AECOM Imagine it. Delivered.

Burrows Industrial Estate
Goodman Property Services (Aust) Pty Ltd
15-Apr-2020

Remedial Action Plan

1-3 Burrows Road, St Peters

Remedial Action Plan

1-3 Burrows Road, St Peters

Client: Goodman Property Services (Aust) Pty Ltd

ABN: 40 088 981 793

Prepared by

AECOM Australia Pty Ltd
Level 21, 420 George Street, Sydney NSW 2000, PO Box Q410, QVB Post Office NSW 1230, Australia
T +61 2 8934 0000 F +61 2 8934 0001 www.aecom.com
ABN 20 093 846 925

15-Apr-2020

Job No.: 60623599

AECOM in Australia and New Zealand is certified to ISO9001, ISO14001 AS/NZS4801 and OHSAS18001.

Quality Information

Document	Remedial Action Plan
Ref	60623599
Date	15-Apr-2020
Prepared by	Alex Latham
Reviewed by	Brad Eismen

Revision History

Rev	Revision Date	Details	Authorised	
			Name/Position	Signature
A	20-Mar-2020	Draft for comment	Alex Latham Associate Director	
0	15-Apr-2020	Final	Alex Latham Associate Director	

Table of Contents

Glossary

General Terms	
ASC NEPM	Assessment of Site Contamination National Environment Protection Measure (2013)
AMP	Asbestos Management Plan
ASS	Acid Sulfate Soil
B(a)P	Benzo(a)pyrene
BTEXN	Benzene, toluene, ethylbenzene, xylenes and naphthalene
CoPC	Contaminants of Potential Concern
DQI	Data Quality Indicators
DQO	Data Quality Objectives
ENM	Excavated Natural Material
EPA	Environment Protection Authority
GME	Groundwater Monitoring Event
HIL	Health Investigation Level
HSL	Health Screening Level
LOR	Limit of Reporting
LNAPL	Light Non-Aqueous Phase Liquid
m bgs	Metres below ground surface
m btoc	Metres Below Top of Casing
M8	Arsenic, cadmium, copper, chromium, lead, mercury, nickel, zinc
MTR	Materials Tracking Register
NATA	National Association of Testing Authorities
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
OCP	Organochlorine Pesticides
OPP	Organophosphorus Pesticides
PAH	Polycyclic Aromatic Hydrocarbons
PASS	Potential Acid Sulfate Soil
PCB	Polychlorinated Biphenyls
PFAS	Per- and poly-fluoroalkyl substances
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctane sulfonate
PID	Photoionisation detector
QA/QC	Quality Assurance/Quality Control
RAP	Remedial Action Plan
RPD	Relative Percent Difference
RRO	Resource Recovery Order

General Terms			
SWL	Standing Water Level		
TCLP	Toxicity Characteristic Leachate Procedure		
TPH/TRH	Total Petroleum Hydrocarbons/Total Recoverable Hydrocarbons		
UPSS/UST	Underground Petroleum Storage System/Underground Storage Tank		
VENM	Virgin Excavated Natural Material		
VHC	Volatile Halogenated Compound (or Chlorinated Hydrocarbons [CHC])		
VOC	Volatile Organic Compound		
Units			
m	Metre	mg/L	milligrams/litre
mg/kg	milligrams/kilogram	µg/L	micrograms/litre

Executive Summary

AECOM Australia Pty Ltd (AECOM) was engaged by Goodman Property Services (Aust) Pty Ltd (GPSA) to prepare a Remedial Action Plan (RAP) for Burrows Industrial Estate, 1-3 Burrows Road, St Peters, NSW (the Site). The RAP is based on the results provided in the AECOM (2020) Phase I and II Environmental Site Assessment (ESA).

The ESA identified fill materials to be contaminated with lead, asbestos, benzo(a)pyrene (B(a)P) and to a lesser extent, long chain-length total recoverable hydrocarbons (TRH). The volume of fill material is estimated to be in the order of 120 000 m^3.

This RAP provides for the installation of a cap over the residual fill materials as part of site development bulk earthworks. Provided the procedures in this RAP are followed and verified/validated, the Site will be suitable for commercial/industrial land use when operated and maintained in accordance with a long term environmental management plan (LTEMP).

1.0 Introduction

AECOM Australia Pty Ltd (AECOM) was engaged by Goodman Property Services (Aust) Pty Ltd (GPSA) to prepare a Remedial Action Plan (RAP) for Burrows Industrial Estate, 1-3 Burrows Road, St Peters, NSW (the Site). The Site location is shown on **Figure 1** in **Appendix A**.

AECOM completed a Phase I and II Environmental Site Assessment (ESA) in March 2020[1]. This RAP is based on the ESA data. The ESA sampling location plan is shown in **Figure 2** in **Appendix A** and tables of results are provided in **Appendix B**.

Tallina Pty Ltd, part of the Goodman Group, owns the Site. GPSA proposes to demolish the existing buildings and develop the Site for commercial/industrial land use. Indicative development plans are provided in **Appendix C**. The proposed development will comprise free standing warehouses, internal roadways and car-parks and landscaped areas. GPSA has advised that:

- Cut to fill earthworks will be required and a net import of approximately 22 700 m^3 is expected. The net import would raise the Site surface, on average, by approximately 1.5 m.
- The warehouse buildings would comprise 'slab-on-ground' construction, supported by piles installed into geotechnically appropriate material at depth.
- There will be an undercroft car park under (part of) the buildings.
- Installation of sub-surface utilities (e.g. hydrant ring-mains, sewer, electricity etc) will be required.

This RAP is based on the indicative plans. In the event there is modification to the proposed development, revision of this RAP may be required.

1.1 Objectives

The objectives of this RAP are to:

- Summarise the ESA data.
- Present a plan of the remedial activities that will allow development to proceed in a manner that protects human health and the environment and render the Site is suitable for commercial/industrial land use in an economical and sustainable manner.
- Support a Planning Proposal and then a Development Application (DA).

1.2 Scope of Work

To achieve the objectives, the following works were completed:

- Review of the ESA data.
- Development of the remedial strategy and goals and Site management provisions.
- Consideration of planning, permitting and licensing requirements.
- Development of the validation process.

1.3 Guidelines

This RAP was completed with reference to the following guidelines:

- National Environment Protection Measure (NEPM), *Assessment of Site Contamination (ASC) (National Environment Protection Council [NEPC]*, *1999* as amended (2013) (the ASC NEPM).
- CRC CARE (2011). *Technical Report No.10 - Health Screening Levels* (HSLs*) for Petroleum Hydrocarbons in Soil and Groundwater*. Friebel, E. and Nadebaum, P. Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE).

[1] AECOM. 2020. Phase I & II ESA, 1-3 Burrows Road, St Peters. 5 March 2020.

- NSW EPA (2017). *Contaminated Land Management*, *Guidelines for the NSW Site Auditor Scheme (3rd Edition)*.
- NSW DEC (2007). *Guidelines for the Assessment and Management of Groundwater Contamination*.
- NSW EPA (1995). *Sampling Design Guidelines*.
- NSW OEH (2011). *Guidelines for Consultants Reporting on Contaminated Sites*. NSW Government Office of Environment & Heritage (OEH).
- Department of Urban Affairs and Planning (DUAP), Environment Protection Authority (EPA). 1998. *Managing Land Contamination, Planning Guidelines, SEPP55 – Remediation of Land*. April 1999.

2.0 Site Identification

Site identification details are summarised on **Table 1**.

Table 1 Site Identification

Item	Description
Address	1-3 Burrows Road, St Peters
Legal Description	Lot 11, DP 606737 Lot 1, DP 1227450
Site Area[1]	3.45 hectares (Ha). Lot 11: 3.27 Ha Lot 1: 0.186 Ha
Site Owner	Tallina Pty Ltd
Local Government	City of Sydney
Zoning[1]	IN1 General Industrial
Elevation (m AHD)[2]	2.03 to 4.93

Notes: 1 = per Local Environment Plan 2012 (LEP), map reference LZN_005. 2 = survey data. Lot and DP identifiers are shown on the borehole survey plan in **Appendix C**.

3.0 ESA Summary

3.1 Current Land Use

The Site comprises four buildings, divided into Units 1 to 9a, used as a warehouse estate. Units 1, 2, 3, 7 and 9a were not tenanted in January-February 2020. Unit 4 was utilised for the storage and distribution of beverages, Unit 5 and 6 for the manufacture and/or storage of 'props' for theatre productions/stage shows and Units 8 and 9 for the storage of electrical equipment.

The Site was mostly sealed in concrete and bitumen hardstand surfaces. Small garden or lawn areas were present along the access driveway from Burrows Road and near Unit 8. A narrow strip of unpaved land between Unit 9 and the north western and northern boundary contained multiple fragments of asbestos containing material (ACM).

3.2 Surrounding Land Use

Land use surrounding the Site included:

- North east and north west: M5 motorway project, constructed on the Alexandria Landfill facility (former brick-pit).
- South east: Burrows Road followed by commercial/industrial properties, then Alexandra Canal. The Canal is located approximately 75 m to the south east.
- South west: Canal Road followed by commercial/industrial properties.

Sydney Park (former Alexandria Landfill facility) is listed as a contaminated site under Section 58 of the Contaminated Land Management Act, 1997 (CLM Act).

3.3 History

History data are summarised below:

- The Site was developed in the mid to late 1940s. Prior to this, the Site appears to have been filled with materials associated with reclamation of land from Sheas Creek and construction of Alexandra Canal and/or waste materials associated with the brick-pit/landfill.
- Quarrying and landfilling operations have been undertaken to the west and north of the Site adjacent property (i.e. Alexandria Landfill facility). A metal merchant/smelter operated adjacent to the south western Site boundary.
- The Site has undergone extensions to the original buildings and additions of new buildings. The original buildings have been removed and replaced.
- Historical operations are inferred to have included manufacturing of hessian bags, plastic containers, vehicle maintenance workshop(s), freight storage and distribution, production of paper packaging products. There had been above-ground storage of solvent-based inks and waste inks, toluene, adhesive and copper naphthenate.
- At least five underground storage tanks (USTs) had been present (refer to **Figure 2**, **Appendix A**). Three USTs were decommissioned by removal in 1997 and two USTs may have been abandoned in-situ in approximately 1990. Based on WorkCover[2] data, the USTs appeared to be:
    - 2 x 18 000 L (petrol): located in the south western portion of the Site, near Unit 1.
    - 1 x 20 000 L (petrol): located on the northern side of Unit 8.
    - 1 x 9000 L (solvent) and 2 x 20 000 L (petrol): located adjacent to Units 4 and 6.

[2] Now known as SafeWork NSW

3.4 Geology and Hydrogeology

Background data indicated the Site subsurface was likely to comprise:

- Quaternary sediments consisting peat, sandy peat and mud (*Sydney 1:100,000 Geological Series Sheet 9130),* with Ashfield Shale of the Wianamatta Group situated adjacent to the Site.
- Disturbed terrain, with original soils removed, greatly disturbed or buried and landfill including soil, rock, building and waste materials may have been added (*Sydney 1:100,000 Soil Landscape Series Sheet 9130).*
- Class 3 Acid Sulfate Soil (City of Sydney Acid Sulfate Soil (ASS) Risk Map). For Class 3 ASS, any work greater than 1 m bgs or any works that would lower the water table by greater than 1 m bgs would require development consent. The ESA did not investigate for ASS. Testing would be required to confirm the presence of ASS.
- A geotechnical investigation completed by Pells Sullivan Meynink (PSM) in September 2015 (ref: PSM2808-005R. *Burrows Industrial Estate, 1-3 Burrows Road, Alexandria, Geotechnical Investigation* inferred that subsurface Units at the Site included[3]:
    - Fill: 0.2 to 1 m bgs. Gravelly sand and clayey sand, medium to very dense.
    - Upper Sand: 1 to 3 m bgs. Silty sand, loose to dense.
    - Upper Clay: 3 to 5.8 m bgs. Clay to silty clay, soft to firm.
    - Lower Sand: 5.8 to 8.7 m bgs. Sand to silty sand, dense to very dense.
    - Lower Clay: 8.7 to 10.7 m bgs. Clay to silty clay, stiff to very stiff.
    - Bedrock: 10.8 m bgs.

The Site is located in Zone 2 of the Botany Groundwater Management Zones, where groundwater use for domestic purposes (e.g. drinking water, watering gardens, washing, bathing etc.) is banned. Five registered monitoring bores were located within an approximate 0.5 km radius of the Site, in the former Alexandria Landfill. Groundwater was expected to flow towards Alexandra Canal however, the following is noted:

- Due to proximity of Alexandra Canal, the depth to groundwater may be tidally influenced.
- The presence of the former brick-pit (Alexandria Landfill) and the recent motorway construction works may cause a localised reversal in groundwater flow direction.

3.5 Intrusive Investigation

The Phase II ESA was completed in August 2015 and January-February 2020 and included:

- Completion of 39 soil boreholes (BH01 to BH22 [2015] and BH100 to BH117[4] [2020]) between 0.5 and 6.3 m bgs on a broad grid and in readily accessible areas. Six boreholes (BH01, BH04, BH16, BH17, BH20 and BH21) were positioned near the inferred locations of the former USTs.
- Installation, development and sampling of eight groundwater monitoring wells (MW01, MW16, MW17, MW19, MW21, MW102, MW105 and MW115)[5].
- Field screening for methane (CH_4), hydrogen sulfide (H_2S), carbon dioxide (CO_2), carbon monoxide (CO) and oxygen (O_2) at the monitoring wells and inside Units 2, 3, 7 and 9.
- Collection and laboratory analysis of samples of fill, natural soil, fragments of ACM and groundwater.

Field investigation results are summarised in the following sections.

[3] Depths are approximate
[4] Borehole BH112 was not completed (due to operational requirements of a tenant)
[5] Monitoring wells MW01, MW16, MW17, MW19 and MW21 were installed in 2015 and MW102, MW105 and MW115 were installed in 2020.

3.5.1 Fill Materials

Fill materials were logged at all boreholes. Where the fill was penetrated, it was logged to extend between 1.5 m (BH100) and 5.1 m bgs (BH110). Based on the available data, fill is inferred to extend on average, to 3.5 m bgs across the Site (refer **Table 1**, **Appendix B**). Based on the Site area and available data, the volume of fill is estimated to be in the order of 120 000 m^3.

Fill was variable in composition, comprising mixtures of sand, silt and clay with inclusions of sandstone, concrete, glass, brick, ash, slag, terracotta, porcelain, ceramics, metal fragments and road-base gravel. Material logged as 'ironstone' gravel (red to orange gravel, approximately 10 to 20 mm diameter) may represent foundry/casting sands. Anthropogenic inclusions were logged in all boreholes. In the boreholes that penetrated the fill:

- Ash was logged at 14 locations.
- Slag was logged at all locations except BH01, BH100, BH103 and BH104.
- Ironstone gravel was logged at all locations except BH02, BH05, BH21 and BH104.
- Metal waste was logged at 17 locations.
- Fragments of probable ACM were observed in BH07, BH21, BH22 and ground surface adjacent to Unit 9. Laboratory analysis identified bonded and friable fragments of ACM and loose fibre bundles in the fill material.
- Buried concrete (slabs) were encountered at BH01, BH02, BH14, BH15 and BH108.
- Potential indicators of putrescible waste were limited to a bone fragment (BH105) and cotton buds (BH101).

Figure 4 in **Appendix A** provides inferred cross sections of the Site subsurface. Due to the heterogeneity of the fill material, distinction between 'fill-types' has not been undertaken.

3.5.2 Natural Soil and Bedrock

Natural soils were logged to comprise sandy clay, clay, silty clay, silty sand and sandy silt. Decomposing vegetation matter (i.e. peat and/or peat-like material) was present in some locations. Bedrock was not encountered in the boreholes completed.

3.5.3 Soil Odours

Hydrogen sulfide (H_2S) odour was noted in natural soil in the many of the boreholes, suggesting the presence of ASS rather than ground gas associated with landfill. Photoionisation detector (PID) readings in samples with H_2S odours were between 0 and 390 parts per million (ppm) (BH09_4.6 m).

Odours were noted at the following locations during the (2015 phase of) investigation:

Table 2 Soil Odour

Location	Odour	PID (ppm)
BH04	Mild hydrocarbon (HC) odour in fill at 0.5 m	0.5
BH11	HC in sandy silt	0.5
BH16	Possible HC at base of fill	2.1
BH17	Slight HC in Fill at 2.7 m	15.2
BH21	Chemical odour noted from 1 m	0.3

No odour observations of fill materials were completed in 2020 due to personnel protective equipment (respirators). The maximum measured PID reading in the screened samples in the 2020 investigation was 3.8 ppm.

3.5.4 Landfill Gas

Landfill gas meter field measurements recorded low to negligible concentrations of CH_4 and H_2S, as summarised below:

- CH_4 readings at the ground level, taken immediately above the monitoring wells prior to opening the caps, were 0 to 0.1 % v/v.
- The highest CH_4 measurement for the air space within the monitoring well casings, 0.6 % v/v, was recorded at monitoring well MW01 upon opening the cap and reduced to 0.2 % v/v.
- CH_4 and H_2S were not detected within the Units.

The available data indicate negligible risk associated with the ground gases investigated.

3.5.5 Groundwater

Groundwater gauging data are presented on **Table 2** in **Appendix B** and summarised below:

- The standing water level (SWL) in the monitoring wells in August 2015 was between 1.096 (MW01) and 3.16 metres below top of casing (m btoc) (MW16). This represented an average SWL of 2.35 m btoc, equating to 0.99 m AHD.
- The measured SWL in the groundwater monitoring wells in February 2020 was between 0.67 (MW01) and 2.749 m btoc (MW16). This represented an average SWL of 1.74 m btoc, equating to 1.39 m AHD.
- The February 2020 SWL and survey data generally indicated a south easterly to southerly flow direction. Data indicated the presence of mounding at MW115 and a low point at MW105, indicating a possible localised reversal of the gradient in the central portion of the Site.

The average groundwater elevation data for August 2015 and February 2020 are presented on **Figure 4** in **Appendix A**.

The stabilised groundwater geochemical parameters collected during sampling in February 2020 indicated fresh to brackish and near neutral pH conditions.

