusion (>4.0m depth) (mg/L)		-	-	-	-	-	-	-	-	-	-	-	NL	-	290	NL	-	-	3	NL	NL	NL	-	-	-	-	-	-	-	-	-	-
B□□□□ □ □	□□□20	□□	□0□□	□□	□□	□□	□0□□	□□	□0	□□	□□	□□	□□	□0□□	□□0	□□0	□□00	□□00	□□	□□	□□	□2	□0□2	□0□2	□0□2	□0□2	□0□2	□0□2	□0□2	□0□2	□0□□	□0□□

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All results in µg/L
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Appendix B Bore Logs (DP 2020)

TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297650
NORTHING: 6230623

PIT No: 126
PROJECT No: 76577.25
DATE: 23/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.15	FILL/Silty CLAY: dark brown and brown, with grey and brown clods, sand, trace sandstone and shale gravel and refuse comprising terracotta pipe		E	0.0				
	0.25	SILT: pale brown, trace sand			0.1				
				D	0.5				
				E	0.6				
	1	SANDSTONE: grey and orange, weathered							1
	1.1	- becoming yellow brown below 0.8m							
		Pit discontinued at 1.1m - refusal on sandstone							

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: ERL/ZAK

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297693
NORTHING: 6230343

PIT No: 130
PROJECT No: 76577.25
DATE: 31/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.2	FILL/Silty CLAY: red brown, with sandstone gravel, siltstone gravel and cobbles, sand, trace charcoal, refuse comprising concrete and demolition refuse on surface		E	0.0 0.2				
		SANDSTONE: grey and orange, weathered		E	0.3 0.5				
	1.3	- black staining below 1.2m							
		Pit discontinued at 1.3m - refusal on sandstone							

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: CKM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS: * Replicate sample BD1/130120 collected

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297691
NORTHING: 6230409

PIT No: 131
PROJECT No: 76577.25
DATE: 29/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.0	FILL/Clayey SAND: brown, with sandstone and siltstone gravel, trace refuse comprising bricks, glass and plastic		E	0.0 0.2				
	0.4	FILL/Silty CLAY: brown and grey mottled red and orange, trace sandstone and siltstone gravel and refuse comprising plastic		E D	0.4 0.5 0.6				
	0.9	Silty CLAY: grey mottled orange and red, trace sandstone gravel		E D	0.9 1.0 1.1				
	1.2	SANDSTONE: grey, brown and orange, weathered		D	1.5				
	1.5	Pit discontinued at 1.5m - refusal on sandstone							

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: CKM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297673
NORTHING: 6230511

PIT No: 133
PROJECT No: 76577.25
DATE: 28/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.2	FILL/Clayey SILT: brown		E	0.0				
		Silty CLAY: red mottled grey, trace siltstone gravel		E	0.2				
	0.6			E	0.4				
	0.7	SANDSTONE: fine grained, grey and orange brown, weathered			0.5				
	1	Pit discontinued at 0.7m - refusal on sandstone							
	2								
	3								
	4								
	5								
	6								
	7								
	8								
	9								
	10								

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: CKM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297712
NORTHING: 6230565

PIT No: 134
PROJECT No: 76577.25
DATE: 29/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.0	FILL/Clayey SAND: brown, with mixed gravel, trace refuse comprising bricks, metal, ceramic tile and concrete		E	0.0 0.2				
	0.5	Silty CLAY: red mottled brown		E	0.5 0.6				
	0.8	SANDSTONE: grey, red and orange, weathered							
	1.1	Pit discontinued at 1.1m - refusal on sandstone							

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: CKM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Test pit excavated in footprint of house that burnt down C.2017

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297693
NORTHING: 6230699

PIT No: 135
PROJECT No: 76577.25
DATE: 23/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.0	FILL/Silty CLAY: dark brown, with siltstone gravel, trace sand		E	0.0 - 0.2				
	0.4	FILL/Silty CLAY: pale brown and red brown, with mixed gravel, trace refuse comprising brick, concrete and timber		E	0.4 - 0.5				
	0.7	Silty CLAY: red mottled grey, trace sand and rootlets		D	0.5 - 0.6				
				E	0.6 - 0.7				
		- becoming grey mottled orange and red, trace sand, extremely weathered sandstone bands below 1.3m		D	0.9 - 1.5				
	1.8	SANDSTONE: highly weathered		D	1.5 - 2.5				
	2.7	Pit discontinued at 2.7m - limit of investigation							

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: ERL/ZAK

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297714
NORTHING: 6230800

PIT No: 137
PROJECT No: 76577.25
DATE: 23/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.3	FILL/Silty CLAY: dark brown, with shale and sandstone gravel, trace sand		E	0.0 0.2				
	1.1	FILL/Clayey SILT: pale brown, with shale, siltstone and sandstone gravel, trace sand, shale and sandstone cobbles		E D	0.4 0.5 0.6				
	2.3	FILL/Silty SAND: brown, with refuse comprising bricks, metal, plastic, multiple >10 ACM fragments		E D	1.2 1.4 1.5				
	2.6	FILL/Silty CLAY: red mottle grey and brown, trace sand, shale and sandstone gravel		E D	2.3 2.5				
		Pit discontinued at 2.6m - refusal on rock or concrete							