No light non-aqueous phase liquid (LNAPL), unusual odours or colour were noted in the monitoring wells sampled. A H_2S odour was noted at MW102.

3.6 Contaminants Investigated

Contaminants of Potential Concern (CoPC) investigated were:

- Suite of eight metals (M8): arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc.
- Benzene, toluene, ethylbenzene xylenes and naphthalene (BTEXN).
- Total Recoverable Hydrocarbons (TRH).
- Polycyclic aromatic hydrocarbons (PAH), including benzo(a)pyrene (B(a)P).
- Phenols.
- Organochlorine pesticides (OCP) and organophosphorus pesticides (OPP).
- Polychlorinated biphenyls (PCB).
- Asbestos.
- Volatile halogenated compounds (VHC).

3.7 Sample Analysis Results

Table 3 in **Appendix B** provides a summary of the soil and fill samples analysed. The soil sample analysis results are presented on **Tables 4** to **7** and the groundwater sample analysis results are presented on **Table 8** (**Appendix B**).

Soil sample results were compared to the ASC NEPM 2013:

- Health investigation levels and health screening levels for commercial/industrial land use (HIL D and HSL D, respectively).

- Direct contact HSL D for commercial workers and intrusive maintenance workers (IMW), sourced from CRC Care 2011.
- Ecological screening levels (ESLs) and management limits (MLs).

Sample locations where asbestos was confirmed by laboratory analysis and where lead, B(a)P and TRH results exceeded the HIL D or HSL D are shown on **Figure 3** in **Appendix A**.

Results of fill samples analysed by the Toxicity Characteristic Leachate Procedure (TCLP) test method were compared to the NSW EPA (2014) *Waste Classification Guidelines – Part 1: Classification of Waste* NSW EPA (2014).

Groundwater sample results were compared to the ASC NEPM (2013) groundwater investigation levels (GILs), including:

- HSL D for vapour intrusion, sand aquifer, groundwater 2 to <4 m depth.
- Marine waters.

3.7.1 Soil

3.7.1.1 TRH, BTEXN

Seventy four samples were laboratory analysed. Concentrations of BTEXN and TRH were below the adopted HSL D for vapour intrusion in the samples analysed.

The concentration of TRH >C16-C34 (F3) exceeded the CRC Care HSL D for Direct Contact in BH21_0.7-0.8. The concentration of F3 in this sample was below the CRC Care criteria for direct contact by an IMW.

Concentrations of TRH >C10-C16 (F2) and/or F3 and/or TRH >C34-C40 (F4) exceeded the MLs in three primary samples, BH17_2.0-2.1, BH20_2.0-2.1 and BH21_0.7-0.8 (**Table 6**).

Concentrations of TRH F2 and/or F3 and/or F4 exceeded the ESLs in BH17_2.0-2.1, BH20_2.0-2.1 and BH21_0.7-0.8 (**Table 6**). The ESLs are low to moderate reliability and apply from the surface to 2 m depth.

Concentrations of total petroleum hydrocarbons (TPH) met the NSW EPA (2014) General Solid Waste (GSW) classification in the samples analysed, except for BH17_2.0-2.1 and BH21_0.7-0.8. In these instances, Restricted Solid Waste (RSW) and Hazardous Waste (HW) classification are inferred (respectively), based on the concentrations of TPH C10-C36.

3.7.1.2 PAH

Eighty four samples were laboratory analysed:

- Concentrations of total PAH were below the HSL D in the samples analysed.
- Concentrations of naphthalene were below the CRC Care direct contact HSL D.
- Concentrations of B(a)P were variable and four results were above the HIL D. The detected concentration of B(a)P at borehole BH21_07-0.8 exceeded the HIL D by more than 250%.

Six fill samples were re-analysed by the TCLP test method. The B(a)P was not leaching under acidic conditions at concentrations above the laboratory limit of reporting (LOR) (**Table 7** in **Appendix B**).

Based on the concentrations of B(a)P and total PAH in the samples analysed, the waste classification is inferred to span GSW to HW. It is noted that B(a)P was not leaching under acidic conditions and lower waste classifications may be possible, subject to confirmation of fill components (e.g. ash, slag), results of pilot trials and applicability of NSW EPA ‘general immobilisation’ approvals. Site specific immobilisation approval(s) may be required.

3.7.1.3 Metals

One hundred samples were laboratory analysed. Concentrations of M8 in the samples analysed were variable and below the adopted SAC with the exception of lead.

Concentrations of lead exceeded the HIL D (1500 mg/kg) in 46 samples. All samples were fill material. Of these, twenty results exceeded the HIL D by more than 250% (i.e. > 3750 mg/kg).

Based on the results of TCLP tests, the waste classification is inferred to span GSW to HW (**Table 7** in **Appendix B**). HW would likely require stabilisation prior to being accepted by a NSW EPA licensed landfill facility. Lower waste classifications may be possible, subject to confirmation of fill components (e.g. metallurgical furnace slag), results of pilot trials and applicability of NSW EPA 'general immobilisation' approvals. Site specific immobilisation approval(s) may be required.

3.7.1.4 Asbestos

Forty four fill and two fragment samples were laboratory analysed (**Table 5** in **Appendix B**). Asbestos was identified in 18 samples, as summarised below:

- Friable asbestos was identified in 16 samples. Eight results exceeded the HSL D. Quantification analyses were not undertaken in the 2015 investigation and data indicates that additional sample locations would likely exceed the HSL D for asbestos fines and fibrous asbestos (AF and FA).
- Fragments of bonded ACM were identified in six samples. Two results from the 2020 investigation exceeded the HSL D.
- The presence of asbestos on the ground surface (i.e. SS01, SS02 and SS04_frag) exceeds the ASC NEPM criteria of "All forms of asbestos: no visible asbestos in surface soils".

The presence of asbestos would result in a dual classification, the chemical classification and special (asbestos) waste. Given that asbestos was identified by laboratory analysis of borehole, surface soil and fragment samples located across the Site, AECOM considers that all fill material has a dual classification unless (rigorously) proven otherwise.

3.7.1.5 OCP, OPP, PCB

Nineteen samples were laboratory analysed. Concentrations of OCP, OPP and PCB were below the HIL D in the samples analysed.

3.7.1.6 Phenols

Four soil samples were laboratory analysed. Concentrations were below the HIL D in the samples analysed.

3.7.1.7 VHC

Four soil samples were laboratory analysed. Concentrations of VHC were below the laboratory LOR in the samples analysed.

3.7.2 Soil Impact Synopsis

The data have identified lead, asbestos, B(a)P and to a lesser extent TRH, impacts in fill. The contaminants are non-volatile and are unlikely to present a vapour inhalation risk. When the Site is developed, the floor slabs, hardstand car-parks and roadways should provide an effective barrier. Controls will be required to manage potential exposure to asbestos, lead and B(a)P during development and the subsequent operational phase.

Given the volume of fill inferred to be present and the variability in contaminant concentrations, it is considered that excavation(s) into fill materials to remove contaminant concentrations exceeding commercial/industrial land use criteria are unlikely to be 'validated'.

3.7.3 Groundwater

The following summary of results primarily relates to the February 2020 data.

3.7.3.1 TRH, BTEXN

Eight groundwater samples were laboratory analysed. Concentrations of TRH and BTEXN were below the ASC NEPM HSL D, sand aquifer, 2-<4 m depth and below the ASC NEPM marine GIL. Data indicates no apparent risk of vapour intrusion from groundwater.

3.7.3.2 PAH

Concentrations of PAH were below the laboratory LOR in the August 2015 GME. No PAH analyses were undertaken in February 2020 based on the 2015 results. B(a)P has not been detected in groundwater at concentrations above the laboratory LOR, indicating a low leaching potential.

3.7.3.3 VHC

Eight groundwater samples were laboratory analysed. Concentrations of VHC were below the laboratory LOR. Data indicates no apparent risk of vapour intrusion from groundwater.

3.7.3.4 Metals

Eight groundwater samples were laboratory analysed. Concentrations of metals were below the ASC NEPM marine GIL or ANZG DGV[6], with the exception of:

- Copper: concentrations at MW16 (231 µg/L), MW17 (32 µg/L) and MW19 (247 µg/L) exceeded the ASC NEPM marine GIL of 1.3 µg/L. It is noted that these concentrations above the marine GIL were (typically) an order of magnitude higher in the 2020 GME, which may be related to the disturbance of the subsurface associated with the motorway works.
- Lead: the concentration at MW16 (8 µg/L) and MW19 (5 µg/L) exceeded the marine GIL of 4.4 µg/L. The location of MW19 suggests an off-Site source.
- Nickel: the concentration at MW19 (294 µg/L) exceeded the DGV of 70 µg/L. The location of MW19 suggests an off-Site source.
- Zinc: concentrations at all wells (59 to 3360 µg/L) except MW102 exceeded the marine GIL of 15 µg/L.

It is noted there is no marine GIL or DGV for arsenic. The highest dissolved arsenic concentration was reported at monitoring well MW19, indicating an off-Site source.

The current data have identified high concentrations of zinc, nickel and copper in groundwater and to a lesser extent, lead and arsenic. Given the high concentrations of lead in fill, it does not appear to be significantly leaching into groundwater. Concentrations of dissolved metals are inferred to be related to an off-Site source or regional, diffuse contamination source issue.

Based on the current data and the ban on domestic use of groundwater, the presence of metals impacts is not considered to affect Site suitability for commercial/industrial land use.

[6] For cadmium and nickel, AECOM adopted the high reliability default guideline values (DGV) for marine water with a 95% level of species protection provided in the Australian and New Zealand Guidelines for fresh and marine water (2018)

4.0 Remediation Assessment

4.1 Development Overview

The proposed development will comprise free standing warehouses, internal roadways, car-parks and landscaped areas. It is understood that:

- Cut to fill earthworks will be required and a net import of approximately 22 700 m^3 is expected. The net import would raise the Site surface, on average and approximately, to between 4.8 and 5.3 m AHD. Based on the borehole survey data, the current average surface elevation is 3.2 m AHD.
- Displacement piles will be required. The piles will have concrete caps, approximately 1 m thick. Spoil from the piling cap excavations, approximately 800 to 1000 m^3, will be re-used on Site.
- The elevation of the finished floor slab of the undercroft is approximately 2.3 m AHD. The slab would be up to 200 mm thick, overlying pavement sub-grade 250 to 300 mm thick.
- The elevation of the ground level floor slab is approximately 5.3 m AHD.

Development plans provided to date are included in **Appendix C**.

4.2 Remediation Goals

The goals are:

- To provide control mechanisms for working in or on fill during Site development.
- To render the Site suitable for commercial/industrial land use.

4.3 Regulatory Preference

The NSW EPA preferred hierarchy on the selection of remediation options in order of preference, based on the DEC (2006) *Guidelines for the NSW Site Auditor Scheme (2nd edition)*[7] is:

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

The appropriateness of any option will vary depending on a range of local factors.

4.4 Remediation Options

The option assessment is based on the identified lead, asbestos, B(a)P contamination in fill, and to a lesser extent, TRH.

[7] The NSW EPA (2017) *Contaminated Land Management*, *Guidelines for the NSW Site Auditor Scheme (3rd edition)* do not provide a preferred hierarchy and reference the ASC NEPM. The ASC NEPM does not provide a preferred hierarchy.

Table 3 Remediation Option Assessment

Option	Discussion	Evaluation
1. On-Site Treatment	Lead: options are limited but could include in-situ chemical stabilisation or excavation, stabilisation and reinstatement. Both would be expensive, pilot trials and controls for working with asbestos would be required. Given that lead in fill does not appear to be significantly leaching to groundwater, there is no inferred environmental benefit from on-Site treatment (stabilisation). Asbestos: there are no economically viable treatment options for asbestos in fill. B(a)P: Given that B(a)P in fill does has not been identified in groundwater and its low leaching potential, there is no inferred environmental benefit from on-Site treatment (stabilisation). TRH: data indicates an area of impact at former USTs (BH17) and in the northern portion of the Site (BH20 and BH21). Concentrations identified to date are below the HSL D for vapour intrusion but above the HSL D for a commercial/industrial worker. TRH was not identified in groundwater. There is no inferred environmental benefit from on-Site treatment (e.g. landfarming).	No
2. Off-Site Treatment	As per Option 1, no inferred environmental benefit.	No
3. Removal of Contaminated Soil	Excavation and landfill disposal of some or all contaminated materials is not warranted or economically feasible, considering: • Volatiles have not been identified to pose a vapour intrusion risk. • Increased potential exposure risks to asbestos via the excavation, movement and handling of fill. • Cost and duration of pilot trials and stabilisation works. • Cost of landfill disposal. • Utilising landfill capacity. • The volume and variable nature of the fill material. • The low likelihood that discrete areas of impact exist (i.e. validation of removal of contamination is unlikely). • The proposed commercial/industrial land-use. • Groundwater quality appears to be related to an off-Site source or regional, diffuse contamination source issue. Where fill material is surplus to Site requirements or geotechnically unsuitable, sampling, analysis and waste classification will be required.	No
4. Capping and Management	To remove source-pathway-receptor (S-P-R) links, the Site can be capped by hardstand (concrete floor, driveways and car parks) and in landscaped areas, soil validated as acceptable for use. Residual risks can be managed through implementation of a passive Long Term Environmental Management Plan (LTEMP). Capping and management would break the S-P-R links, be cost effective and be in general accordance with principles of ecological sustainable development.	Yes

The preferred remediation strategy is Option 4.

4.5 Category of Remediation

Remedial works shall be carried out in accordance with the requirements of the CLM Act 1997, SEPP 55[8], the City of Sydney (CoS) Development Control Plan of December 2012 (DCP), Protection of the Environment Operations Act 1997 and when issued, the CoS conditions of development consent.

Section 3.17 of the DCP states "*each development application is to include information sufficient to allow Council to meets its obligation to determine whether development should be restricted due to the presence of contamination. Note: these obligations are outlined in SEPP 55"*. The CoS Local Environment Plan of 2012 (LEP) does not mention contamination.

SEPP 55 specifies when remediation work will require development consent from the planning authority (Category 1 remediation work). Any remediation works that do not require development consent are Category 2. Clause 9 of SEPP 55 defines Category 1 remediation work as:

Table 4 Category of Remediation

Category 1 Triggers	Evaluation
a). Designated Development, or	No
b). Carried out or to be carried out on land declared to be critical habitat, or	No
c). Likely to have significant effect on a critical habitat or a threatened species, population or ecological community, or	No
d). Development for which another State environmental policy or regional environmental plan requires development consent, or	No
e). Carried out or to be carried out in an area or zone to which any classifications to the following effect apply under an environmental planning instrument:	
i). coastal protection	No
ii). conservation or heritage conservation	No
iii). habitat area, habitat protection area, habitat or wildlife corridor	No
iv). environment protection	No
v). escarpment, escarpment protection or escarpment preservation	No
vi). floodway	No
vii). littoral rainforest	No
viii). nature reserve	No
ix). scenic area or scenic protection	No
x). wetland, or	No
f). carried out or to be carried out on any land in a manner that does not comply with a policy made under the contaminated land planning guidelines by the council for any local government area in which the land is situated (or if the land is within the unincorporated area, the Western Lands Commissioner).	No

AECOM considers that Category 2 works apply to the Site however, it is probable that remedial works would fall under the conditions of development consent.

4.6 Notification

SEPP 55 requires the following notification for Category 2 works:

- Council must be notified at least 30 days prior to the commencement of remediation works.

[8] Managing Land Contamination, Planning Guidelines, SEPP55 - Remediation of Land

- Copies of the ESA and RAP must be provided to Council at least 14 days prior to commencement of the remediation works.
- Contact details for the remediation contractor and/or party responsible for ensuring compliance of remediation work with relevant regulatory requirements.

AECOM assumes that the notification will be provided by GPSA or their nominated representative.

5.0 Remediation Work Plan

5.1 Roles and Responsibilities

Roles and responsibilities are provided in the following table.

Table 5 Roles & Responsibilities

Company	Role/Responsibility
GPSA	Property Manager/Development Manager
TBA	Building Contractor (BC)
TBA	Environmental consultant, contamination
TBA	Auditor, contamination

An Auditor is not currently involved in the project. A Site Audit Report and Site Audit Statement will likely be required as a condition of development consent.

5.2 Asbestos in Soil Management

Friable and bonded asbestos is present in the fill. There is a high potential for additional, as yet unidentified, asbestos to be present. Controls will be required to manage potential exposure to asbestos during development. Applicable reference documents include:

- *Managing asbestos in or on soil* (WorkCover[9] NSW 2014).
- *How to manage and control asbestos in the workplace Code of Practice* (SafeWork NSW 2016a).
- *How to safely remove asbestos Code of Practice* (SafeWork NSW 2016b).
- *Code of Practice for the Management and Control of Asbestos in the workplace* (NOHSC: 2018 (2005)).
- *Code of Practice for the Safe Removal of Asbestos 2nd Edition* (NOHSC: 2002 (2005)).

Section 2 of WorkCover NSW 2014 indicates that:

- Asbestos only poses a risk to human health when elevated levels of asbestos fibres are inhaled. Non-friable (bonded) asbestos in sound condition represents a low human health risk however, friable asbestos materials or damaged, crumbling bonded asbestos, have the potential to generate or be associated with, free asbestos fibres and therefore must be carefully managed to minimise the release of asbestos fibres into the air.
- The likelihood of exposure occurring depends upon the potential for the asbestos materials to release fibres, whether the asbestos is contained or covered and any operational control measures or personnel protective equipment (PPE) which have been applied to limit the generation and/or inhalation of airborne fibres.

Section 5 of WorkCover NSW (2014) indicates that:

- If the Site is a workplace (as defined in the Health and Safety Legislation), only workers who have been appropriately trained in asbestos removal techniques (including identification, safe handling and suitable control measures) may conduct asbestos removal works.
- For sheets or fragments of non-friable (bonded) asbestos > 10 m^2, only a Class A or B asbestos removal license holder may conduct the asbestos removal work.

[9] Now SafeWork NSW

Section 6 of WorkCover NSW (2014) indicates that if friable asbestos is identified in or on soil, the following actions are recommended:

- Isolate and secure the area by installing warning signs and a temporary barricade around the affected area.
- Keep the soil damp and if safe to do so, cover the area with plastic sheeting.
- Only Class A asbestos removal license holders are permitted to conduct asbestos removal work or asbestos related work that involves friable asbestos.
- Where friable asbestos is present, only a licensed asbestos assessor may undertake air monitoring, risk assessments and issue clearance certificates for removal work.

WorkSafe NSW 2016a indicates that:

- Removal of friable asbestos contaminated soil will require a Class A licensed asbestos removalist.
- A Class B licensed asbestos removalist is required if more than 10 m^2 of non-friable asbestos is to be removed.
- A person who does not have a license can remove 10 m^2 or less of non-friable asbestos. Where there is uncertainty on the quantity of non-friable asbestos being above or below 10 m^2, a Class A or B licensed asbestos removalist must be used.
- For all asbestos removal requiring Class A licensed asbestos removal, an air monitoring program must be implemented.

5.2.1 Air Monitoring & Exposure Standards

Air monitoring involves sampling and analysis for airborne asbestos fibres, to assess exposure risk and the effectiveness of the control measures. In accordance with WorkSafe NSW 2016b, it must be conducted in accordance with the *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Dust, 2nd Edition [NOHSC: 3003 (2005)]*. The air-monitoring analysis must be undertaken by a laboratory with NATA accreditation for airborne fibre analysis.

WorkSafe NSW 2016b indicates that air monitoring requirements will vary depending on the type of asbestos being removed, the location and position of asbestos, if an enclosure is used and whether the asbestos removal work is inside or outside a building.

- **Friable asbestos removal**: air monitoring is mandatory for all friable asbestos removal.
- **More than 10 m^2 of non-friable asbestos removal**: air monitoring is not required but may be considered to be carried out by an independent licensed asbestos assessor or competent person to ensure compliance with the duty to eliminate or minimise exposure to airborne asbestos and to ensure the exposure standard is not exceeded.
- **Public Location**: air monitoring should be considered where the asbestos removal work is being undertaken in or next to a public location.
- **Exposure Air Monitoring**: should be carried out at other times to establish worker exposure to airborne asbestos if, based on reasonable grounds, there is uncertainty as to whether the exposure standard may be exceeded and a risk assessment by a competent person indicates it is necessary.

5.2.2 Exposure Standards

The SafeWork NSW 2016b exposure standards and actions for air monitoring data are:

Table 6 Action Levels, Airborne Asbestos Fibres

Airborne asbestos fibres/mL	Control	Action
Less than 0.01	No new control measures necessary	Continue with control measures
≥ 0.01 and ≤ 0.02	1. Review	Review control measures
	2. Investigate	Investigate the cause
	3. Implement	Implement controls to eliminate or minimise exposure and prevent further release
> 0.02	1. Stop Work	Stop removal work
	2. Notify the Regulator	Notify by phone followed by written statement that the work has ceased and the results of the air monitoring
	3. Investigate the cause	Conduct thorough inspection of the works area and associated equipment in consultation with all workers involved with the removal work
	4. Implement controls to eliminate or minimise potential exposure and prevent further release	Extend the isolated/barricaded area around the removal area as far as reasonably practicable (until fibre levels are < 0.01 fibres/mL)
	5. Do not recommence removal work until further air monitoring is conducted	Do not recommence until fibre levels are at or below 0.01 fibres/mL.

In summary and based on the available data:

- Only Class A asbestos removal license holders are permitted to conduct asbestos removal work or asbestos related work that involves friable asbestos.
- The BC must be made aware of the asbestos (and other contaminants) in fill and have an asbestos management plan (AMP), including occupational health and safety (OHS) provisions. The AMP would form part of the Construction-phase Environmental Management Plan (CEMP). PPE will need to be suitable for managing exposure to asbestos, lead, B(a)P and TRH.
- Control measures must be detailed in the AMP and be implemented to reduce the potential for the release of asbestos fibres. Control measures will include but not necessarily be limited to:
  - PPE.
  - Reducing the potential for generation of dust (e.g. keeping soil moist, covering stockpiles of excavated materials etc).
  - Air monitoring.

5.3 Working On or In Fill

Friable and bonded asbestos is present in the fill. All works on or in the fill must be undertaken under the supervision of Class A licensed asbestos contractors. SafeWork NSW must be notified prior to commencement of the works.

All personnel will be required to use PPE for asbestos. Decontamination unit(s) and appropriate storage, handling and disposal of disposable PPE will be required.

Monitoring for airborne asbestos fibres must be undertaken and conform to regulatory requirements. Air monitoring data must be assessed, to evaluate if controls are appropriate.

5.4 Works Compound

The works compound (offices, crib-sheds, amenities, parking areas etc.) must be established on material providing a barrier to the fill. If the barrier is recycled aggregate or similar, a visible marker layer would be required between the fill and barrier. This would need to be documented in the AMP. Recycled aggregate must be suitable for use.

5.5 Truck Wash

Any trucks, plant or other vehicles that have been in contact with fill, must be washed prior to leaving the Site.

5.6 Cut to Fill Earthworks

All cut to fill earthworks on or in the fill material must be undertaken in accordance with the AMP.

5.7 Piling

All piling works on or in the fill must be undertaken in accordance with the AMP.

5.8 Temporary Work Pad

To reduce potential exposure to asbestos in fill, the use of a temporary work pad (TWP) is recommended. The TWP should comprise a layer of recycled aggregate laid over the surface of the fill. The recycled aggregate must be suitable for use.

TWPs would likely be required for piling works and/or as interim trafficable roadways due to the Site geotechnical conditions.

The TWP would likely become cross contaminated during works. When the TWP is no longer required, the materials would be incorporated into the fill, during final levelling of the cut to fill earthworks.

5.9 Underground Storage Tanks

In the event USTs are encountered during earthworks, the following will apply:

- Residual fluids are to be removed and disposed to an EPA licensed facility. Copies of dockets must be retained.
- The location of the UST(s) must be recorded by survey.
- The UST(s) must be decommissioned in accordance with SafeWork NSW requirements. Copies of disposal documentation records must be retained.
- UST excavation sampling and analysis should be completed, to characterise conditions and assess the (future) vapour intrusion and/or direct contact risk. Sampling should be based on the EPA Fact Sheet: Underground petroleum storage system (UPSS) Obligations (December 2019). Laboratory analysis data for any soil samples collected and analysed from the UPSS areas should be interpreted to the final surface elevation (i.e. approximately 5.3 m AHD).
- If LNAPL is present, works should cease in that location until conditions are assessed by the environmental consultant.

5.10 Unexpected Finds

If materials are encountered during the earthworks which are significantly different to those described herein (e.g. unusual conditions, buried drums and other wastes etc), works will cease in that area and the environmental consultant and GPSA (and the Auditor) will be contacted immediately. An exclusion zone will be established around the unexpected find area and an appropriate OHS protocol for entry into the exclusion zone will be implemented. The environmental consultant will inspect the unexpected find and assess if it is the source or has the potential to contaminate the surrounding area.

If there is potential for contamination or it has occurred, sampling and analysis for contaminants specific to the unexpected find will be undertaken, to assess the risk and requirement for management and/or remediation.

If fluid-filled drums or other storage vessels are encountered, sampling and analysis of the fluids will be undertaken, to assess the risk and management options. No fluid-filled drums/vessels should be opened without PPE unless the contents are confirmed safe. Specialist 'hazchem' contractors would be required for investigation and/or management of unknown fluids.

5.11 Underground Services

New underground service infrastructure should be installed into the capping material wherever possible. Service bedding materials must be validated as acceptable for commercial/industrial land use.

When services are installed within residual fill, management controls will be required to minimise potential exposure to construction workers and future maintenance workers, including:

- Excavations should be lined with geofabric and then plastic mesh (**Figure 5, Appendix A**).
- Excavations are to be backfilled with materials validated as suitable for commercial/industrial land use.
- All service trenches should be surveyed, to allow appropriate long term management.

5.12 Soil Disposal

Given the variability in composition and contaminant concentrations in the fill materials, it will be retained on Site wherever possible. Surplus soil (i.e. residual fill and natural soils) must be sampled and laboratory analysed to establish the waste classification, prior to disposal to an EPA licensed landfill facility. Sampling, analysis and data interpretation must be in accordance with the EPA (2014) Waste Guidelines.

Fill materials classified as HW will likely require stabilisation prior to being acceptable for landfill disposal. This RAP does not contemplate the stabilisation trials that may be required.

Copies of all landfill disposal records must be retained.

5.13 Material Importation

Soil, rock or other filling materials imported to the Site must suitable for commercial/industrial land use. Materials imported to Site must be any of the following:

- Virgin Excavated Natural Material (VENM) and/or Excavated Natural Material (ENM). This would apply to the capping material. VENM should be used in preference to ENM.
- Other material approved in writing by EPA under a Resource recovery Order (RRO). These are expected to be used as backfill in underground service trenches and bedding materials or as TWP and may include but not be limited to:
    - Recycled concrete aggregate that meet the requirements of the NSW EPA Resource Recovery Order under part 9, clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014 – the Recovered Aggregate Order 2014.
    - Basalt fines (maximum particle size of 9.5 mm) that meet the requirements of the NSW EPA Resource Recovery Order under part 9, clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014 – the Basalt Fines Order 2014.
    - Recycled glass sands that meet the requirements of the NSW EPA Resource Recovery Order under part 9, clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014 – the Recovered Glass Sand Order 2014.

This RAP only considers the contamination status of fill materials to be imported to the Site. Geotechnical suitability and stakeholder requirements (e.g. Sydney Water, CoS etc) have not been considered.

The Protection of the Environment Operations Act 1997 (POEO Act) defines VENM as natural material that:

- Has been excavated or quarried from areas that are not contaminated with manufactured chemicals, or with process residues, as a result of industrial, commercial, mining or agricultural activities.
- Does not contain any sulfidic ores or soils or any other waste.
- Includes excavated natural material that meets such criteria for virgin excavated natural material as may be approved for the time being pursuant to an EPA Gazettal notice.

To be classified as VENM, materials must satisfy all aspects of the above definition.

ENM is defined in the Resource Recovery Order under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014 – The excavated natural material order 2014 - as naturally occurring rock and soil that has:

- Been excavated from the ground.
- Contains at least 98% (by weight) natural material.
- Does not meet the definition of Virgin Excavated Natural Material in the Act.

ENM **does not include**:

- Material located in a hotspot.
- Material that has been processed.
- Material that contains asbestos, acid sulfate soil (ASS), potential acid sulfate soil (PASS) or sulfidic ores.

5.14 Material Tracking Register

A Materials Tracking Register (MTR) must be implemented by the BC, to ensure that only 'approved' material is imported to the Site and records are maintained for materials that disposed off-Site.

At a minimum, the MTR for importation of materials should include the following:

- Location of source site, expected volume of material and description and reference to a Consultant's Assessment Report.
- Log of vehicles leaving source site, to be provided by the source site each morning, including license plate details. The source site should also provide an indication of the number of truck loads expected each day.
- All trucks arriving at Site must possess a loading docket from the source site. If a truck does not possess a loading docket, it will not be allowed to unload at the Site. The loading docket must identify the source site and time the truck left the source site.
- A Spotter (or Spotters) will be at Site, to meet all trucks. The Spotter(s) will:
    - Log all vehicles entering the Site, including license plate details and 'time in'.
    - Check the loading docket, including time left source site and time-in at Site. Any discrepancies in times will be discussed. Trucks with significant time discrepancies may be refused entry to the Site.
    - Description of materials imported (e.g. clay, shale, sandstone etc.).
    - Location materials deposited at Site.
    - When tipping, the Spotter will check material for unexpected contaminants (odours, staining, waste materials etc.).

When the Spotter(s) is/are satisfied, they will sign the loading docket and keep a copy for records.

Where suspicious loads and/or evasive answers and/or incomplete vehicle tracking data are apparent, permission to unload will not be granted.

Where contaminants or suspected contaminants are observed in imported material during tipping, the truck will be reloaded and be sent back to the source site. Cartage from the source site shall cease and will only recommence when the issue has been addressed.

5.15 Capping

Capping of the residual fill will break the contaminant S-P-R links, in conjunction with adoption of a LTEMP. The proposed net import of 22 700 m^3 is expected to comprise the capping material. Information supplied by GPSA, indicates the 'net import' material will be placed to an approximate thickness of 1.5 m. AECOM considers that a minimum capping thickness of 0.5 m will apply. The 'net import' should be VENM wherever possible.

Capping will involve:

- The final earthworks associated with levelling of the residual fill materials. The final residual fill level (FRFL) will require detailed survey to record elevation data.
- Placement of a visible marker layer over the entire FRFL. The visible marker layer will comprise geofabric and plastic mesh. The geofabric is to minimise the potential for ingression of impacted materials. The mesh will provide a secondary, visually obvious layer. The visible marker layer and location must be recorded by survey and be documented with photographic evidence. Note: survey of the FRFL can be undertaken after installation of the visible marker layer.
- Placement of non-contaminated materials such as VENM, ENM, other EPA approved materials or concrete hardstand (and pavement sub-grade) above the visible marker layer. The capping must be a minimum 0.5 m thick. Surveying should be completed to confirm the depth of capping.
- Capping material must be validated as suitable for commercial/industrial land use.
- Proprietary 'soil' and mulch products may be required in landscaped areas. These products would comprise part of the capping and must be validated as suitable for commercial/industrial land use.

Conceptual plans of the capping are provided in **Figure 5, Appendix B**.

Testing and validation requirements are discussed in **Section 7**.

6.0 Site Management Provisions

The BC will be required to conduct all remediation works in accordance with the site management provisions detailed in the CoS conditions of consent. The following sections provide a summary of (some) management provisions expected to be applicable during development works.

6.1 Remediation Schedule

The duration of the remedial works is yet to be established and will require liaison with GPSA and the BC. The BC is to prepare a detailed program of development (remediation) works, outlining key activities, milestones and completion dates.

6.2 Hours of Operation

Hours of operation are expected to be:

- Monday to Friday: 7 a.m to 6 p.m.
- Saturday: 8 a.m to 1 p.m.
- Sunday: no work permitted.

6.3 Occupational Health & Safety

Prior to commencing any remedial works, the BC will be required to provide an OH&S Plan for the works that meets the requirements of SafeWork NSW.

The environmental consultant should provide an OH&S plan to GPSA and the BC for review and approval prior to initiation of their field activities.

6.4 Soil and Water Management

A soil and water management plan (SWMP) must be produced by the BC as part of the CEMP. The SWMP is to be prepared in accordance with the Southern Sydney Regional Organisation of Council's brochure *"Soil and Water Management for Urban Development".* The plan would be kept on-site and made available to Council officers on request.

The SWMP would include placement of erosion and sediment control measures prior to the disturbance of soils, including dust screens on fences erected around the perimeter of the works area and silt fence at appropriate locations. Components of the SWMP are summarised below.

6.4.1 Contaminated Soil Stockpiling

When stockpiling is required, the following will apply:

- Any contaminated soils will be kept separate from stockpiles of other materials such as imported material, or materials of different waste classification.
- A MTR (see **Section 5.14**) will be developed by the BC to monitor and control excavation and importation of all materials and their movements at the Site. The main objective of the MTR will be to ensure traceability of the remediation process and to track materials through the duration of the Site development. Material tracking forms will be used by the BC, to ensure appropriate tracking of soil stockpiles.
- Each soil stockpile should be given a unique name to facilitate material tracking and management. The name should be marked on the plastic stockpile cover and documented.
- The length of time that an impacted fill material stockpile remains on-site should be minimised to the extent practicable.
- Plastic covers should be placed on the stockpiles and sediment controls (e.g. sediment fencing/geo-fabric, hay bales) placed around the stockpiles to minimise erosion and run-off in stormwater or migration in wind. If required, shallow drainage diversion channels and/or bunds may also be required around the stockpiles.

- All soil stockpiles are to be kept wholly on the Site and away from drainage lines, gutters, stormwater pits or inlets.

6.4.2 Excavation Water Management

Based on the available data, excavations are unlikely to intersect groundwater. If water accumulates within excavations in the fill material and requires removal:

- The water could be used for dust suppression, on residual fill material only.
- Remove and dispose to an EPA licensed facility.
- Disposal to stormwater or sewer can only be undertaken with prior approval from the relevant authorities.

6.5 Site Access

Vehicle access to the Site from public roads should be via bitumen or concrete driveways. As per Section 5.5, a truck wash will be required to ensure no contaminated soil leaves the Site.

6.6 Noise Control

All works are to comply with the currently applicable regulations. All equipment and machinery shall be operated in an efficient manner to minimise the generation of noise.

6.7 Odour Control

Activities at the Site will control the emission of smoke, fumes and vapour into the atmosphere. Control measures may include:

- Construction equipment will be properly maintained, to minimise exhaust emissions.
- Combustible waste will not be burned on Site.
- The spraying of proprietary products (e.g. Biosolve™) to suppress hydrocarbon odours that may be present in excavated materials.

6.8 Dust Control

Dust emissions from fill material must be minimised and confined within the Site boundary. Dust control procedures will be the responsibility of the BC and may include:

- Erection of dust screens around the Site perimeter fence.
- Erection of dust screens around specific work zones in the fill material.
- Covering fill material with a TWP (refer **Section 5.8**).
- Use of water sprays.
- Keeping the surface of the fill moist.
- Use of proprietary products for dust control. Safety data sheets must be reviewed and the products proven not to contain contaminants.
- Cover all loads entering and exiting the Site.

6.9 Transport

All Site vehicles must:

- Conduct deliveries within the specified working hours.
- Securely cover all loads.
- Exit the site in a forward direction.

- Not track materials onto external roads.
- Dependant on the waste classification, waste materials for landfill disposal will be transported by appropriately licensed contractors. Transport and disposal will be undertaken in accordance with the NSW EPA (2014) Waste Guidelines.

6.10 Importation of Fill

Refer to **Sections 7.2.1** to **7.2.5**.

6.11 Disposal of Contaminated Soil

The NSW EPA (2014) *Waste Classification Guidelines – Part 1: Classification of Waste* will be utilised for fill or soil materials that may require disposal to landfill.

The EPA (2014) Waste Guidelines do not provide recommended sampling rates for stockpiles. Section 7.5.2 of Schedule B2 of the ASC NEPM recommends a minimum of 1 sample per 25 m^3 for the initial assessment of stockpiles comprising similar materials however, a greater number of samples may be required when there is a large range in contaminant concentrations or soil types.