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: CKM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297754
NORTHING: 6230270

PIT No: 138
PROJECT No: 76577.25
DATE: 31/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.0	FILL/Silty CLAY: dark brown and brown, trace mixed gravel, sand and refuse comprising brick, concrete tile and plastic		E	0.2				
				D	0.5				
	1.0	Silty CLAY: red mottled grey, with siltstone gravel, trace sand		E	1.0				
	1.4	SILTSTONE: grey, brown and red, trace sand, weathered		D	1.2				
	1.8	Pit discontinued at 1.8m - refusal on siltstone			1.5				

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: CKM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297889
NORTHING: 6230316

PIT No: 139
PROJECT No: 76577.25
DATE: 31/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.15	FILL/Clayey SILT: brown, with sand, trace siltstone gravel		E	0.0				
		FILL/Silty CLAY: red and orange brown, with charcoal, trace angular and rounded gravel and sand, moist, reworked natural		E	0.15 0.35				
	2.6	Pit discontinued at 2.6m - limit of investigation							

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: CKM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Drainage line fill platform

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297780
NORTHING: 6230439

PIT No: 140
PROJECT No: 76577.25
DATE: 29/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.0	FILL/Silty CLAY: brown, trace sandstone and siltstone gravel and rootlets		E	0.0 0.2				
	0.4	FILL/Silty CLAY: pale brown and grey mottled orange, trace sand, siltstone and sandstone gravel		E D	0.4 0.5 0.6				
	0.9	Silty CLAY: red mottled brown, trace sand		E	0.9 1.1				
	1.5	SANDSTONE: red brown and grey, weathered		D	1.5				
	1.8	Pit discontinued at 1.8m - refusal on sandstone							

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: CKM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297794
NORTHING: 6230671

PIT No: 141
PROJECT No: 76577.25
DATE: 29/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.0	FILL/Silty CLAY: red brown, with mixed gravel, sand and refuse comprising bricks, concrete, metal and plastic		E	0.0 0.1				
	0.5	Silty CLAY: mottled grey, red and orange, with siltstone and ironstone gravel, trace fine grained sand		D E	0.5 0.6				
	0.9	SILTSTONE: orange and grey, weathered		D	1.0				
	1.5	Pit discontinued at 1.5m - refusal on siltstone		D	1.5				

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: CKM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS: * Replicate sample BD1/290120 collected; test pit excavated in footprint of house previously burnt down

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297760
NORTHING: 6230698

PIT No: 142
PROJECT No: 76577.25
DATE: 23/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.01	FILL/Silty CLAY: orange and red, with mixed gravel, trace sand and refuse comprising terracotta pipe and bricks		E	0.0				
					0.1				
	0.5	Silty CLAY: red mottled grey		E	0.2				
		SANDSTONE: grey and orange, weathered		D	0.4				
	1				0.5				
		- black banding at 1.0m							
	1.2	Pit discontinued at 1.2m - limit of investigation							

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: CKM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297786
NORTHING: 6230723

PIT No: 143
PROJECT No: 76577.25
DATE: 23/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.5	FILL/Clayey SAND: brown, trace shale gravel and organics comprising mulch, rootlets and 1 fragment of ACM		E	0.0 0.2				
	0.55	FILL/Silty SAND: dark brown, with shale gravel							
	0.65								
	0.7	FILL/Silty CLAY: pale brown, with shale gravel, trace sand		E	1.0 1.1				
	1.3	Silty CLAY: mottled grey and orange, trace sand							
		SANDSTONE: grey and orange, with red banding, weathered							
		Pit discontinued at 1.3m - refusal on sandstone							

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: CKM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS: ACM on surface adjacent test pit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297829
NORTHING: 6230298

PIT No: 144
PROJECT No: 76577.25
DATE: 30/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.15	FILL/Silty CLAY: brown, trace sand and rootlets		E	0.0				
		Silty CLAY: red mottled brown, trace ironstone gravel		E	0.15				
				D	0.35				
	0.8	SANDSTONE: brown, grey and red, weathered		D	0.5				
	1.7	Pit discontinued at 1.7m - refusal on sandstone		D	1.5				

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: CKM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297812
NORTHING: 6230321

PIT No: 145
PROJECT No: 76577.25
DATE: 30/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
		FILL/Clayey SILT: brown, trace sand, ironstone gravel and charcoal		E	0.0				
		Silty CLAY: red mottled brown, trace rootlets and ironstone gravel		E	0.15				
	0.8	- with sandstone gravel and cobbles below 0.6m		D	0.2				
	1.0	SANDSTONE: grey and pale brown, weathered			0.4				
		Pit discontinued at 1.0m			0.5				
		- limit of investigation							

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: CKM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297818
NORTHING: 6230361

PIT No: 146
PROJECT No: 76577.25
DATE: 30/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.0	FILL/Silty CLAY: brown, with sand, siltstone and sandstone gravel, sandstone cobbles, trace refuse		E	0.0				
	0.2				0.2				
	0.4	comprising concrete			0.4				
		Silty CLAY: brown, trace sand		E	0.5				
				D	0.6				
	1	- becoming red brown below 0.9m							
		- becoming red brown, with ironstone gravel below 1.3m		D	1.5				
	2								
	2.5			D	2.5				
		Pit discontinued at 2.5m - limit of investigation							
	3								
	4								
	5								
	6								
	7								
	8								
	9								
	10								