Where fill material is surplus to Site requirements and landfill disposal is required, the following will apply:

- Stockpiles < 50 m^3: a minimum of 3 samples, excluding QC samples.
- Stockpiles > 50 m^3: 1 sample per 25 m^3, excluding QC samples.
- Each sample to be analysed for the identified contaminants of concern, including M8, TPH C6-C9 and C10-C36, PAH and asbestos (absence/presence method).
- Re-analysis of samples by the TCLP method.
- Analysis of QC samples.

The environmental consultant will prepare a waste classification report, including a conclusion on the interpreted waste classification.

The BC will provide the waste classification report to EPA licensed landfill facilities. When a landfill confirms acceptability of the waste material for receipt, material can be transported and disposed to that facility.

The BC must retain all landfill disposal records and provide copies to the environmental consultant.

7.0 Validation Plan

7.1 Soil Validation Criteria

Soil sample results will be compared to assessment criteria provided in:

- NEPC, 1999. *National Environment Protection (Assessment of Site Contamination) Measure (as amended 2013)* (ASC NEPM 2013).
- CRC CARE (2011). *Health Screening Levels for petroleum hydrocarbons in soil and groundwater.* Technical report series No. 10. Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE). Friebel, E. and Nadebaum, P., 2011.

The assessment criteria are summarised below. It is expected that sample testing will primarily be related to capping and other imported materials.

7.1.1 Health Investigation Levels (HILs)

The HILs described in the ASC NEPM 2013 are scientifically based, generic assessment criteria designed to be used in the first stage of an assessment of potential risks to human health from chronic exposure to contaminants. They are intentionally conservative and are based on a reasonable worst-case scenario for four generic land use settings.

HIL D, applicable for commercial/industrial land use such as shops, offices, factories and industrial sites will apply to all materials that are not VENM.

7.1.2 Health Screening Levels (HSLs)

The HSLs presented in the ASC NEPM 2013 and CRC CARE 2011 were developed to be protective of human health by determining the reasonable maximum concentration from site sources for a range of situations commonly encountered on contaminated sites. The HSLs apply to the same land use settings as for the HILs and include consideration of soil texture and depth to source to determine the appropriate soil, groundwater and soil vapour criteria for the exposure scenario.

HSL D will apply to all imported materials except VENM and is summarised on the following table:

Table 7 Health Screening Level

HSL	Land Use	Soil Depths	Soil Types (all land uses)
HSL-D	Commercial/industrial	0 m to <1 m 1 m to <2 m 2 m to <4 m 4 m +	**Sand** (sand, sandy clay, sandy clay loam, sandy loam, loamy sand, loam, sandy silt and silty sand) **Silt** (silt, silty clay and silty clay loam) **Clay** (clay, clay loam and silt loam)
Shallow Trench Worker	Utility/intrusive maintenance workers involved in shallow trenches (to a maximum depth of 1 m)	0 m to <2 m 2 m to <4 m 4 m +	

Concentrations of TRH and BTEXN must be below the laboratory LOR for material to be considered VENM.

7.1.3 Aesthetics

The ASC NEPM 2013 and CRC CARE 2011 do not provide numeric aesthetic guidelines however, the ASC NEPM states that ”*site assessment requires balanced consideration of the quantity, type and distribution of foreign material or odours in relation to the specific land use and its sensitivity*”.

Aesthetic issues generally relate to the presence of low-concern or non-hazardous inert foreign material (refuse) in soil or fill resulting from human activity. Capping materials must be free of potential aesthetic issues, such as:

- Odorous soil.
- Discoloured or stained soil.

- Presence of refuse, rubble, ACM and other deleterious material.

7.1.4 Asbestos

The ASC NEPM provides the following information on asbestos:

- Bonded ACM: material that is in a sound condition, although possibly broken or fragmented and where the asbestos is bound in a matrix such as cement or resin. Bonded ACM is restricted to material that cannot pass through a 7 mm x 7 mm sieve. This sieve size equates to the approximate thickness of common asbestos cement sheeting and for fragments to be smaller than this would imply a high degree of damage and hence potential for fibre release. Bonded ACM is equivalent to non-friable asbestos in Safe Work Australia (2016). Per the ASC NEPM, bonded ACM in sound condition represents a low human health risk.
- Fibrous Asbestos (FA): friable and severely weathered asbestos cement sheet, insulation products and woven asbestos material. FA can be broken or crumbled by hand pressure. This material is typically unbonded or was previously bonded and is now significantly degraded. FA is equivalent to friable asbestos in Safe Work Australia (2016).
- Asbestos Fines (AF): free fibres, small fibre bundles and small fragments of bonded ACM that pass through a 7 mm x 7 mm sieve. AF is equivalent to friable asbestos in Safe Work Australia (2016).

The ASC NEPM provides the following HSL D for asbestos in soil:

- Bonded ACM: 0.05% w/w.
- Friable ACM (FA and AF): 0.001 % w/w.
- All forms of asbestos: no visible asbestos in surface soils.

All materials imported to Site must be sampled and tested by the quantification method for asbestos. All sample results must be below the laboratory limit of reporting (LOR) for material to be acceptable for use.

7.1.5 Validation Criteria, Summary

The following will be the soil validation criteria for all capping material except for VENM.

Table 8 Soil Validation Criteria

Guideline	Level Adopted	CoPC
ASC NEPM 2013	HIL-D	PAH, Metals, OCP, OPP, PCB
	Vapour Intrusion: HSL D, Sand, 0-<1 m.	TRH, BTEXN
CRC CARE 2011	Direct Contact: HSL D Direct Contact: Intrusive Maintenance Worker	
ASC NEPM 2013	No visible asbestos in surface soil Bonded ACM: results < LOR Friable ACM: results < LOR	Asbestos

The following rationale was applied in the selection of these criteria:

- Commercial/industrial standards (HIL-D and HSL-D for industrial land use) are the most applicable criteria for the proposed land use.
- For HSLs, sand, 0-<1 m is selected as a conservative measure. In the event that clay or shale comprises the bulk of the capping material, re-consideration of the soil type would be appropriate.

VENM validation will require:

- Analysis results for organics (i.e. TRH, BTEX, PAH, OCP, OPP, PCB) below the laboratory LOR. Any results above LOR should be assessed on a case by case basis before allowing material on Site.

- Analysis results for metals should indicate background concentrations.
- Assessment of results to the HIL A and HSL A.

If asbestos is identified, materials will not be acceptable for use at the Site.

7.2 Assessment of Imported Fill

The assessment requirements relate to the BC and the environmental consultant. This RAP recognises that the BC may either:

- Appoint their own environmental consultant(s) to pre-assess the suitability of ENM and/or VENM materials proposed for importation to the Site.
- Be provided with VENM and/or ENM assessment reports prepared by other consultants for potential source sites.

Where VENM and/or ENM assessment reports have been prepared by other consultants, the BC must supply the reports to Goodman and environmental consultant for review, prior to materials being imported to Site. Each report must be prepared by an appropriately qualified consultant and include:

- All applicable VENM and/or ENM assessment requirements noted in this document.
- Identifiers for the source site(s) (i.e. street address and suburb and Lot and Deposited Plan numbers).
- A Figure showing the location of the source site(s).
- The anticipated volume and description of material to be imported to the Site.
- Source site(s) inspection observations, including neighbouring properties.
- Photographs showing source site(s) conditions.
- Consideration of the likelihood of per- and poly-fluoroalkyl substances (PFAS) to be present (refer **Section 7.2.1**).
- Analysis for PFAS if it is identified as a contaminant of concern.
- Copies of NATA stamped laboratory analysis certificates, including chain of custody documentation, sample receipt acknowledgement forms, quality assurance/quality control (QA/QC) data.
- Analysis results for field QA/QC samples (e.g. equipment rinsate blanks, field duplicates etc). Split field duplicate samples should be analysed by a secondary laboratory, so that an assessment of the precision of the primary laboratory data can be made. QA/QC evaluation should be undertaken with reference to the ASC NEPM 2013.
- Evaluation of the analysis data reliability and useability.
- A conclusion (i.e. does the material meet the classification of either VENM or ENM).

In the event that the review indicates insufficient assessment data, no materials shall be imported to the Site until the data gaps have been satisfactorily addressed.

Goodman and the environmental consultant should retain a copy of each Assessment Report. This includes source sites not deemed to be an acceptable source of VENM or ENM or reports lacking sufficient data, so that an “Exclusion Register” can be maintained and tracked.

Any materials imported to the Site will require compliance sampling by the environmental consultant, to confirm suitability for use.

7.2.1 VENM

Reports prepared by other consultants must be undertaken in accordance with the POEO Act definition of VENM (refer **Section 5.13**), as per the following table:

Table 9 VENM Assessment

Item/ Consideration	VENM	Course of Action
Are manufactured chemicals or process residues present	A material can only be VENM if it has been excavated from an area that is not contaminated with manufactured chemicals or process residues as a result of industrial, commercial, mining or agricultural activities	Undertake land-use history appraisal of proposed source site. This must include at a minimum: • Review of current and historical aerial photographs, to confirm no previous industrial land uses. • Review of historical certificates of title, to assess previous owners and potential land use. • Review NSW EPA website to assess if the source site and/or nearby properties have been notified under section 58 of the Contaminated land Management Act 1997. • Review the NSW EPA website to assess if the source site and/or nearby properties are listed on the NSW Government PFAS [per- and poly-fluoroalkyl substances] Investigation Program. • Review the Department of Defence website for Unexploded Ordnance records. • Review geological and soil maps to evaluate anticipated subsurface conditions. • Inspection of the source site to ascertain current conditions, with photographic records to be provided as a line of evidence.
Are sulfidic ores or soils present	VENM cannot contain sulfidic ores or soils	• Review acid sulfate soil risk maps. • Material cannot be classified as VENM if the acid sulfate soil risk maps identify a high probability of occurrence of ASS or PASS. • If the acid sulfate soil risk maps identify a high probability of ASS or PASS, chemical assessment will be required as per the Acid Sulfate Soils Assessment Guidelines and up-dated ASS laboratory method Guidelines Version 2.1 (June 2004).
Are naturally occurring asbestos soils present	VENM cannot contain naturally occurring asbestos	• Review the naturally occurring asbestos risk maps available on SafeWork NSW website. • If the maps indicate a medium/high probability of naturally occurring asbestos, sampling and analysis would be required to demonstrate that the material does not contain asbestos[10].
Is there any other waste present	VENM cannot contain any waste	• Inspection of source site. • Interviews with personnel at source site. • Supplier to provide VENM certificate.
Is chemical assessment necessary	Yes, if material is potentially contaminated with manufactured chemicals or process residues and/or if ASS/PASS may be present	• Analysis for chemicals or process residues will depend on the potential contaminant sources. • To remove ambiguity, all samples should be analysed for BTEXN, TRH C6-C40, PAH, OCP, OPP, PCB, M8 and asbestos. • Analysis for PFAS if background data indicate it is a contaminant of concern (refer **note** below). • Analysis for ASS/PASS by the sPOCAS method if background data indicates a potential presence.

[10] It is recommended that these potential source sites are not considered further.

To confirm suitability for use, compliance sampling will be undertaken, as summarised on **Table 9**.

Note: PFAS

PFAS can be associated with aqueous film forming foams (AFFF, used in firefighting), Teflon coatings, fabric protectors, electroplating, a range of industrial processes and landfills. VENM (or ENM) proposed for import must be assessed for PFAS if background/history data for the source site indicates that it is a potential source, or located near a potential PFAS source site. The indicators would include but not be limited to:

- Listing on the NSW EPA website.
- Previous or current use of the source site as a fire station or fire training ground.
- Department of Defence properties, including adjacent lands.
- Electroplating facilities.
- Industrial facilities or other lands that have had fires attended to by the NSW Fire Brigade.

No materials will be imported if:

- Background data for the source site indicates a potential for PFAS and no PFAS analyses have been undertaken.
- PFAS concentrations in soil and/or bedrock materials exceed the ‘residential and garden accessible soil’ land use criteria provided in the draft PFAS National Environmental Management Plan March 2019 (PFAS NEMP 2.0).

The draft PFAS NEMP 2.0 ‘residential and garden accessible soil’ land use criteria are:

- PFOS + PFHxS: 0.01 mg/kg
- PFOA: 0.3 mg/kg.

In the event that the draft PFAS NEMP 2.0 criteria are not adopted by the Regulators, the assessment criteria shall be consistent with the PFAS NEMP January 2018, which are:

- PFOS + PFHxS: 0.009 mg/kg
- PFOA: 0.1 mg/kg.

7.2.2 ENM

For materials to meet the ENM classification, assessment reports prepared by other consultants must be undertaken in accordance with Resource Recovery Order under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014 – The excavated natural material order 2014 (the ENM Order).

To confirm suitability for use, compliance sampling will be undertaken, as summarised on **Table 9**.

7.2.3 Other RRO approved materials

The BC must source the following information for any materials imported to the Site under an applicable Resource Recovery Order (RRO) and provide to Goodman and the environmental consultant:

- The commercial supplier of the material must provide a letter stating that the material was generated under a RRO. One letter per material type will be required.
- The commercial supplier must provide copies of test results, confirming contaminant concentrations meet the ‘Absolute maximum concentrations’ of the applicable RRO.

To confirm suitability for use, compliance sampling will be undertaken, as summarised on **Table 9**.

7.2.4 Other materials

Other materials are envisaged to include 'horticultural' proprietary products (e.g. soil blends) and bark mulch for landscape areas. Where possible, the BC should source documentation from the commercial supplier and provide to the environmental consultant. To confirm suitability for use, compliance sampling will be undertaken, as summarised on **Table 9**.

7.2.5 Compliance sampling summary

To confirm suitability of imported materials for use, compliance sampling will be undertaken to validate acceptability for use, as summarised below:

Table 10 Validation of Imported Fill

Material	Pre importation	Compliance Sampling	CoPC
ENM	Consultant assessment report reviewed and considered acceptable. VENM certificate.	A minimum of 3 samples per source site. Source site volume < 1,000 m^3: 1 sample per 100 m^3. Source site volume > 1,000 m^3: 1 sample per 1,000 m^3.	TRH C6-C40, BTEXN, PAH, M8, OCP, OPP, PCB, asbestos (quantification)
VENM			
Other RRO approved materials	Documentation from commercial supplier	1 per 500 m^3 or a minimum of 3 samples per RRO material type.	
Soil blends		1 per 100 m^3 or a minimum of 3 samples per material type.	
Bark mulch	As above, if applicable	1 per 100 m^3 or a minimum of 3 samples per material type. Visual inspection to assess for the presence of aesthetic impacts.	Asbestos (quantification)

Asbestos should not be present at concentrations above the laboratory LOR in any samples analysed.

The sampling rates exclude QC samples, which will be undertaken as follows:

- Field duplicates by primary laboratory: 1 sample per 20 primary samples. Duplicate(s) to be analysed for all CoPC except asbestos. At least one duplicate will be analysed in each sample batch.
- Field duplicates by secondary laboratory: as above.
- Equipment blank: one sample per day of sampling, when hand tools are used, analysed for TRH C6-C40, BTEXN and M8.
- Trip blank: one sample per day of sampling, analysed for TRH C6-C40, BTEXN and M8.

Data validation will be undertaken with reference to the ASC NEPM.

7.3 Material Tracking Register

The environmental consultant must periodically review the MTR completed by the BC and confirm that documentation is complete for imported material and landfill disposal.

7.4 Survey Data

Survey data must prove a minimum of 0.5 m capping over the residual fill material. Photographic evidence of the visible marker layer will be required.

7.5 Field Sampling and Laboratory Analysis

All field procedures must be in accordance with the ASC NEPM and/or NSW EPA (2017) Contaminated Land Management: *Guidelines for the NSW Site Auditor Scheme (3rd Edition).*

The soil sampling strategy would include:

- All soil samples will be collected into laboratory prepared and supplied glass jars with Teflon lined lids (except samples for PFAS, if required). The sampling locations will be accurately recorded.
- Screening of the vapour headspace of soil samples for volatile organic compounds (VOC) will be undertaken in the field using a calibrated photoionisation detector (PID). Calibration records must be retained.
- All samples will be collected using decontaminated equipment and a new pair of nitrile gloves.
- Samples for analysis for organic compounds will be placed on ice. Samples should be received by the laboratories at 4^0C or lower (per AS 4482.1-2005).
- All samples will be forwarded to the laboratories under chain-of-custody protocol.

All sample analyses will be conducted by NATA accredited laboratories utilising methodologies that comply with the ASC NEPM.

The environmental consultant must validate the field sampling and laboratory data as 'reliable and acceptable' for use. The validation process should be undertaken with reference to the seven step data quality objective (DQO) process and include the data quality indicators (DQI). The DQI comprise precision, accuracy, representativeness, comparability and completeness (i.e. PARCC parameters).

7.6 Validation Report

A Validation Report will be prepared by the environmental consultant on completion of the capping works. The Validation report will be prepared in accordance with the NSW EPA (2011) *Guidelines for Consultants Reporting on Contaminated Sites*. The report will contain an overview of the activities conducted and details of the following:

- Survey data confirming the capping thickness.
- Tracking of materials disposed to landfill, including all landfill disposal dockets.
- Volumes of material imported to Site from each source.
- Confirmation that sampling rates were in accordance with the RAP.
- VENM certificates.
- Tables of sample analysis results.
- NATA approved laboratory reports.
- Validation of field and laboratory data.
- Plan of sampling locations (as applicable).
- Site photographs.
- Air monitoring records.

The report will include an assessment of all results and evaluation of the suitability of the Site for the proposed land use. Suitability of the Site for commercial/industrial land use will be contingent upon the preparation and adherence to the LTEMP.

Management of potential exposure to groundwater should also be documented in the LTEMP.

8.0 Conclusions

This RAP provides for the installation of a cap over residual fill materials contaminated with asbestos, lead, B(a)P and to a lesser extent, TRH.

Provided the procedures in this RAP are followed and verified/validated, the Site will be suitable for commercial/industrial land use when operated and maintained in accordance with a LTEMP.

9.0 References

AECOM. 2020. *Phase I & II ESA, 1-3 Burrows Road, St Peters*. 5 March 2020.

Department of Urban Affairs and Planning (DUAP), Environment Protection Authority (EPA). 1998. *Managing Land Contamination, Planning Guidelines, SEPP55 – Remediation of Land*. April 1999.

Friebel, E. and Nadebaum, P. 2011. *Health Screening Levels for Petroleum Hydrocarbons in Soil and Groundwater, CRC CARE Technical Report No. 10*. Cooperative Research Centre for Contamination Assessment and Remediation of the Environment, Adelaide, Australia.

National Environment Protection Council. 1999. *National Environmental Protection (Assessment of Site Contamination) Measure, as amended May 2013 (ASC NEPM)*.

NSW EPA. 2017. Contaminated Land Management: *Guidelines for the NSW Site Auditor Scheme (3rd Edition).* October 2017.

NSW EPA. 2014. *Waste Classification Guidelines, Part 1: Classifying Waste*. November 2014.

NSW OEH. 2011. *Guidelines for Consultants Reporting on Contaminated Sites*. NSW Government Office of Environment & Heritage (OEH).

SafeWork NSW. 2016a. Code of Practice*: How to Manage and Control Asbestos in the Workplace*.

SafeWork NSW. 2016b. Code of Practice: *How to Safely Remove Asbestos*.

WA DOH. 2009. *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia*. May 2009.

WorkCover NSW. 2014. *Managing asbestos in or on soil*. March 2014.

Appendix A

Figures

G:\IENV\GIS\Projects\606 Projects\60623599 Burrows Industrial Estate\FIGURES\60623599 F1 Site Location 03 03 2020 TO

AECOM

SITE LOCATION

Burrows Industrial Estate
New South Wales

FIGURE 1

SS02
SS04_Frag
SS03_Frag
SS01
BH108
BH109
BH110
BH19/MW19
BH20
BH21/MW21
BH107
BH18
BH114
BH113
BH16/MW16
BH17/MW17
BH106
BH111
BH12
BH11
BH105/MW105
BH13
BH07
BH08
BH22
BH14
BH117
BH116
BH115/MW115
BH15
BH09
BH05
BH04
BH01/MW01
BH100
BH104
BH10
BH02
BH06
BH103
BH101
BH03
BH102/MW102

A
A′
B
B′
C
C′
D
D′

Unit 9
Unit 8
Unit 9A
Unit 7
Unit 4
Unit 6
Unit 5
Unit 3
Unit 2
Unit 1

Brick warehouse with metal roof
Brick office block
Rendered office block

Inferred location of former 1x 20kL USTs
Inferred location of former 2x 20kL and 1x 9kL UST
Inferred location of former 2x 18kL USTs
Substation

Lot 11
DP606737
(3.27ha)

Canal Road
Burrows Road
Burrows Road
Alexandra Canal

KEY
- Site boundary
- Building footprint
- Easement
- Cross section transect
- Borehole sample location
- Surface sample location
- Borehole/monitoring well location

0 40 80m

G:\ENVIGIS\Projects\606 Projects\60623599 Burrows Industrial Estate\FIGURES\RAP\60623599 F2 Site Layout and Sampling Locations 17 03 2020 TO

AECOM

SITE LAYOUT AND SAMPLING LOCATIONS

Burrows Industrial Estate
New South Wales

Note: Unit areas are approximate and inferred only

FIGURE 2

G:\ENVIGIS\Projects\606 Projects\60623599 Burrows Industrial Estate\FIGURES\RAP\60623599 F3 Soil Impact Plan 18 03 2020 TO Rev A

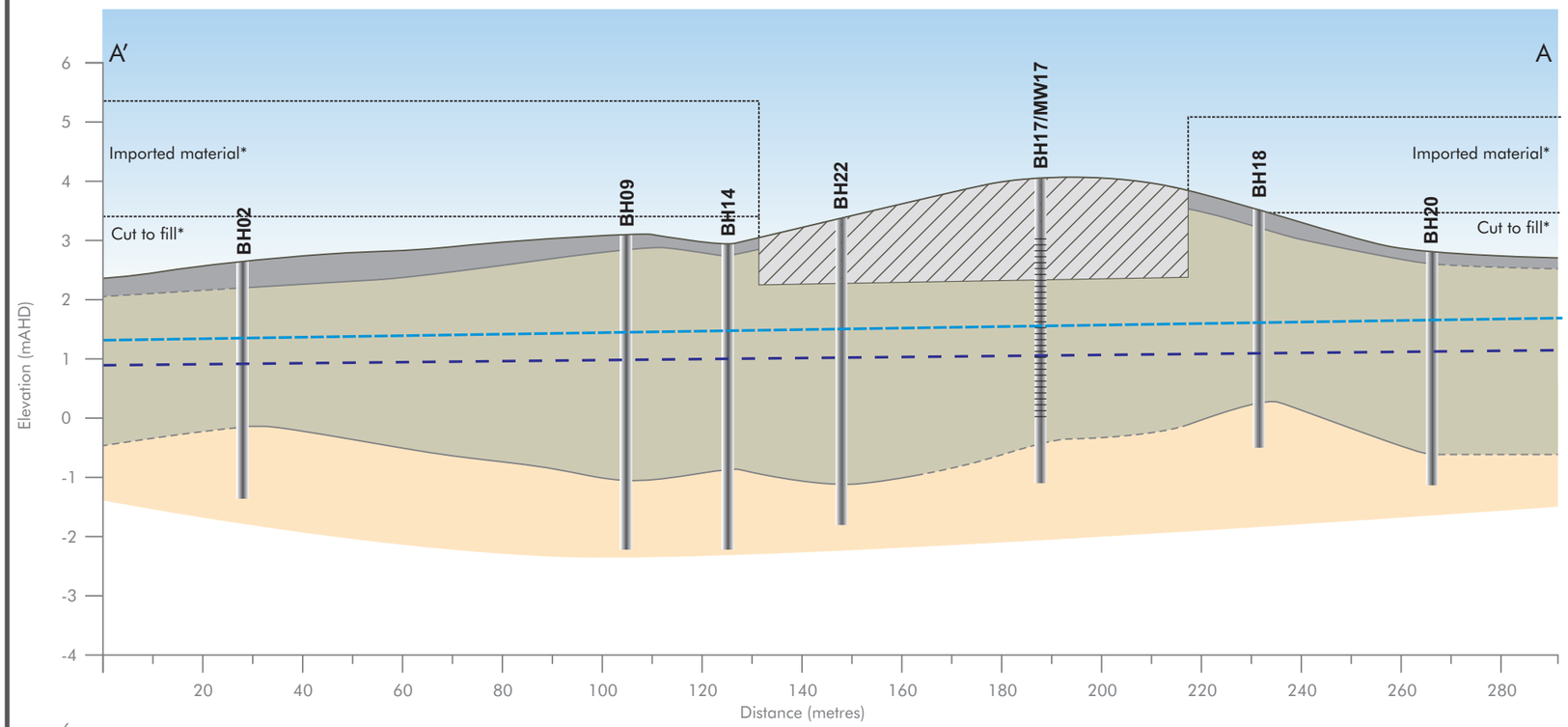
AECOM

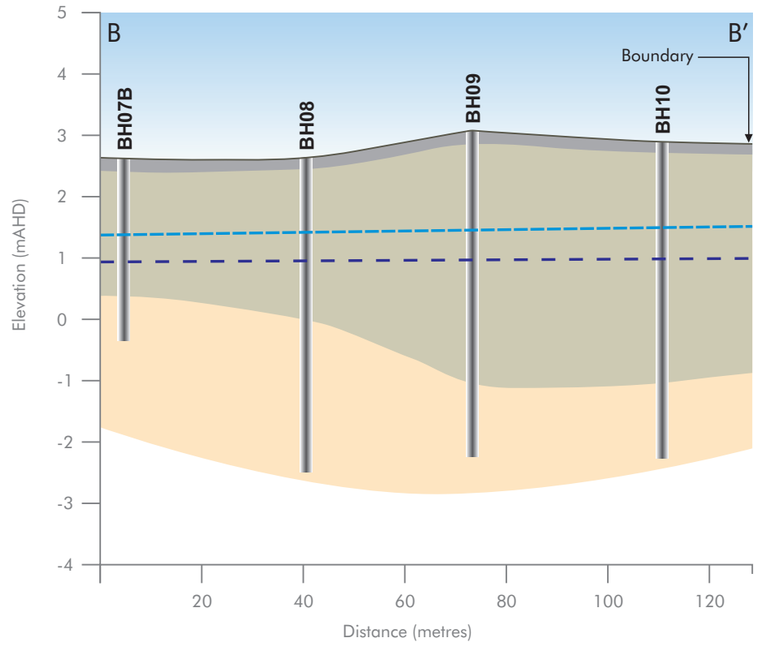
SOIL IMPACT PLAN

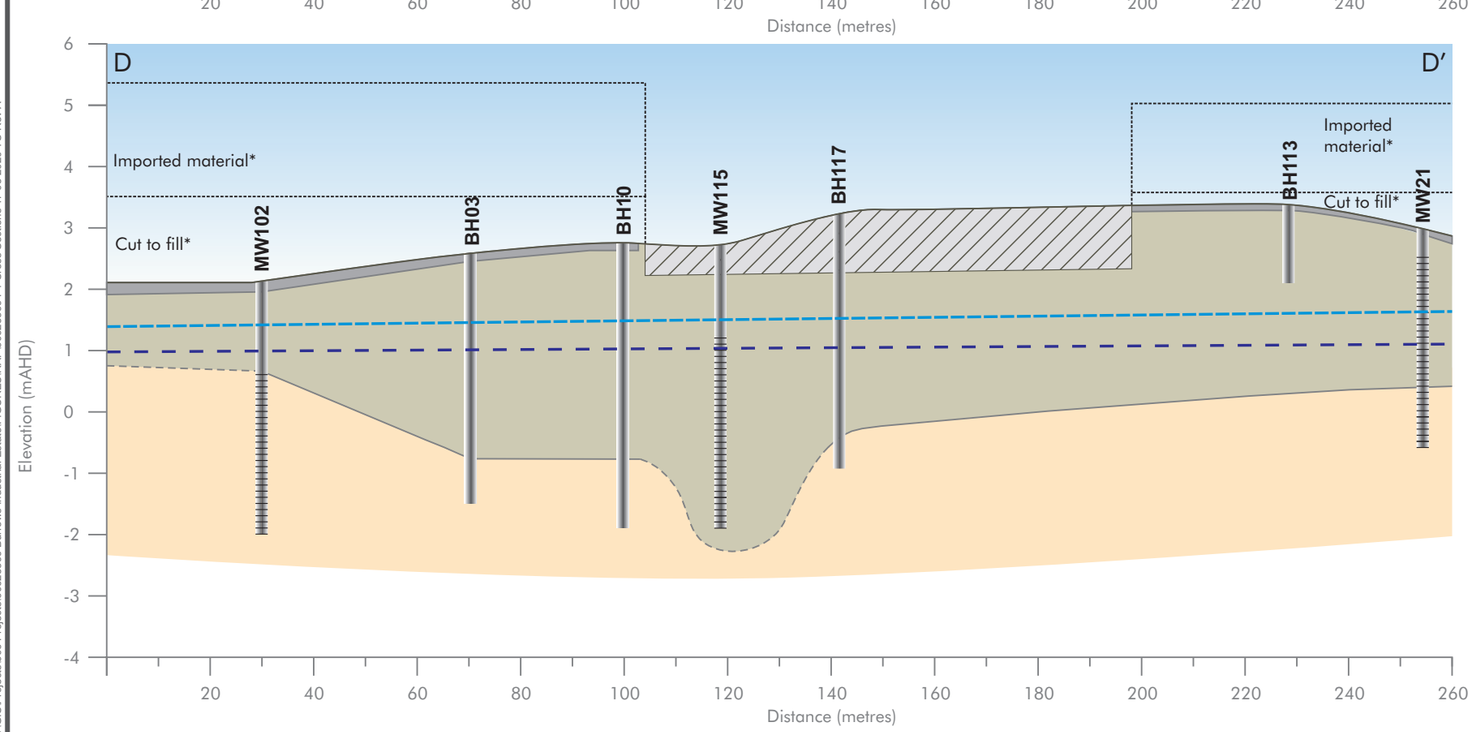
Burrows Industrial Estate
New South Wales

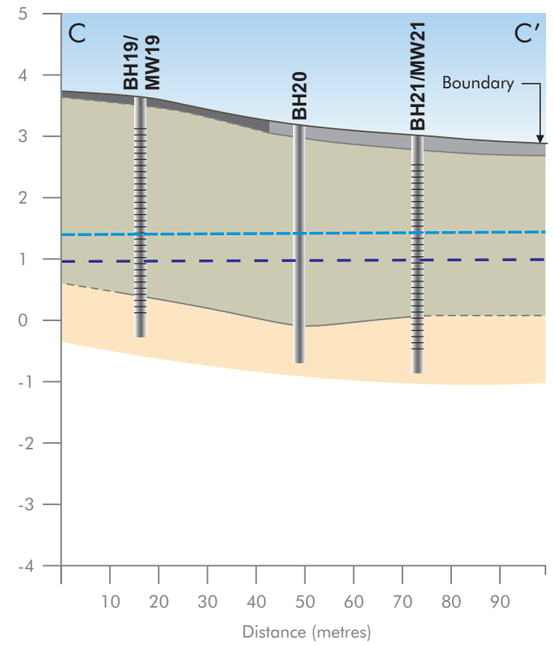
Note: Unit areas are approximate and inferred only

FIGURE 3









Scale: See figured dimensions

G:\ENV\GIS\Projects\606 Projects\60623599 Burrows Industrial Estate\FIGURES\RAP\60623599 F4 Cross Sections 17 03 2020 TO Rev A

AECOM

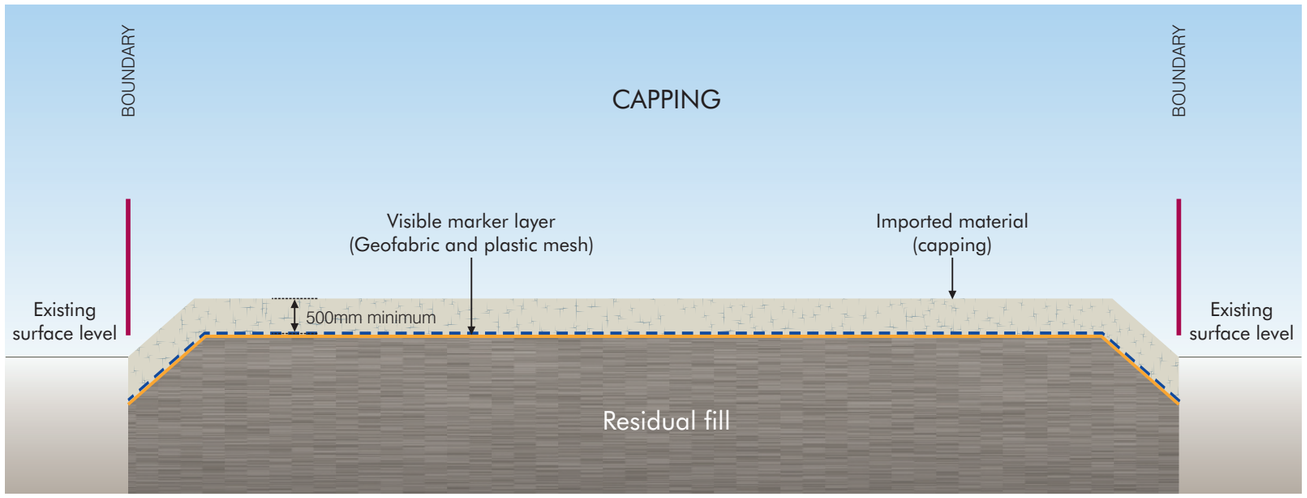
KEY

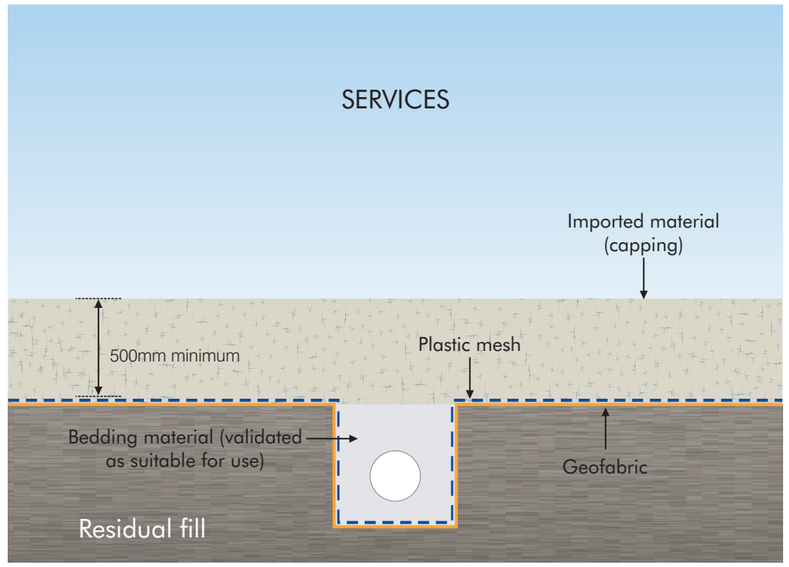
- Asphalt
- Concrete
- Fill
- Natural (clay, sandy clay, sand, clayey sand, sandy silt)
- Screened interval
- Undercroft excavation
- Inferred cut/fill elevation
- Average groundwater elevation, August 2015 (0.999mAHD)
- Average groundwater elevation, February 2020 (1.399mAHD)