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: CKM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Test pit excavated adjacent to stormwater drain alignment

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297782
NORTHING: 6230524

PIT No: 147
PROJECT No: 76577.25
DATE: 28/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.3	FILL/Clayey SILT: brown, with sand, mixed gravel, trace refuse comprising glass and plastic		E	0.0 0.2				
	0.6	Silty CLAY: red mottled grey, with siltstone gravel		E D	0.3 0.4				
	1	SILTSTONE: grey and red, weathered		D	0.5 1.0				
	1.2	Pit discontinued at 1.2m - refusal on siltstone							

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: CKM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297827
NORTHING: 6230719

PIT No: 148
PROJECT No: 76577.25
DATE: 29/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.0	FILL/Silty CLAY: pale brown and grey, with sand, sandstone and ironstone gravel, 1 fragment of ACM		E	0.0				
					0.2				
				D	0.5				
	0.6	Silty CLAY: red mottled brown		E	0.6				
					0.7				
	1			D	1.0				
				D	1.5				
		- becoming mottled grey, red and orange, trace sand below 1.7m							
	2			D	2.0				
	2.2	- becoming orange brown below 1.9m							
	2.5	SILTSTONE: dark brown and grey, weathered		D	2.5				
		Pit discontinued at 2.5m - limit of investigation							
	3								
	4								
	5								
	6								
	7								
	8								
	9								
	10								

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: CKM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS: ACM on surface adjacent test pit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297887
NORTHING: 6230287

PIT No: 149
PROJECT No: 76577.25
DATE: 30/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.3	FILL/Silty CLAY: dark brown and purple, with shale and ironstone gravel, trace refuse comprising glass and plastic		E*	0.0 - 0.2				
		FILL/Silty CLAY: orange brown, trace rootlets and charcoal, reworked		E	0.3				
	0.8			D	0.5				
	1	FILL/Silty CLAY: red mottled brown, with dark grey silty clay clods, reworked		D	1.0				
	1.4	SANDSTONE: very fine grained, grey, orange and brown, highly weathered							
	2.1	Pit discontinued at 2.1m - refusal on sandstone							

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: CKM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS: * Replicate sample BD1/300120 collected

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297877
NORTHING: 6230307

PIT No: 150
PROJECT No: 76577.25
DATE: 30/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.1	FILL/Clayey SILT: pale brown, with sand, trace rootlets		E	0.0				
				E	0.1				
		Silty CLAY: red mottled grey, trace ironstone gravel			0.3				
				D	0.5				
	1	- becoming mottled red and grey, trace siltstone gravel below 0.8m							
		- becoming grey mottled red, with siltstone and ironstone gravel below 1.3m		D	1.5				
	2	- ironstone cobbles below 1.9m							
				D	2.5				
	2.7	Pit discontinued at 2.7m							
	3	- limit of investigation							

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: CKM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297856
NORTHING: 6230359

PIT No: 151
PROJECT No: 76577.25
DATE: 30/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.0	FILL/Silty CLAY: red brown, with sandstone and siltstone gravel and sandstone cobbles		E	0.0				
					0.2				
				D	0.5				
	0.7	Silty CLAY: brown mottled grey, with ironstone gravel, potentially some charcoal		E	0.7				
					0.9				
		- becoming orange brown, with ironstone below 1.2m			1.2				
				E	1.4				
		- becoming red and grey, with ironstone below 1.5m		D	1.5				
	2.1	Pit discontinued at 2.1m - limit of investigation							

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: CKM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Test pit excavated adjacent to stormwater drain alignment

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297875
NORTHING: 6230525

PIT No: 152
PROJECT No: 76577.25
DATE: 28/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.3	FILL/Clayey SILT: brown, trace sand and rootlets		E	0.0 0.1				
	0.5	Silty CLAY: red mottled grey, trace siltstone gravel		E	0.2				
	1	SILTSTONE: grey and red, weathered		D	0.5				
	1.2	Pit discontinued at 1.2m - refusal on siltstone		D	1.0				

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: CKM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297894
NORTHING: 6230548

PIT No: 153
PROJECT No: 76577.25
DATE: 28/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.2	FILL/TOPSOIL: Clayey SILT, brown, trace sand and rootlets		E*	0.0				
				E	0.2				
	0.6	Silty CLAY: red mottled grey, trace siltstone gravel and rootlets		D	0.4				
	0.7	SILTSTONE: grey and red, weathered			0.5				
	1	Pit discontinued at 0.7m - refusal on siltstone							

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: CKM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS: * Replicate sample BD2/280120 collected

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297860
NORTHING: 6230621

PIT No: 154
PROJECT No: 76577.25
DATE: 29/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.0	FILL/Silty CLAY: brown, with sandstone and shale gravel, trace refuse comprising brick, concrete and terracotta tile		E	0.0				
					0.2				
				D	0.5				
	0.6	Silty CLAY: grey mottled orange, with sand, sandstone gravel and cobbles		E	0.6				
					0.8				
	1			D	1.0				
	1.4	SANDSTONE: with silty clay bands, highly weathered		D	1.5				
	2 2.0	Pit discontinued at 2.0m - refusal on hardened clay and sandstone		D	2.0				