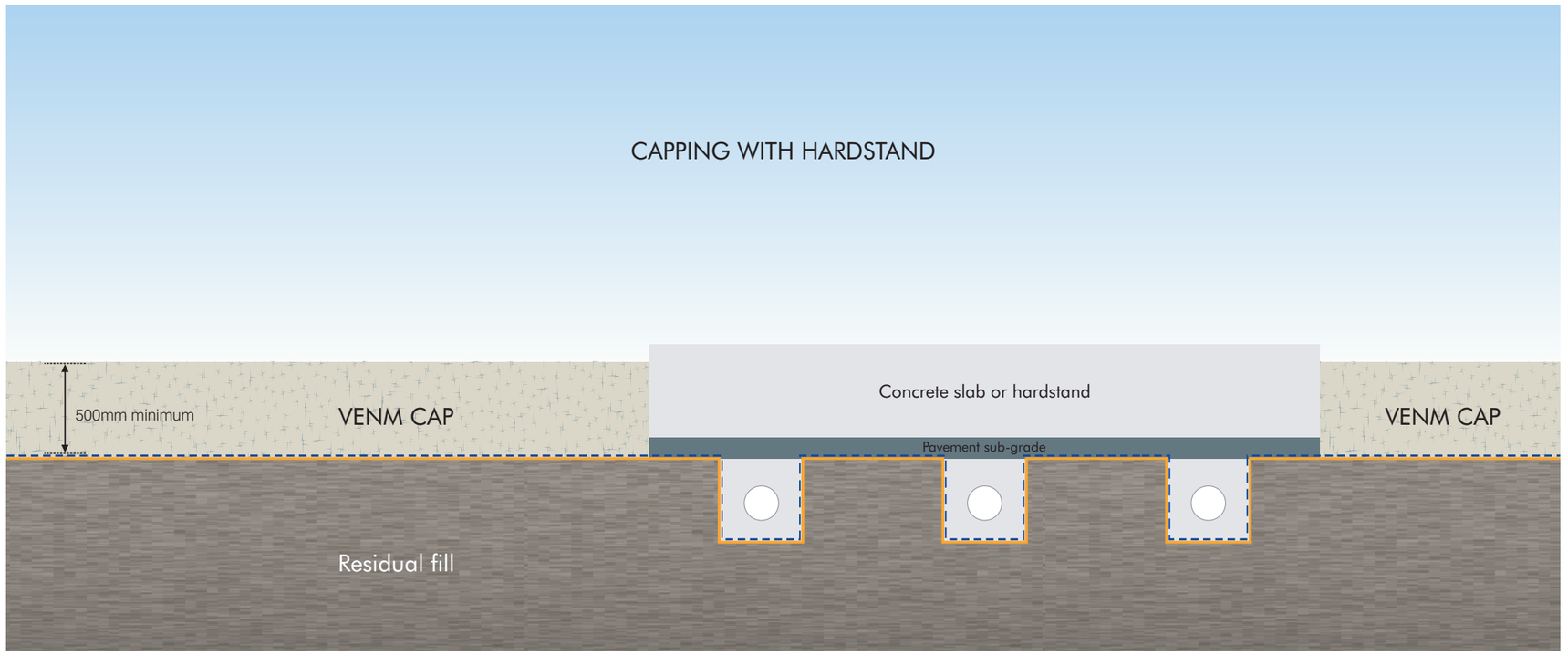
CROSS SECTIONS

Burrows Industrial Estate
New South Wales

FIGURE 4







AECOM

(SCHEMATIC) VISIBLE MARKER LAYER AND CAPPING

Burrows Industrial Estate
New South Wales

FIGURE 5

Appendix B

Tables

Table 1 - Borelog Summary

BH	Easting	Northing	Ground Surface (AHD)	Drilled Depth (m bgs)	Logged Fill Depth (m bgs)	Comments	Drilled Depth (AHD)	Base of Fill (AHD)
BH01	331543.404	6245408.2	2.21	3.9	2.8		-1.69	-0.59
BH02	331576.145	6245363.85	2.58	3.9	2.9		-1.32	-0.32
BH03	331596.394	6245317.16	2.32	3.9	3		-1.58	-0.68
BH04	331553.645	6245416.11	2.25	3.9	2.3		-1.65	-0.05
BH05	331587.754	6245401.4	2.19	3.9	2.3		-1.71	-0.11
BH06	331632.445	6245356.49	2.69	1.1		Refusal in fill	1.59	2.69
BH07	331577.783	6245440.8	2.56	3	2.3		-0.44	0.26
BH08	331611.759	6245424.02	2.6	5.1	2.7		-2.5	-0.1
BH09	331640.584	6245404.25	3.04	5.3	4.2		-2.26	-1.16
BH10	331665.802	6245375.68	2.91	5.1	3.9		-2.19	-0.99
BH11	331605.73	6245465.68	3.12	3.9	3.3		-0.78	-0.18
BH12	331645.559	6245472.36	3.62	4	3.7		-0.38	-0.08
BH13	331634.823	6245442.06	2.96	3.9	2.8		-0.94	0.16
BH14	331653.883	6245419.95	2.93	5.1	3.8		-2.17	-0.87
BH15	331674.617	6245398.48	2.7	0.5		Refusal in fill	2.2	2.7
BH16	331688.598	6245470.9	4.23	5.1	4.5		-0.87	-0.27
BH17	331700.452	6245465.95	4.13	5.1			-0.97	4.13
BH18	331741.891	6245485.27	3.42	3.9	3.2		-0.48	0.22
BH19	331743.935	6245525.41	3.51	3.9	3.2		-0.39	0.31
BH20	331767.618	6245507.73	3.24	3.9	3.4		-0.66	-0.16
BH21	331791.781	6245494.97	3.12	3.9	3		-0.78	0.12
BH22	331672.77	6245435.47	3.37	5.1	4.5		-1.73	-1.13
BH100	331555.408	6245391.02	2.035	3.5	1.5		-1.465	0.535
BH101	331574.416	6245336.5	2.422	4	3.2		-1.578	-0.778
BH102	331627.004	6245313.22	2.385	4.5	3.15		-2.115	-0.765
BH103	331649.295	6245352.7	2.786	4.5	3.8		-1.714	-1.014
BH104	331621.782	6245384.24	2.852	4.5	3.8		-1.648	-0.948
BH105	331627.489	6245463.59	3.287	4.5	3.9		-1.213	-0.613
BH106	331684.03	6245461.2	3.467	6.3	4		-2.833	-0.533
BH107	331731.264	6245491.17	4.32	5	4.5		-0.68	-0.18
BH108	331714.016	6245533.7	4.935	5.1	4.3		-0.165	0.635
BH109	331694.186	6245515.8	4.924	6.2	4.5		-1.276	0.424
BH110	331661.963	6245491.96	4.888	5.1	5.1	Fill depth not clear	-0.212	-0.212
BH111	331718.244	6245456.26	3.455	4.5	3.5		-1.045	-0.045
BH113	331776.03	6245471.04	3.473	1.38		Terminated in fill, possible service	2.093	3.473
BH114	331703.793	6245481.45	4.335	5.5	4.3		-1.165	0.035
BH115	331673.5	6245404.4	2.883	5.1		Fill depth not clear	-2.217	2.883
BH116	331707.577	6245414.8	3.382	0.78		Terminated in fill, possible service	2.602	3.382
BH117	331695.246	6245419.79	3.367	4.5	3.9		-1.133	-0.533

GDA 94

Average	**3.2**	**4.2**	**3.5**		**-1.0**	**0.2**
Minimum	2.035	0.5	1.5		-2.833	-1.16
Maximum	4.935	6.3	5.1		2.602	4.13

Table 2 - Groundwater Elevation

Well ID	Easting	Northing	Gauging Date	Total Well Depth	TOC Elevation	SWL	GWE
				(m btoc)	(mAHD)	(m btoc)	(mAHD)
MW01	331543.404	6245408.202	31/08/2015	3.454	2.12	1.096	1.024
MW16	331688.598	6245470.9	31/08/2015	4.441	4.15	3.16	0.990
MW17	331700.452	6245465.954	31/08/2015	4.091	4.04	3.065	0.975
MW19	331743.935	6245525.412	31/08/2015	3.920	3.44	2.449	0.991
MW21	331791.781	6245494.973	31/08/2015	3.895	3.04	2.026	1.014
MW01	331543.404	6245408.202	11/02/2020	3.275	2.12	0.677	1.443
MW16	331688.598	6245470.9	11/02/2020	4.22	4.15	2.749	1.401
MW17	331700.452	6245465.954	11/02/2020	3.99	4.04	2.647	1.393
MW19	331743.935	6245525.412	11/02/2020	3.425	3.44	2.034	1.406
MW21	331791.781	6245494.973	11/02/2020	3.415	3.04	1.643	1.397
MW102	331627.004	6245313.221	11/02/2020	4.42	2.3	0.941	1.359
MW105	331627.489	6245463.586	11/02/2020	4.39	3.202	1.811	1.391
MW115	331673.5	6245404.4	11/02/2020	4.42	2.843	1.438	1.405

Notes

m btoc = metres below top of casing

SWL = standing water level

TOC = top of casing

AHD = Australian Height Datum

Table 3 - Soil Sample Register

Sample Location & Depth	Sample Type	PID (ppm)	FILL Sample description	Analyses																
				TRH C6-C40, BTEXN	TRH C6-C10, BTEX(N)	PAH	Metals	OCP, OPP, PCB	Phenols	Asbestos	Asbestos (quant)	VHC	TCLP - As	TCLP - Pb	TCLP - B(a)P	TCLP - Hg	TCLP - Cr VI	TCLP - Cd	TCLP - Ni
BH01_0.3-0.4	Fill	0.1	Dark brown-orange sand, FeSt & porcelain							1									
BH01_1.0-1.1	Fill	-	Dark brown-orange sand, FeSt & porcelain	1		1	1	1											
BH01_3.8-3.9	Sandy Clay	-		1		1													
BH02_0.4-0.5	Fill	0.2	Crushed SST, concrete, glass & ceramics	1		1	1			1									
BH02_2.0-2.1	Fill	2.9	Sand with slag & ceramics				1												
BH02_3.0-3.1	Silty Clay	14.1		1															
BH03_0.2-0.3	Fill	0.1	SST & RB			1	1			1									
BH03_1.0-1.2	Fill	2.1	Crushed SST with slag & ceramics	1		1	1			1									
BH03_3.0-3.1	Sandy Clay	19.5		1			1												
BH04_0.5-0.6	Fill	0.5	Mottled brown-grey sand with RB & slag. HCO	1		1	1												
BH04_1.0-1.1	Fill	0.6	Black-brown-orange mottled sand, ceramics, aluminium, FeSt, slag			1	1						1	1	1				
BH04_2.3-2.4	Silty Clay	0.1		1			1												
BH05_0.5-0.6	Fill	1.8	Orange and black mottled clay with crushed SST, nails	1		1	1	1	1			1							
BH05_1.0-1.1	Fill	0.4	Black sand with crushed SST, glass, ceramics, bone, slag & metal			1	1												
BH05_2.3-2.4	Sandy Silt	0.7		1			1												
BH06_1.0-1.1	Fill	0.2	Grey-white crushed SST				1	1		1									
BH07A_0.5-0.6	Fill	0.1	Black sand with metal, glass, slag, bricks			1	1	1		1									
BH07B_1.2-1.3	Fill	0.9	Brown-black sand, FeSt, metal, ceramics, glass & slag	1		1	1	1		1									
BH07B_2.3-2.4	Silty Clay	0.4		1			1												
BH08_0.17-0.18	Fill	0.5	Black-orange-yellow mottled sand with crushed SST & FeSt				1	1											
BH08_1.0-1.1	Fill	0.2	Black-orange mottled sand with crushed SST, metal, slag	1		1	1												
BH08_2.5-2.6	Fill	0.3	Black sand with slag			1	1												
BH08_3.7-3.8	Silty Sand	0.5		1			1												
BH09_0.25-0.35	Fill	0.1	Pink crushed SST			1	1												
BH09_4.0-4.2	Fill	0.4	Black-brown to green-brown sand with SST, FeSt, ash & slag			1	1												
BH09_4.5-4.6	Sandy Clay	390.1		1		1	1		1			1							
BH10_0.15-0.25	Fill	0.1	Yellow crushed SST					1											
BH10_4.0-4.1	Clayey Sand	20.1		1			1												
BH11_0.2-0.3	Fill	0.1	Dark brown-black gravelly sand with ash			1	1												
BH11_2.3-2.4	Fill	0.8	Black-orange mottled silt with FeSt & slag	1		1	1												
BH11_3.3-3.4	Sandy Silt	0.5		1			1												
BH12_0.15-0.25	Fill	0.1	Black and white sand with SST, ash, slag & glass			1	1												
BH12_1.0-1.1	Fill	0.1	Black-red-yellow mottled sand with ash, SST, slag & glass				1												
BH12_1.8-1.9	Fill	0.4	Brown sand with slag							1									
BH12_3.6-3.7	Fill	3.5	Grey sand	1			1												
BH13_0.4-0.5	Fill	0.1	Dark brown-black sand with SST, FeSt, glass & ceramics			1	1												
BH13_3.6-3.7	Silty Sand	6.6						1											
BH14_0.45-0.55	Fill	-	Brown sand and RB					1											
BH14_1.8-1.9	Fill	0.6	Dark brown sand with slag			1	1	1											
BH14_4.0-4.1	Sandy Clay	150.1		1					1			1							
BH15_0.4-0.5	Fill	0.1	RB with minor clay			1	1			1									
BH16_0.7-0.8	Fill	0	Yellow-grey-black-orange sand with bricks, SST, glass, slag & ash	1		1	1	1											
BH16_2.0-2.1	Fill	0.9	Dark brown sand with clay, FeSt, RB, slag, glass & metal	1			1									1			
BH16_3.0-3.1	Fill	4.3	Dark brown sand with clay, FeSt, RB, slag, glass & metal				1												
BH17_1.0-1.1	Fill	0.1	Sand, mottled brown with black	1			1												
BH17_2.0-2.1	Fill	15.2	Grey-brown sand with slag, SST, FeSt, concrete, metal. HCO	1		1	1										1		
BH18_0.7-0.8	Fill	0	Dark brown-black sand with bricks	1		1	1			1									
BH18_2.0-2.1	Fill	0.2	Red-brown-yellow-black sand with FeSt & SST			1	1												
BH19_2.0-2.2	Fill	1.9	Orange-brown sand with FeSt & slag	1			1												
BH20_0.5-0.6	Fill	0.2	Brown sand with RB			1	1			1									
BH20_1.0-1.1	Fill	0.4	Red-brown and black sand with slag & crushed SST			1	1			1									
BH20_2.0-2.1	Fill	0.3	Dark brown sand with slag & crushed SST	1															
BH21_0.7-0.8	Fill	0.1	Yellow-black mottled sand with SST, concrete & bricks	1		1	1			1					1				
BH21_2.7-2.8	Fill	0.2	Brown sand with metal & slag	1			1												
BH21_3.0-3.1	Sand	2.1		1		1	1												
BH22_0.3-0.4	Fill	0.1	Red-brown to grey-brown sand with FeSt & RB							1									
BH22_0.45	Fragment	-								1									
BH22_0.8-0.9	Fill	0.1	Dark brown sand with organic matter (peat?) & slag			1	1												
BH22_2.2-2.3	Fill	0.1	Slag	1		1	1						1	1					1
BH22_4.5-4.7	Sandy Clay	26.7		1		1	1												
SS01	Fill	-	Surface soil/fill							1									
SS02	Fill	-	Surface soil/fill							1									
SS04_Frag	Fragment	-								1									
BH100_0.7-0.8	Fill	0	Brown-grey sand with FeSt, glass & ceramics	1		1	1				1								
BH100_0.8-0.9	Fill	0.6	Orange-brown brittle fragments and sponge-like material	1		1	1				1								
BH101_0.16-0.26	Fill	NR	Crushed SST with slag & FeSt					1											
BH101_0.7-0.8	Fill	NR	Sand with FeSt, glass & bricks	1		1	1												
BH101_1.3-1.4	Fill	0	Sand with RB, ceramics, metal, glass & cotton buds								1								
BH101_2.2-2.3	Fill	0	Sand with RB, brick, metal, ceramics & glass	1		1	1												
BH102_0.3-0.4	Fill	0.3	Orange-brown sand with SST, FeSt & glass			1	1												
BH102_0.5-0.6	Fill	0	Brown sand with SST, FeSt & slag	1		1	1				1			1	1	1			
BH103_0.15-0.25	Fill	0.1	Crushed SST	1		1	1				1								
BH103_0.85-0.95	Fill	0.1	Sand with FeSt & ceramics			1	1												
BH103_2.0-2.1	Fill	0	Sand with RB, bricks & ceramics			1	1				1								
BH104_0.8-0.9	Fill	0.1	Black sand with RB & tiles	1		1	1				1								
BH104_1.6-1.7	Fill	0.2	Black sand with RB, tiles & metal	1		1	1				1								
BH104_2.0-2.2	Fill	0.1	Black sand with RB	1															
BH105_0.4-0.5	Fill	0.1	Black sand with RB & slag	1		1	1				1								
BH105_0.85-0.95	Fill	0.1	Orange-brown sand with FeSt, glass, ash, charcoal & ceramics	1		1	1							1	1				
BH105_1.7-1.8	Fill	0.1	Orange sand with FeSt			1	1							1					1
BH106_0.2-0.3	Fill	1.7	Sand with FeSt & slag	1		1	1	1			1			1	1				
BH106_4.0-4.1	Sandy Clay	3.2		1		1	1												
BH107_0.4-0.5	Fill	0.2	Black-grey-orange sand with bricks								1								
BH107_0.5-0.6	Fill	0.3	Sand with slag, brick & ceramics	1		1	1												
BH107_1.5-1.7	Fill	3.5	Sand with glass, ash, ceramics & bricks	1		1	1							1			1		1
BH108_0.15-0.25	Fill	1.7	Sand with RB								1								
BH108_0.35-0.45	Fill	1.5	Sand with RB, FeSt, ceramics & glass			1	1				1								
BH108_1.3-1.4	Fill	2.4	Sand with ash & slag	1		1	1				1			1			1	1	1
BH108_2.3-2.4	Fill	0.7	Red-orange sand with FeSt & slag	1		1	1				1								
BH108_4.1-4.2	Fill	3.8	Red sand with FeSt & slag	1															
BH109_0.3-0.4	Fill	0.3	Dark grey sand with brick, ceramics & FeSt	1		1	1				1								
BH109_0.9-1.0	Fill	0.4	Crushed SST with glass, ceramics & slag	1		1	1							1			1		1
BH110_0.35-0.36	Fill	0.5	Dark grey sand with FeSt & slag	1		1	1	1			1								
BH110_0.4-0.6	Fill	0.4	Dark grey sand with FeSt, slag, metal, brick & glass			1	1				1								
BH110_1.2-1.3	Fill	0.7	Dark grey sand with SST			1	1												
BH111_0.3-0.4	Fill	0.2	Sand with FeSt, RB, slag & ceramics	1		1	1				1								
BH111_0.65-0.75	Fill	0.1	Red-brown sand with FeSt & ceramics			1	1				1			1					
BH113_0.2-0.3	Fill	1.3	Dark brown sand with slag & tiles	1		1	1	1			1								
BH113_0.6-0.7	Fill	0.2	Yellow/brown and orange sand with FeSt & glass	1		1	1				1								
BH114_0.45-0.55	Fill	0.1	Black sand with FeSt, slag, bricks, ceramics & plastic	1		1	1				1								
BH114_1.3-1.4	Fill	0	Brown sand with RB & FeSt	1		1	1										1		
BH115_0.6-0.7	Fill	0.2	Dark grey sand with FeSt and slag	1		1	1	1			1								
BH115_2.5-2.6	Fill	NR	Brown sand with RB, slag & ceramics	1		1	1						1	1					1
BH116_0.3-0.4	Fill	0.2	Brown sand with FeSt, brick & glass	1		1	1	1			1								
BH116_0.6-0.65	Fill	0.3	Black sand with slag, FeSt, brick & SST	1		1	1				1								
BH117_0.3-0.4	Fill	0.1	Orange & grey sand with FeSt & SST			1	1				1								
BH117_1.3-1.4	Fill	0.4	Black sand with FeSt, metal & glass			1	1				1								
BH117_2.2-2.3	Fill	0.3	Brown sand with RB, metal, glass & ceramics	1		1	1								1				
Subtotal, Primary Soil Samples				**63**	**0**	**72**	**88**	**17**	**3**	**18**	**28**	**3**	**3**	**11**	**6**	**2**	**5**	**1**	**6**
QC100	Split	-	BH22_4.5-4.7	1		1	1												
QC201	Split	-	BH07B_1.2-1.3	1		1	1	1	1			1							
QC105	Split	-	BH107_0.5-0.6	1		1	1												
QC102	Split	-	BH109_0.9-1.0	1		1	1												
QC106	Split	-	BH113_0.2-0.3	1		1	1												
QC101	Duplicate	-	BH09_4.0-4.2			1	1												
QC200	Duplicate	-	BH05_1.0-1.1			1	1												
QC202	Duplicate	-	BH21_0.7-0.8	1		1	1												
QC102	Duplicate	-	BH01_3.8-3.9	1															
QC111	Duplicate	-	BH03_1.0-1.2	1		1	1												
QC111	Duplicate	-	BH104_1.6-1.7	1		1	1												
QC100	Duplicate	-	BH106_0.2-0.3	1		1	1	1											
QC114	Duplicate	-	BH114_0.45-0.55	1		1	1												
Sub-total, Split Duplicates				5	0	5	5	1	1	0	0	1	0	0	0	0	0	0	0
Sub-total, Duplicates				6	0	7	7	1	0	0	0	0	0	0	0	0	0	0	0
Total Soil Samples				**74**	**0**	**84**	**100**	**19**	**4**	**18**	**28**	**4**	**3**	**11**	**6**	**2**	**5**	**1**	**6**