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: CKM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297748
NORTHING: 6230602

PIT No: 155
PROJECT No: 76577.25
DATE: 29/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.15	FILL/Silty CLAY: red brown, with siltstone and sandstone gravel, trace sand, ACM on surface		E	0.0 0.1				
		Pit discontinued at 0.15m - limit of investigation							

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: CKM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS: ACM on surface, surface scrape due to services

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297956
NORTHING: 6230543

PIT No: 156
PROJECT No: 76577.25
DATE: 28/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.3	FILL/TOPSOIL: Clayey SILT, brown, trace sand and rootlets		E	0.0 0.2				
		Silty CLAY: red mottled grey - becoming mottled grey and red below 0.6m		E D	0.4 0.5 0.6				
	1.1	SILTSTONE: grey and red, weathered		D	1.0				
	1.4	Pit discontinued at 1.4m - limit of investigation							

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: CKM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297906
NORTHING: 6230673

PIT No: 157
PROJECT No: 76577.25
DATE: 29/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.15	FILL/Silty CLAY: brown, with mixed gravel and sand, refuse comprising bricks, glass and ACM on the surface		E	0.0 - 0.1				
		Pit discontinued at 0.15m - limit of investigation							

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: CKM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Surface scrape only, multiple shallow services <1m away

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297883
NORTHING: 6230701

PIT No: 158
PROJECT No: 76577.25
DATE: 29/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.0	FILL/Silty CLAY: brown, with sand, sandstone and siltstone gravel, trace rootlets		E	0.0				
	0.2				0.2				
				D	0.5				
	0.9	FILL/Silty CLAY: red brown, with siltstone and shale gravel		E	0.9				
				D	1.0				
	1.4				1.1				
	1.6	FILL/GRAVEL AND SAND: sandstone, siltstone and shale gravel and sand		E	1.4				
				D	1.5				
		Pit discontinued at 1.6m			1.6				
		- limit of investigation due to services							

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: CKM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Test pit excavated on mound ~0.6m high

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297747
NORTHING: 6230684

PIT No: 166
PROJECT No: 76577.25
DATE: 23/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
	0.3	FILL/Silty CLAY: brown and red mottled grey, with shale and sandstone gravel, 1 fragment of ACM		E	0.0 0.2				
	0.8	Silty CLAY: red mottled grey		E	0.3 0.5				
		Pit discontinued at 0.8m - limit of investigation							

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: CKM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297775
NORTHING: 6230712

PIT No: 167
PROJECT No: 76577.25
DATE: 23/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.0	FILL/Silty CLAY: brown and dark brown, with mixed gravel, trace concrete and bricks in top 0.1m		E	0.0				
	0.4	Silty CLAY: extremely weathered sandstone		E	0.3 0.5 0.6				
	0.8	Pit discontinued at 0.8m - limit of investigation							

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: CKM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Demolition refuse comprising bricks, glass and concrete on surface

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297816
NORTHING: 6230727

PIT No: 168
PROJECT No: 76577.25
DATE: 29/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.4	FILL/Silty Sandy CLAY: dark brown, trace siltstone and sandstone gravel		E	0.0 0.2 0.4				
	1	FILL/Silty CLAY: brown, with mixed gravel, sandstone and siltstone cobbles		E	0.6				
	1.2	Silty CLAY: mottled orange, grey and red		E	1.2 1.4				
	1.5	Pit discontinued at 1.5m - limit of investigation							
	2								
	3								
	4								
	5								
	6								
	7								
	8								
	9								
	10								

Dynamic Penetrometer Test (blows per mm): 5, 10, 15, 20

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: CKM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297850
NORTHING: 6230708

PIT No: 169
PROJECT No: 76577.25
DATE: 29/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.0	FILL/Sandy SILT: brown, trace mixed gravel and rootlets		E	0.2				
	0.4	SILTSTONE: brown, grey and orange, weathered		E	0.4				
	0.6								
	0.8	Pit discontinued at 0.8m - limit of investigation							

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: CKM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297653
NORTHING: 6230509

PIT No: 170
PROJECT No: 76577.25
DATE: 28/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.0	FILL/Sandy SILT: brown, with rootlets, trace refuse comprising glass and plastic		E	0.0				
	0.4				0.2				
	0.5	Sandy SILT: dak brown, trace rootlets, former topsoil		E	0.4				
	0.6	SILT: pale brown and grey, trace sand			0.5				
	1.0	Silty CLAY: red mottled grey, trace rootlets							
	1.1	SILTSTONE: grey, weathered							
		Pit discontinued at 1.1m - limit of investigation							

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: CKM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Test pit excavated on shallow mound <0.2m high

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297740
NORTHING: 6230522

PIT No: 171
PROJECT No: 76577.25
DATE: 28/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.15	FILL/Clayey SILT: dark brown, with rootlets, trace sand, glass and demolition refuse on surface		E	0.0				
	0.5	Silty CLAY: mottled red and grey		E	0.15 0.2 0.3				
	0.7	SILTSTONE: grey, weathered							
		Pit discontinued at 0.7m - limit of investigation							

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: CKM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Glass and demolition refuse on surface

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297817
NORTHING: 6230524

PIT No: 172
PROJECT No: 76577.25
DATE: 28/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.2	FILL/Clayey SILT: brown, with rootlets, trace sand		E	0.0				
	0.5	Silty CLAY: red mottled grey		E	0.2				
	0.9	SILTSTONE: grey and orange, weathered			0.4				
	1	Pit discontinued at 0.9m - limit of investigation							

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: CKM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297847
NORTHING: 6230528

PIT No: 173
PROJECT No: 76577.25
DATE: 28/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.2	FILL/Clayey SILT: brown, trace siltstone gravel, sand and rootlets		E	0.0				
	0.4	Silty CLAY: red mottled grey		E	0.2				
	0.7	SILTSTONE/SANDSTONE: very fine grained, brown and red mottled grey			0.4				
		Pit discontinued at 0.7m - limit of investigation							

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: CKM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297857
NORTHING: 6230287

PIT No: 174
PROJECT No: 76577.25
DATE: 30/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.0			E	0.0				
	0.2	FILL/Clayey SILT: brown silty clay clods, trace sand, sandstone and siltstone gravel		E	0.2				
		FILL/Silty CLAY: pale brown			0.4				
	0.8	FILL/Silty CLAY: red mottled brown, trace charcoal, shale and sandstone gravel		E	0.8				
	1				1.0				
	2.0	SANDSTONE: brown and grey, highly weathered		E	2.1				
	2.3	Pit discontinued at 2.3m - limit of investigation			2.3				

Dynamic Penetrometer Test (blows per mm): 5, 10, 15, 20

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: CKM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297847
NORTHING: 6230316

PIT No: 175
PROJECT No: 76577.25
DATE: 30/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.0								
		FILL/Clayey SILT: brown, trace sand, sandstone gravel and refuse comprising glass		E	0.2				
	0.4	Silty CLAY: red mottled brown, trace ironstone gravel		E	0.4				
					0.6				
	1.2	Pit discontinued at 1.2m - limit of investigation							

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: CKM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297868
NORTHING: 6230289

PIT No: 176
PROJECT No: 76577.25
DATE: 30/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.3	FILL/Clayey SILT: brown with red mottled grey silty clay clods, trace refuse comprising glass		E	0.0				
	0.4	FILL/Clayey SILT: pale brown and grey		E	0.2				
		Silty CLAY: red mottled brown		E	0.3				
	1				0.4				
	1.2	Pit discontinued at 1.2m - limit of investigation			0.6				

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: CKM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297825
NORTHING: 6230276

PIT No: 177
PROJECT No: 76577.25
DATE: 30/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.0	FILL/Silty CLAY: dark brown, with sand and mixed gravel, trace rootlets and refuse comprising concrete, glass and asphalt		E	0.0 0.2				
	0.5			E	0.4 0.5				
	0.6	SILT: pale brown							
	0.9	Silty CLAY: red mottled brown, with siltstone gravel							
	1	Pit discontinued at 0.9m - limit of investigation							

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: CKM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297852
NORTHING: 6230266

PIT No: 178
PROJECT No: 76577.25
DATE: 30/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.0	FILL/Silty CLAY: dark brown, with sand, mixed gravel, sandstone cobbles, trace refuse comprising asphalt, pavers and concrete, 2 fragments of ACM		E	0.0 - 0.1				
	0.4	FILL/Silty CLAY: mottled red, brown and grey, trace siltstone and sandstone gravel		E	0.4 - 0.6				
	1.0	Silty CLAY: red mottled brown		E	1.0 - 1.2				
	1.4	Pit discontinued at 1.4m - limit of investigation							

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: CKM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297683
NORTHING: 6230684

PIT No: 184
PROJECT No: 76577.25
DATE: 23/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.0	FILL/TOPSOIL: Clayey SAND, dark brown, trace ironstone gravel and fine grained sand		E*	0.2				
	0.4	Silty CLAY: red mottled grey, trace rootlets		E	0.4				
	0.9	Pit discontinued at 0.9m - limit of investigation			0.6				

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: CKM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS: * Replicate sample BD1/230120 collected adjacent to building footprint

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297723
NORTHING: 6230706

PIT No: 185
PROJECT No: 76577.25
DATE: 23/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.35	FILL/TOPSOIL: Clayey SAND, dark brown, with fine grained sand, trace rootlets		E	0.0 0.2				
	0.55	Clayey SILT: pale brown and red, trace fine grained sand and rootlets		E	0.4 0.5				
	0.8	Silty CLAY: red mottled brown, trace ironstone gravel and sand							
		Pit discontinued at 0.8m - limit of investigation							

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: CKM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297826
NORTHING: 6230729

PIT No: 186
PROJECT No: 76577.25
DATE: 29/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.1	FILL/Silty CLAY: brown, with mixed gravel and sand		E	0.0				
	0.25	FILL/GRAVEL AND COBBLES: brown		E	0.1				
	0.6	Silty CLAY: mottled grey and orange, with sand			0.2				
		Pit discontinued at 0.6m - limit of investigation due to services							

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: CKM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297712
NORTHING: 6230313