Notes:

NR = not recorded
RB = road base gravel
HCO = hydrocarbon odour

FeSt = ironstone-like gravels (red-orange). Possible foundry/casting sands
SST = sandstone
Orange shading: Lead > HIL D
Yellow shading: asbestos detected

Table 4 - Soil Results

Sample Location & Depth	Sample Date	Sample Type	PID	BTEX				TPH		TRH						PAH				Metals								OCP and OPP										VHC				Phenols		PCB
				Benzene	Toluene	Ethylbenzene	Xylenes	C6-C9	C10-C36	C6 - C10	C6 - C10 minus BTEX (F1)	>C10 - C16	>C10 - C16 minus Naphthalene (F2)	>C16 - C34 (F3)	>C34 - C40 (F4)	Naphthalene	Benzo(a)pyrene	Benzo(a)pyrene TEQ (LOR)	Sum of PAH	Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc	Mercury	Aldrin + Dieldrin	Chlordane	Endosulfan	Endrin	DDD + DDE + DDT	Heptachlor	Hexachlorobenzene (HCB)	Methoxychlor	Chlorpyrifos	Tetrachloroethene (PCE)	Trichloroethene (TCE)	Vinyl chloride	Carbon Tetrachloride	Phenol	Pentachlorophenol	PCB
ASC NEPM 2013 - HIL D																		40	4000	3000	900	3600	240000	1500	6000	400000	730	45	530	2000	100	3600	50	80	2500	2000					240000	660	7
HSL D, Vapour Intrusion (sand)			0-<1m	3	NL	NL	NL				260		NL			NL																									
			1m-<2m	3	NL	NL	NL				370		NL			NL																									
			2m-<4m	3	NL	NL	NL				630		NL			NL																									
			> 4m	3	NL	NL	NL				NL		NL			NL																									
CRC Care IMW, DIRECT CONTACT				1100	280000	85000	230000				82000		62000	85000	120000	29000																									
CRC Care HSL D, DIRECT CONTACT				430	99000	27000	81000				26000		20000	27000	38000	11000																									
NSW EPA (2014) - GSW (CT1)				10	288	600	1000	650	10000								0.8		200	100	20	100		100	40		4	<50	<50	60	<50	<50	<50	<50		4	14	10	4	10	288	<50	<50
NSW EPA (2014) - RSW (CT2)				40	1152	2400	4000	2600	40000								3.2		800	400	80	400		400	160		16	<50	<50	240	<50	<50	<50	<50		16	56	40	16	40	1152	<50	<50
BH01_1.0-1.1	21/08/2015	Fill	-	<0.2	<0.5	<0.5	<0.5	<10	990	<10	<10	<50	<50	910	240	0.6	29.1	41.9	278	14	2	58	3040	1510	26	1560	2.3	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.2	<0.05							<0.1
BH01_3.8-3.9	21/08/2015	Sandy Clay	-	<0.2	<0.5	<0.5	<0.5	<10	<50	<10	<10	<50	<50	<100	<100	<0.5	<0.5	1.2	<0.5																							
QC102	21/08/2015	BH01_3.8-3.9		<0.2	<0.5	<0.5	<0.5	<10	<50	<10	<10	<50	<50	<100	<100																										
BH02_0.4-0.5	29/08/2015	Fill	0.2	<0.2	<0.5	<0.5	<0.5	<10	<50	<10	<10	<50	<50	<100	<100	<0.5	<0.5	1.2	<0.5	<5	<1	7	140	79	3	106	0.2															
BH02_2.0-2.1	29/08/2015	Fill	2.9																	59	<1	33	783	1410	28	815	0.6															
BH02_3.0-3.1	29/08/2015	Silty Clay	14.1	<0.2	<0.5	<0.5	<0.5	<10	460	<10	<10	<50	<50	380	160																										
BH03_0.2-0.3	29/08/2015	Fill	2.1													<0.5	0.9	1.7	10.7	<5	<1	8	228	338	6	279	1.0														
BH03_1.0-1.2	29/08/2015	Fill	19.5	<0.2	<0.5	<0.5	<0.5	<10	440	<10	<10	<50	<50	380	110	0.6	6.9	10.1	94.0	6	<1	12	114	731	9	268	0.6														
QC111	29/08/2015	BH03_1.0-1.2		<0.2	<0.5	<0.5	<0.5	<10	370	<10	<10	<50	<50	310	<100	<0.5	5.0	7.2	63.3	60	7	68	2240	2230	107	3460	1.0														
BH03_3.0-3.1	29/08/2015	Fill	0.1	<0.2	<0.5	<0.5	<0.5	<10	<50	<10	<10	<50	<50	<100	<100					17	<1	23	14	31	12	85	<0.1															
BH04_0.5-0.6	20/08/2015	Fill	0.5	<0.2	<0.5	<0.5	<0.5	<10	<50	<10	<10	<50	<50	100	<100	<0.5	1.6	2.6	15.7	52	2	28	218	1030	48	1590	1.0														
BH04_1.0-1.1	20/08/2015	Fill	0.6													0.8	13.4	19.8	158	311	1	105	293	10400	24	1170	1.6														
BH04_2.3-2.4	20/08/2015	Silty Clay	0.1	<0.2	<0.5	<0.5	<0.5	<10	200	<10	<10	<50	<50	230	240					14	<1	26	17	67	4	46	<0.1															
BH05_0.5-0.6	20/08/2015	Fill	1.8	<0.2	<0.5	<0.5	<0.5	<10	<50	<10	<10	<50	<50	140	<100	<0.5	1.1	2.0	11.2	13	3	20	296	1470	26	4070	0.9	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.2	<0.05	<0.5	<0.5	<5	<0.5	<0.5	<2	<0.1
BH05_1.0-1.1	20/08/2015	Fill	0.4													<0.5	1.3	2.2	12.5	19	<1	70	321	1000	27	750	2.5														
QC200	20/08/2015	BH05_1.0-1.1														<0.5	<0.5	1.3	4.1	76	4	69	634	3180	42	890	15.2														
BH05_2.3-2.4	20/08/2015	Sandy Silt	0.7	<0.2	<0.5	<0.5	<0.5	<10	150	<10	<10	<50	<50	210	<100					12	<1	14	86	113	4	522	<0.1															
BH06_1.0-1.1	21/08/2015	Fill	0.2																	13	<1	8	71	313	6	366	0.3	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.2	<0.05							<0.1
BH07A_0.5-0.6	20/08/2015	Fill	0.1													<0.5	0.6	1.3	3.0	84	13	121	4410	6310	80	20400	0.7	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<1.0	<0.25							<0.1
BH07B_1.2-1.3	21/08/2015	Fill	0.9	<0.2	<0.5	<0.5	<0.5	<10	930	<10	<10	<50	<50	850	180	<0.5	1.9	3.0	16.0	8	2	128	85	7530	13	1120	6.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05							<0.1
QC201	21/08/2015	BH07B_1.2-1.3		<0.2	<0.5	<1	<2	<25	800	<25	<25	<50	<50	730	170	<0.1	1.6	2.2	12	25	3	180	430	14000	30	2600	15	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<1	<1	<1	<5		<0.1
BH07B_2.3-2.4	21/08/2015	Silty Clay	0.4	<0.2	<0.5	<0.5	<0.5	<10	400	<10	<10	<50	<50	360	100					26	1	19	183	372	22	1460	0.6															
BH08_0.17-0.18	20/08/2015	Fill	0.5																	19	1	24	1020	1060	23	1010	0.4	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.2	<0.05							<0.1
BH08_1.0-1.1	20/08/2015	Fill	0.2	<0.2	<0.5	<0.5	<0.5	<10	390	<10	<10	<50	<50	350	<100	<0.5	0.7	1.5	8.9	52	3	33	396	1930	39	2630	0.7														
BH08_2.5-2.6	20/08/2015	Fill	0.3													<0.5	1.4	2.9	25.2	42	3	200	1280	1470	51	4830	3.4														
BH08_3.7-3.8	20/08/2015	Silty Sand	0.5	<0.2	<0.5	<0.5	<0.5	<10	400	<10	<10	<50	<50	380	<100					18	<1	20	447	85	17	348	6.0															
BH09_0.25-0.35	21/08/2015	Fill	0.1													<0.5	<0.5	1.2	<0.5	<5	<1	6	7	6	<2	30	<0.1														
BH09_4.0-4.2	21/08/2015	Fill	0.4													<0.8	<0.8	1.2	<0.5	218	25	435	4340	3710	240	14200	2.7														
QC101	21/08/2015	BH09_4.0-4.2														<0.5	<0.5	1.2	<0.5	80	9	106	3150	3480	214	4780	0.8														
BH09_4.5-4.6	21/08/2015	Sandy Clay	390.1	<0.2	<0.5	<0.5	<0.5	<10	<50	<10	<10	<50	<50	<100	<100	<0.8	<0.8	1.2	<0.5	19	<1	31	10	13	10	21	<0.1										<0.5	<0.5	<5	<0.5	<0.8	<2	
BH10_0.15-0.25	21/08/2015	Fill	0.1																									<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.2	<0.05							<0.1
BH10_4.0-4.1	21/08/2015	Clayey Sand	20.1	<0.2	<0.5	<0.5	<0.5	<10	<50	<10	<10	<50	<50	<100	<100					26	<1	31	69	189	16	417	<0.1															
BH11_0.2-0.3	20/08/2015	Fill	0.1													<0.5	0.9	1.7	10.4	26	2	39	482	3480	96	1540	0.5														
BH11_2.3-2.4	20/08/2015	Fill	0.8	<0.2	<0.5	<0.5	<0.5	<10	<50	<10	<10	<50	<50	150	<100	<0.5	<0.5	1.2	<0.5	56	5	125	23300	2590	226	6980	0.1														
BH11_3.3-3.4	20/08/2015	Sandy Silt	0.5	<0.2	<0.5	<0.5	<0.5	<10	770	<10	<10	<50	<50	650	310					22	<1	23	78	142	15	550	0.3															
BH12_0.15-0.25	21/08/2015	Fill	0.1													<0.5	1.1	2.0	11.1	41	6	36	2460	2290	75	5200	1.7														
BH12_1.0-1.1	21/08/2015	Fill	0.1																	34	2	47	12400	1530	57	2040	1.0														
BH12_3.6-3.7	21/08/2015	Fill	3.5	<0.2	<0.5	<0.5	<0.5	<10	1820	<10	<10	70	70	1660	430					385	9	36	576	2770	37	5750	0.9														
BH13_0.4-0.5	20/08/2015	Fill	0.1													<0.5	1.6	2.6	16.0	35	10	258	971	1420	58	3040	0.9														
BH13_3.6-3.7	20/08/2015	Silty Sand	6.6																									<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.2	<0.05							<0.1
BH14_0.45-0.55	21/08/2015	Fill	-																									<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.2	<0.05							<0.1
BH14_1.8-1.9	21/08/2015	Fill	0.6													<0.5	<0.5	1.2	<0.5	30	3	29	298	478	23	2060	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.2	<0.05							<0.1
BH14_4.0-4.1	21/08/2015	Sandy Clay	150.1	<0.2	<0.5	<0.5	<0.5	<10	<50	<10	<10	<50	<50	<100	<100																						<0.5	<0.5	<5	<0.5	<0.5	<2	
BH15_0.4-0.5	21/08/2015	Fill	0.1													<0.5	<0.5	1.2	<0.5	<5	<1	100	28	5	89	46	<0.1														
BH16_0.7-0.8	21/08/2015	Fill	0	<0.2	<0.5	<0.5	<0.5	<10	<50	<10	<10	<50	<50	<100	<100	<0.5	<0.5	1.2	<0.5	49	15	429	5480	2250	520	11600	0.4	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.2	<0.05							<0.1
BH16_2.0-2.1	22/08/2015	Fill	0.9	<0.2	<0.5	<0.5	<0.5	<10	450	<10	<10	<50	<50	370	220					136	19	109	3520	3290	167	7710	20.4															
BH16_3.0-3.1	22/08/2015	Fill	4.3																	71	10	182	7430	4370	254	14000	1.7														
BH17_1.0-1.1	21/08/2015	Fill	0.1	<0.2	<0.5	<0.5	<0.5	<10	<50	<10	<10	<50	<50	<100	<100					62	16	54	26400	6060	1320	21400	0.1															
BH17_2.0-2.1	22/08/2015	Fill	15.2	<0.2	<0.5	<0.5	<0.5	<10	25400	16	16	2610	2610	22300	1620	<0.5	<0.5	1.2	8.7	62	4	607	12200	1150	738	2560	0.1														
BH18_0.7-0.8	29/08/2015	Fill	0	<0.2	<0.5	<0.5	<0.5	<10	<50	<10	<10	<50	<50	<100	<100	<50	<0.5	1.2	<0.5	20	2	28	476	469	68	704	0.1														
BH18_2.0-2.1	29/08/2015	Fill	0.2														<0.5	1.2	<0.5	48	<1	63	294	1610	45	2240	<0.1														
BH19_2.0-2.2	22/08/2015	Fill	1.9	<0.2	<0.5	<0.5	<0.5	<10	550	<10	<10	<50	<50	440	270					54	1	33	299	559	21	5700	0.7														
BH20_0.5-0.6	29/08/2015	Fill	0.2														<0.5	1.2	<0.5	<5	<1	8	10	29	6	53	<0.1														
BH20_1.0-1.1	29/08/2015	Fill	0.4														<0.5	1.2	<0.5	116	4	9	208	2030	41	4290	<0.1														
BH20_2.0-2.1	29/08/2015	Fill	0.3	<0.2	<0.5	<0.5	<0.5			<10	<10	140	140	3940	780	4860																									
BH21_0.7-0.8	21/08/2015	Fill	0.1	<0.2	<0.5	<0.5	<0.5	<10	58500	<10	<10	7440	7400	**47500**	10100	57.3	102	159	2170	31	1	12	155	234	23	367	0.3														
QC202	21/08/2015	BH21_0.7-0.8		<0.2	<0.5	<0.5	<0.5	<10	38200	<10	<10	3740	3720	**31900**	6230	50.0	106	158	2320	39	1	10	140	201	33	382	0.3														
BH21_2.7-2.8	22/08/2015	Fill	0.2	0.9	<0.5	<0.5	<0.5	<10	1180	<10	<10	80	80	960	500					28	3	244	337	4430	86	3170	3.2														
BH21_3.0-3.1	22/08/2015	Sand	2.1	<0.2	<0.5	<0.5	<0.5	<10	110	<10	<10	<50	<50	150	<100	<0.5	<0.5	1.2	<0.5	<5	<1	7	11	42	6	90	<0.1														
BH22_0.8-0.9	21/08/2015	Fill	0.1													4.6	50.9	64.1	699	357	1	19	444	554	12	862	0.8														
BH22_2.2-2.3	21/08/2015	Fill	0.1	<0.2	<0.5	<0.5	<0.5	<10	<50	<10	<10	<50	<50	<100	<100	<0.5	<0.5	1.2	<0.5	119	3	29	550	6300	2700	14500	0.3														
BH22_4.5-4.7	21/08/2015	Sandy Clay	26.7	<0.2	<0.5	<0.5	<0.5	<10	<50	<10	<10	<50	<50	<100	<100	<0.5	<0.5	1.2	<0.5	13	<1	20	6	14	7	26	<0.1														
QC100	21/08/2015	BH22_4.5-4.7		<0.2	<0.5	<1	<2	<25	<50	<25	<25	<50	<50	<100	<100	<0.1	<0.05	<0.5	<0.1	9	<0.4	11	8	29	6	64	<0.1														
BH100_0.7-0.8	03/02/2020	Fill	0	<0.2	<0.5	<0.5	<0.5	<10	270	<10	<10	<50	<50	230	<100	<0.5	3.6	5.2	40.2	32	<1	116	180	1230	23	593	1.7														
BH100_0.8-0.9	03/02/2020	Fill	0.6	<0.2	<0.5	<0.5	<0.5	<10	<50	<10	<10	<50	<50	<100	<100	<0.5	<0.5	1.2	<0.5	12	3	8	265	278	11	428	2.5														
BH101_0.16-0.26	31/01/2020	Fill	NR																									<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.2	<0.05							<0.1
BH101_0.7-0.8	31/01/2020	Fill	NR	<0.2	<0.5	<0.5	<0.5	<10	260	<10	<10	<50	<50	230	<100	<0.5	0.7	1.5	6.2	59	4	50	1310	2490	81	2410	1.2														
BH101_2.2-2.3	31/01/2020	Fill	0	<0.2	<0.5	<0.5	<0.5	<10	340	<10	<10	<50	<50	280	110	<0.5	2.0	3.1	18.7	56	6	153	1440	2430	138	3410	9.5														
BH102_0.3-0.4	31/01/2020	Fill	0.3													<0.5	<0.5	1.2	<0.5	<5	<1	5	23	71	3	49	0.1														
BH102_0.5-0.6	31/01/2020	Fill	0	<0.2	<0.5	<0.5	<0.5	<10	250	<10	<10	<50	<50	200	<100	<0.5	3.3	4.7	32.3	9	<1	19	367	2010	12	712	56.4														
BH103_0.15-0.25	03/02/2020	Fill	0.1	<0.2	<0.5	<0.5	<0.5	<10	<50	<10	<10	<50	<50	<100	<100	<0.5	<0.5	1.2	<0.5	<5	<1	6	10	19	3	31	<0.1														
BH103_0.85-0.95	03/02/2020	Fill	0.1													<0.5	4.6	6.5	50.8	40	<1	9	93	319	12	304	0.7														
BH103_2.0-2.1	03/02/2020	Fill	0.1													<0.5	3.4	5.1	31.8	66	13	34	2540	1090	39	17500	1.4														
BH104_0.8-0.9	03/02/2020	Fill	0.1	<0.2	<0.5	<0.5	<0.5	<10	640	<10	<10	<50	<50	580	<100	<0.5	2.3	3.5	25.6	10	<1	8	53	171	19	170	0.7														
BH104_1.6-1.7	03/02/2020	Fill	0.2	<0.2	<0.5	<0.5	<0.5	<10	1130	<10	<10	<50	<50	1000	210	<0.5	3.6	5.2	36.5	31	5	42	540	1610	66	3720	1.1														
QC111	03/02/2020	BH104_1.6-1.7		<0.2	<0.5	<0.5	<0.5	<10	730	<10	<10	<50	<50	620	180	<0.5	3.1	4.6	29.9	35	4	32	685	1900	65	3350	1.2														
BH104_2.0-2.2	03/02/2020	Fill	0.1	<0.2	<0.5	<0.5	<0.5	<10	1040	<10	<10	<50	<50	930	200	<1																									
BH105_0.4-0.5	31/01/2020	Fill	0.1	<0.2	<0.5	<0.5	<0.5	<10	180	<10	<10	<50	<50	210	140	<0.5	<0.5	1.2	<0.5	8	<1	16	336	606	20	676	0.1														
BH105_0.85-0.95	31/01/2020	Fill	0.1	<0.2	<0.5	<0.5	<0.5	<10	400	<10	<10	<50	<50	330	150	<0.5	3.4	5.3	31.2	25	3	20	2130	2260	135	4890	0.4														