PIT No: 190
PROJECT No: 76577.25
DATE: 31/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.1	FILL/Clayey SILT: brown, with sand, sandstone and siltstone gravel, trace refuse comprising glass and concrete		E	0.0				
	0.4	FILL/Clayey SILT: pale brown		E	0.15				
	0.8	Silty CLAY: red mottled grey, trace sand and charcoal		E	0.2				
		Pit discontinued at 0.8m - limit of investigation			0.4				
					0.6				

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: CKM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Trace demolition refuse on surface comprising bricks and concrete

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297778
NORTHING: 6230307

PIT No: 191
PROJECT No: 76577.25
DATE: 31/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.2	FILL/Clayey SILT: brown, trace rootlets, siltstone gravel and sand		E*	0.0				
				E	0.2				
	0.6	Silty CLAY: red mottled brown, trace siltstone gravel			0.4				
		Pit discontinued at 0.6m - limit of investigation							

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: CKM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS: * Replicate sample BD2/310120 collected

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297749
NORTHING: 6230294

PIT No: 192
PROJECT No: 76577.25
DATE: 31/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.0	FILL/Silty CLAY: brown, with mixed gravel and sand, trace refuse comprising plastic and concrete		E	0.0				
	0.2			E	0.2				
	0.3				0.3				
	0.5				0.5				
	1.4			E	1.4				
	1.6	Silty CLAY: orange mottled brown		E	1.6				
	1.8				1.8				
	1.9	Pit discontinued at 1.9m - limit of investigation							

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: CKM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297807
NORTHING: 6230302

PIT No: 193
PROJECT No: 76577.25
DATE: 31/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.0	FILL/Silty CLAY: dark brown and brown, with mixed gravel and refuse comprising cobbles sized concrete, bricks, metal, ceramics and clay pipe, trace sand		E	0.0 0.2				
	1.0	Silty CLAY: red mottled brown, trace sand		E	1.0 1.2				
	1.6	- becoming mottled grey and red below 1.5m							
		Pit discontinued at 1.6m - limit of investigation							

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: CKM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297869
NORTHING: 6230300

PIT No: 194
PROJECT No: 76577.25
DATE: 30/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.1	FILL/Clayey SILT: brown, trace sand and rootlets		E	0.0				
		FILL/Silty CLAY: red and brown, with siltstone and ironstone gravel		E	0.1				
		- increased gravel below 0.8m			0.3				
	1.2	SANDSTONE: very fine grained, grey, brown and orange, trace grey silty clay, highly weathered							
	1.6	Pit discontinued at 1.6m - limit of investigation							

RIG: Hyundai 60CR-9 6t excavator - 450mm bucket

LOGGED: CKM

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297714
NORTHING: 6230782
DIP/AZIMUTH: 90°/--

BORE No: BH1/GW1
PROJECT No: 76577.25
DATE: 24/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.0	FILL/TOPSOIL: Sandy Silty CLAY CI, medium plasticity, brown, with plastic and glass, trace gravel		D	0.5 0.6				
	1.5	Silty CLAY CI: medium plasticity, brown with red, blackened clay bands, w<PL							sand/spoil casing bentonite
	6.0	SHALE: grey, low strength, moderately weathered						24-01-20	slotted screen sand endcap
	8.0	Bore discontinued at 8.0m - limit of investigation							

RIG: Tracked Geoprobe 7522DT **DRILLER:** Terratest **LOGGED:** ZAK **CASING:**
TYPE OF BORING:
WATER OBSERVATIONS: Free groundwater observed at ~7.0m whilst augering
REMARKS: Location coordinates are in MGA94 Zone 56.

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297883
NORTHING: 6230342
DIP/AZIMUTH: 90°/--

BORE No: BH2/GW2
PROJECT No: 76577.25
DATE: 24/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.0	FILL/TOPSOIL: Sandy Silty CLAY CL: low plasticity, brown, trace gravel, w<PL							
	0.7	Silty CLAY CI: low plasticity, red brown, trace gravel and sand, w<PL, hard - silty sand band at 0.9m							
	1.5	- becoming low strength, extremely weathered shale below 1.4m SILTSTONE: grey with yellow staining, low strength, extremely weathered							
	6.0	SANDSTONE: brown, medium to low strength, highly weathered							
	7.0	SHALE: grey, with silica, medium strength, moderately weathered							
	10.0	Bore discontinued at 10.0m - limit of investigation							

RIG: Tracked Geoprobe 7522DT **DRILLER:** Terratest **LOGGED:** ZAK **CASING:**
TYPE OF BORING:
WATER OBSERVATIONS: No free groundwater observed whilst augering
REMARKS: Location coordinates are in MGA94 Zone 56.

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Landcom
PROJECT: Proposed Residential Subdivision
LOCATION: Stages 5 & 6, Dobell Road, Claymore, NSW

SURFACE LEVEL: --
EASTING: 297786
NORTHING: 6230435
DIP/AZIMUTH: 90°/--

BORE No: BH3/GW3
PROJECT No: 76577.25
DATE: 24/1/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.4	FILL/TOPSOIL: Silty CLAY CI, brown, trace gravel and rootlets, w<PL - may be weathered natural below 0.1m							
	0.9	Silty CLAY CI: red brown, w<<PL, hard							
		Silty Sandy CLAY CI: orange brown with minor yellow and grey sands, trace gravel increasing with depth, including possible ironstone gravel							
	5.0	SHALE: very low strength, extremely weathered - becoming grey, low to medium strength below 0.6m							
	10.0	Bore discontinued at 10.0m - limit of investigation							

RIG: Tracked Geoprobe 7522DT **DRILLER:** Terratest **LOGGED:** ZAK **CASING:**
TYPE OF BORING:
WATER OBSERVATIONS: No free groundwater observed whilst augering
REMARKS: Location coordinates are in MGA94 Zone 56.

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

Appendix C Campbelltown Local Environmental Plan 2015 Maps

Campbelltown Local Environmental Plan 2015

Terrestrial Biodiversity Map – Sheet BIO_008A

Terrestrial Biodiversity

Biodiversity - significant vegetation

Cadastre

Cadastre 20/04/2021 © Spatial Services

N

0 200 400

Metres

Projection: GDA 1994
MGA Zone 56

Scale: 1:10,000 @ A3

Map Identification Number: 1500_COM_BIO_008A_010_20210420

Campbelltown Local Environmental Plan 2015

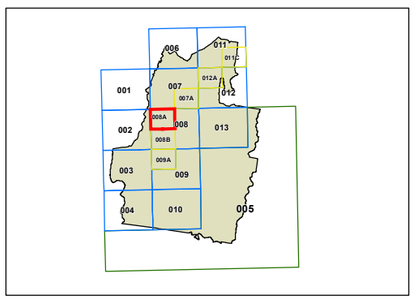
Land Zoning Map - Sheet LZN_008A

Zone

- B1 Neighbourhood Centre
- B2 Local Centre
- B3 Commercial Core
- B4 Mixed Use
- B5 Business Development
- B7 Business Park
- E1 National Parks and Nature Reserves
- E2 Environmental Conservation
- E3 Environmental Management
- E4 Environmental Living
- IN1 General Industrial
- IN2 Light Industrial
- R2 Low Density Residential
- R3 Medium Density Residential
- R4 High Density Residential
- R5 Large Lot Residential
- RE1 Public Recreation
- RE2 Private Recreation
- RU2 Rural Landscape
- RU5 Village
- RU6 Transition
- SP1 Special Activities
- SP2 Infrastructure
- W1 Natural Waterways
- DM Deferred Matter
- SEDP SEPP (State Significant Precincts) 2005 Edmondson Park South
- SWGC South West Growth Centre
- MIC SEPP (Major Infrastructure Corridors) 2020

Cadastre

- Cadastre 20/04/2021 © Spatial Services



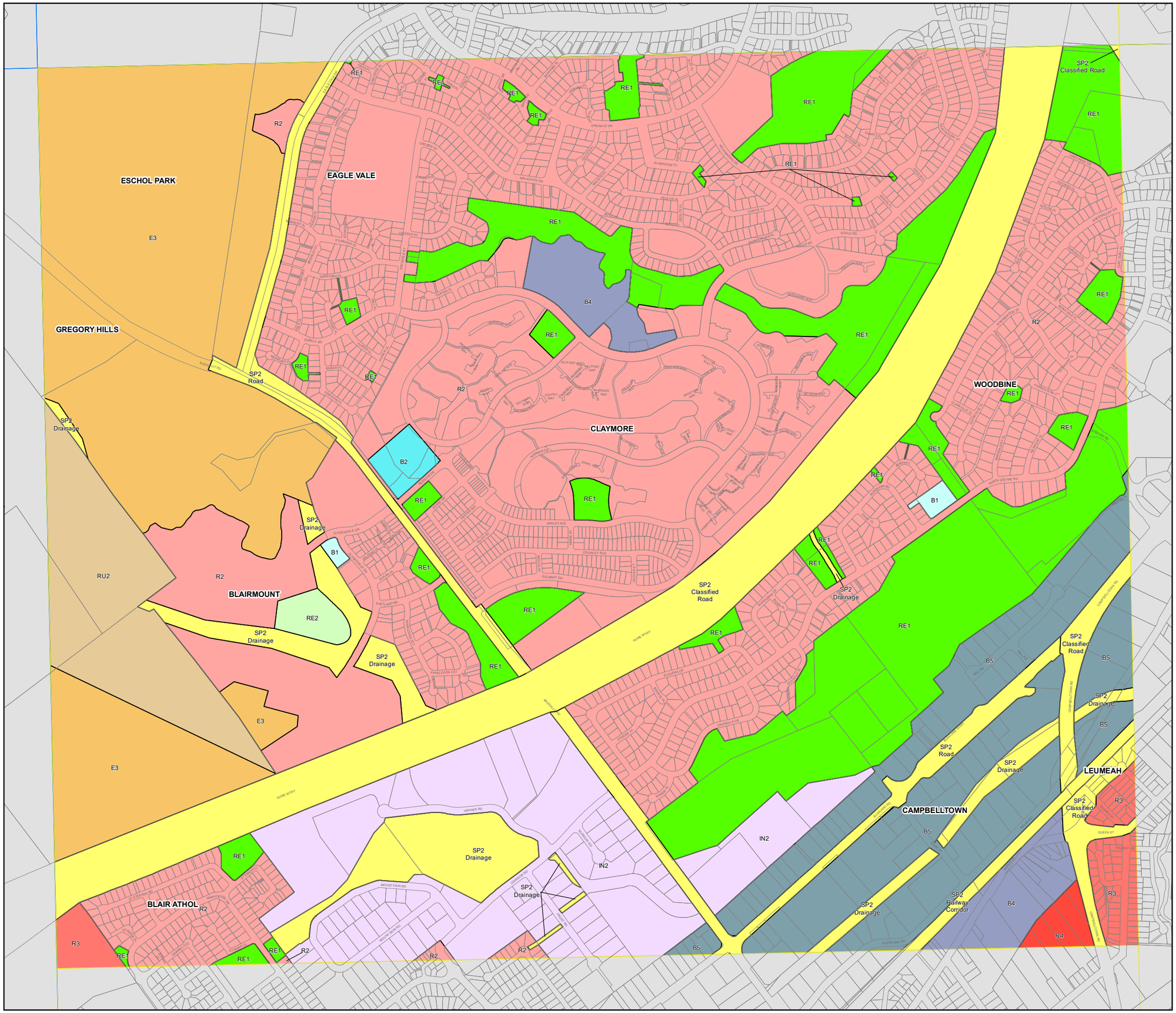
N W E S

0 200 400
Metres

Projection: GDA 1994 MGA Zone 56

Scale: 1:10,000 @ A3

Map Identification Number: 1500_COM_LZN_008A_010_20210420



Appendix D Containment Cell Plans

LEGEND

- EXISTING CADASTRAL BOUNDARY
- ROAD BOUNDARY
- LOT BOUNDARY
- RETAINING WALL
- BATTER (1:4 MAX)
- CUT/FILL LINE
- LIMIT OF WORKS
- EXISTING CONTOUR
- DESIGN CONTOUR
- CONTAMINATED MATERIAL BURIAL CELLS

NOTES:

1. THE PURPOSE OF THIS PLAN IS TO SHOW EARTHWORK QUANTITIES PROPOSED AS PART OF THE DA APPLICATION.
2. THE QUANTITIES PROVIDED ARE THE DIFFERENCE IN LEVEL BETWEEN DESIGN AND NATURAL SURFACE (ONLY).
3. FOR GENERAL NOTES REFER DRAWING No. 300178164.05.DA002.

BULK EARTHWORKS - AREAS & VOLUMES:

SUMMARY STAGE:

SURFACE AREA	=	53 323m²
CUT	=	4 182m³
FILL	=	66 668m³
IMPORT FILL	=	62 485m³

NO BOXING OR TRENCHING ALLOWANCE

Surface Analysis: Cut & Fill Depths

Number	Color	Minimum Depths (m)	Maximum Depths (m)	
1		-3.0	-2.0	CUT
2		-2.0	-1.0	
3		-1.0	0.0	
4		0.0	1.0	FILL
5		1.0	2.0	
6		2.0	3.0	
7		3.0	4.0	
8		4.0	5.0	
9		5.0	6.0	
10		6.0	7.0	

DRAWING FILE LOCATION / NAME: C:\12dSdata\SMECSYN\300178164 - Claymore Stage 4-6 Civil_101\300178164\78164.05\11. CAD\01_Dwg\02_DA\Stage_05\300178164.05.DA051.dwg

PLOT DATE: 16/11/2022 TIME: 4:16:20 pm

EXTERNAL REFERENCE FILES

REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL
01	11/12/2020	ISSUED FOR INFORMATION	014	ZK
02	17/12/2020	ISSUED FOR DEVELOPMENT APPLICATION	015	MP
03	16/11/2022	ISSUED FOR DEVELOPMENT APPLICATION	016	MP

TITLE	NAME
DRAFTER	M. JAMIL
DRAFTING CHECK	Z. KHALIL
DESIGNER	Z. KHALIL
DESIGN CHECK	M. PATEL
PROJECT MANAGER	Z. KHALIL
PROJECT DIRECTOR	G. FLEMING

SCALES AT A1 SIZE DRAWING

SCALE 1:750 5 0 10 20 30

DESIGNER: SMEC
Member of the Surbana Jurong Group
© ABN 47 065 475 149
LEVEL 6, 3 HORWOOD PLACE
PARRAMATTA NSW. 2150
PH +61 2 9900 7100
SMEC PROJECT No. 300178164

CLIENT: LANDCOM

PROJECT TITLE
CAMPBELLTOWN CITY COUNCIL
STAGE 5 - CLAYMORE URBAN RENEWAL
CUT AND FILL PLAN

SCALE	PHASE	PROJECT / DRAWING No.	REVISION
AS NOTED	APPROVAL	300178164.05.DA051	03

150 mm ON ORIGINAL
A1

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Rev No.	Author	Reviewer	Approved for Issue		
		Name	Name	Signature	Date
A	Ellen Howley	Matthew Bennett	Matthew Bennett	Draft for Client comment	11/11/2022
B	Ellen Howley	Matthew Bennett	Matthew Bennett	Draft for Client comment	17/11/2022