Table 4 - Soil Results

Sample Location & Depth	Sample Date	Sample Type	PID	BTEX				TPH		TRH						PAH				Metals								OCP and OPP										VHC				Phenols		PCB
				Benzene	Toluene	Ethylbenzene	Xylenes	C6-C9	C10-C36	C6 - C10	C6 - C10 minus BTEX (F1)	>C10 - C16	>C10 - C16 minus Naphthalene (F2)	>C16 - C34 (F3)	>C34 - C40 (F4)	Naphthalene	Benzo(a)pyrene	Benzo(a)pyrene TEQ (LOR)	Sum of PAH	Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc	Mercury	Aldrin + Dieldrin	Chlordane	Endosulfan	Endrin	DDD + DDE + DDT	Heptachlor	Hexachlorobenzene (HCB)	Methoxychlor	Chlorpyrifos	Tetrachloroethene (PCE)	Trichloroethene (TCE)	Vinyl chloride	Carbon Tetrachloride	Phenol	Pentachlorophenol	PCB
ASC NEPM 2013 - HIL D																		40	4000	3000	900	3600	240000	1500	6000	400000	730	45	530	2000	100	3600	50	80	2500	2000					240000	660	7
HSL D, Vapour Intrusion (sand)			0-<1m	3	NL	NL	230				260		NL			NL																									
			1m-<2m	3	NL	NL	NL				370		NL			NL																									
			2m-<4m	3	NL	NL	NL				630		NL			NL																									
			> 4m	3	NL	NL	NL				NL		NL			NL																									
CRC Care IMW, DIRECT CONTACT				1100	280000	85000	230000				82000		62000	85000	120000	29000																									
CRC Care HSL D, DIRECT CONTACT				430	99000	27000	81000				26000		20000	27000	38000	11000																									
NSW EPA (2014) - GSW (CT1)				10	288	600	1000	650	10000								0.8		200	100	20	100		100	40		4	<50	<50	60	<50	<50	<50	<50		4	14	10	4	10	288	<50	<50
NSW EPA (2014) - RSW (CT2)				40	1152	2400	4000	2600	40000								3.2		800	400	80	400		400	160		16	<50	<50	240	<50	<50	<50	<50		16	56	40	16	40	1152	<50	<50
BH105_1.7-1.8	31/01/2020	Fill	0.1													<0.5	<0.5	1.2	<0.5	66	7	76	431	11800	283	1320	0.3															
BH106_0.2-0.3	28/01/2020	Fill	1.7	<0.2	<0.5	<0.5	<0.5	<10	120	<10	<10	<50	<50	180	<100	<0.5	1.9	2.9	14.8	6	2	9	86	232	12	426	0.3	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05							<0.1
QC100	28/01/2020	BH106_0.2-0.3		<0.2	<0.5	<0.5	<0.5	<10	110	<10	<10	<50	<50	170	<100	<0.5	3.1	4.5	28.9	6	<1	8	46	113	10	106	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05							<0.1
BH106_4.0-4.1	28/01/2020	Sandy Clay	3.2	<0.2	<0.5	<0.5	<0.5	<10	<50	<10	<10	<50	<50	<100	<100	<0.5	<0.5	1.2	<0.5	8	<1	6	7	18	3	111	<0.1															
BH107_0.5-0.6	28/01/2020	Fill	0.3	<0.2	<0.5	<0.5	<0.5	<10	100	<10	<10	<50	<50	150	<100	<0.5	<0.5	1.2	<0.5	8	6	29	785	280	179	307	0.6															
QC 105	29/01/2020	BH107_0.5-0.6		<0.2	<0.5	<1	<3	<25	<50	<25	<25	<50	<50	140	<100	<0.1	0.1	<0.5	1.6	7	4.4	22	530	260	170	350	0.4															
BH107_1.5-1.7	28/01/2020	Fill	3.5	<0.2	<0.5	<0.5	<0.5	<10	<50	<10	<10	<50	<50	<100	<100	<0.5	<0.5	1.2	<0.5	94	2	180	986	5350	185	1110	1.0															
BH108_0.35-0.45	28/01/2020	Fill	1.5													<0.5	<0.5	1.2	<0.5	6	<1	46	171	255	95	238	<0.1															
BH108_1.3-1.4	28/01/2020	Fill	2.4	<0.2	<0.5	<0.5	<0.5	<10	<50	<10	<10	<50	<50	<100	<100	<0.5	<0.5	1.2	<0.5	30	96	320	15500	3160	823	23400	<0.1															
BH108_2.3-2.4	28/01/2020	Fill	0.7	<0.2	<0.5	<0.5	<0.5	<10	<50	<10	<10	<50	<50	<100	<100	<0.5	<0.5	1.2	<0.5	48	5	300	5050	3880	65	4280	<0.1															
BH108_4.1-4.2	28/01/2020	Fill	3.8	<0.2	<0.5	<0.5	<0.5	<10	<50	<10	<10	<50	<50	<100	<100																											
BH109_0.3-0.4	28/01/2020	Fill	0.3	<0.2	<0.5	<0.5	<0.5	<10	110	<10	<10	<50	<50	160	<100	<0.5	<0.5	1.2	<0.5	9	1	16	369	435	49	820	0.4															
BH109_0.9-1.0	28/01/2020	Fill	0.4	<0.2	<0.5	<0.5	<0.5	<10	<50	<10	<10	<50	<50	<100	<100	<0.5	<0.5	1.2	<0.5	28	13	241	10800	3780	241	12400	2.2															
QC 102	29/01/2020	BH109_0.9-1.0		<0.2	<0.5	<1	<3	<25	<50	<25	<25	<50	<50	<100	<100	<0.1	<0.05	<0.5	<0.05	44	10	260	42000	4500	230	12000	2.8															
BH110_0.35-0.36	28/01/2020	Fill	0.5	<0.2	<0.5	<0.5	<0.5	<10	910	<10	<10	<50	<50	740	340	<0.5	1.8	2.9	19.2	18	5	30	395	2520	71	4030	0.4	1.32	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05							<0.1
BH110_0.4-0.6	28/01/2020	Fill	0.4													<0.5	<0.5	1.2	6.3	48	6	60	1260	3960	91	2120	1.4															
BH110_1.2-1.3	28/01/2020	Fill	0.7													<0.5	2.8	4.1	25.7	32	2	20	336	1350	16	828	0.2															
BH111_0.3-0.4	30/01/2020	Fill	0.2	<0.2	<0.5	<0.5	<0.5	<10	<50	<10	<10	<50	<50	<100	<100	<0.5	<0.5	1.2	<0.5	41	7	210	3350	4530	337	3400	<0.1															
BH111_0.65-0.75	30/01/2020	Fill	0.1													<0.5	<0.5	1.2	<0.5	102	12	120	4920	8960	179	14000	<0.1															
BH113_0.2-0.3	29/01/2020	Fill	1.3	<0.2	<0.5	<0.5	<0.5	<10	<50	<10	<10	<50	<50	<100	<100	<0.5	<0.5	1.2	<0.5	46	2	28	776	4840	69	1160	1.0	0.34	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05							<0.1
QC 106	29/01/2020	BH113_0.2-0.3		<0.2	<0.5	<1	<3	<25	240	<25	<25	<50	<50	210	<100	<0.1	0.5	0.7	4.5	12	1	16	110	330	17	450	0.4															
BH113_0.6-0.7	29/01/2020	Fill	0.2	<0.2	<0.5	<0.5	<0.5	<10	270	<10	<10	<50	<50	240	<100	<0.5	<0.5	1.2	1.5	18	1	22	732	336	21	752	0.4															
BH114_0.45-0.55	03/02/2020	Fill	0.1	<0.2	<0.5	<0.5	<0.5	<10	440	<10	<10	<50	<50	390	110	<0.5	0.6	1.4	3.6	30	16	186	1190	4520	592	2890	1.0															
QC114	03/02/2020	BH114_0.45-0.55		<0.2	<0.5	<0.5	<0.5	<10	320	<10	<10	<50	<50	290	<100	<0.5	<0.5	1.2	2.1	33	55	234	1570	6150	456	3310	1.3															
BH114_1.3-1.4	3/02/2020	Fill	0	<0.2	<0.5	<0.5	<0.5	<10	280	<10	<10	<50	<50	240	<100	<0.5	<0.5	1.2	<0.5	55	23	1240	2870	4600	885	9880	2.8															
BH115_0.6-0.7	29/01/2020	Fill	0.2	<0.2	<0.5	<0.5	<0.5	<10	110	<10	<10	<50	<50	170	<100	<0.5	<0.5	1.2	1.0	45	1	90	407	522	160	776	0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05							<0.1
BH115_2.5-2.6	29/01/2020	Fill	NR	<0.2	<0.5	<0.5	<0.5	<10	<50	<10	<10	<50	<50	<100	<100	<0.5	<0.5	1.2	<0.5	117	13	38	872	6390	145	2930	<0.1															
BH116_0.3-0.4	30/01/2020	Fill	0.2	<0.2	<0.5	<0.5	<0.5	<10	<50	<10	<10	<50	<50	<100	<100	<0.5	<0.5	1.2	<0.5	23	<1	11	83	192	20	217	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05							<0.1
BH116_0.6-0.65	30/01/2020	Fill	0.3	<0.2	<0.5	<0.5	<0.5	<10	<50	<10	<10	<50	<50	180	<100	<0.5	0.6	1.3	3.2	32	<1	26	384	1280	28	915	0.6															
BH117_0.3-0.4	30/01/2020	Fill	0.1													<0.5	<0.5	1.2	<0.5	<5	<1	6	6	30	8	21	<0.1															
BH117_1.3-1.4	30/01/2020	Fill	0.4													<0.5	6.6	9.6	62.3	27	2	51	964	2260	55	1430	2.0															
BH117_2.2-2.3	30/01/2020	Fill	0.3	<0.2	<0.5	<0.5	<0.5	<10	1450	<10	<10	<50	<50	1310	260	<0.5	8.7	12.6	95.5	52	7	90	1250	2240	64	3720	1.0															
n samples				74				74		74						84				100								19										4				4		19
n > criteria				0				n/a		n/a	0	n/a	0	**2**	0	0	n/a	**4**	0	0	0	0	0	**46**	0	0	0						0						n/a				0		0
minimum				<0.2	<0.5	<0.5	<0.5	<10	<50	<10	<10	<50	<50	<100	<100	<0.5	<0.5	<0.5	<0.5	<5	<0.4	6	6	5	<2	21	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.5	<0.5	<1	<0.5	<0.5	<2	<0.1
maximum				0.9	<0.5	<1	<2	<25	58500	<25	16	7440	7400	47500	10100	4860	106	159	2320	385	96	1240	42000	14000	2700	23400	56.4	1.32	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.25	<1	<1	<5	<1	<5	<2	<0.1

Notes

Results = mg/kg
LOR = limit of reporting
< # = not detected above LOR
RPD = Relative Percent Difference
nc = not calculated, result(s) < LOR
Bold RPD = RPD > DQI
HSL D / HIL D = commercial/industrial land use
Shade + Bold = result > criteria
NL = not limiting

Table 5 - Asbestos

Sample Location_Depth	Sample Date	Sample Type	Asbestos Detected	Asbestos (trace)(fibres)	Asbestos Type	Asbestos Containing Material (as 15% Asbestos in ACM >7mm)	Asbestos (Fines and Fibrous FA+AF)	Description
ASC NEPM 2013 - HSL D						**0.05**	**0.001**	
		Units	g/kg	Fibres		% w/w	% w/w	
		LOR	0.1	5		0.01	0.001	
BH01_0.3-0.4	21/08/2015	Fill	**Yes**		Ch			One loose bundle of friable asbestos fibres approximately 3 x 1 x 0.5mm.
BH02_0.4-0.5	29/08/2015	Fill	No					
BH03_0.2-0.3	29/08/2015	Fill	No					
BH03_1.0-1.2	29/08/2015	Fill	**Yes**		Ch			Several friable asbestos fibre bundles approx 5 x 2 x 2mm
BH06_1.0-1.1	21/08/2015	Fill	No					
BH07A_0.5-0.6	20/08/2015	Fill	**Yes**		Ch			One loose bundle of friable asbestos fibres approximately 4 x 1 x 0.5mm.
BH07B_1.2-1.3	21/08/2015	Fill	No					
BH12_1.8-1.9	21/08/2015	Fill	No					
BH15_0.4-0.5	21/08/2015	Fill	No					
BH18_0.7-0.8	29/08/2015	Fill	No					
BH20_0.5-0.6	29/08/2015	Fill	No					
BH20_1.0-1.1	29/08/2015	Fill	No					
BH21_0.7-0.8	21/08/2015	Fill	**Yes**		Ch			Several pieces of heavily degraded and friable asbestos fibre board approximately 60 x 30 x 3mm. Soil debris containing several loose bundles of friable asbestos fibres approximately 2 x 1 x 0.5mm.
BH22_0.3-0.4	21/08/2015	Fill	**Yes**		Ch, Am			Two pieces of bonded abestos cement sheeting approximately 45 x 35 x 5mm plus several pieces of friable asbestos cement sheeting approximately 4 x 4 x 1mm.
BH22_0.45	21/08/2015	Fragment	**Yes**		Ch, Am			One piece of bonded asbestos cement sheeting approx 90 x 60 x 5 mm.
SS01	29/08/2015	Fill	**Yes**		Ch, Am			Two pieces of friable asbestos fibre board approx 4 x 3 x 2 mm and several loose bundles of friable asbestos fibres approx 2 x 1 x 0.5 mm.
SS02	29/08/2015	Fill	**Yes**		Ch, Cr			Four pieces of bonded asbestos cement sheeting approx 40 x 40 x 5 mm, several pieces of friable asbestos cement sheeting approx 7 x 6 x 4 mm and several loose bundles of friable asbestos fibres approx 2 x 1 x 0.5 mm.
SS04-FRAG	29/08/2015	Fragment	**Yes**		Ch, Am			Five pieces of bonded asbestos cement sheeting approx 50 x 30 x 5 mm.
BH100_0.7-0.8	03/02/2020	Fill	No	No		<0.01	<0.001	
BH100_0.8-0.9	03/02/2020	Fill	No	No		<0.01	<0.001	
BH101_1.3-1.4	31/01/2020	Fill	**Yes**	No	Ch	<0.01	**0.031**	Many large asbestos fibre bundles approximately 10x4x2mm.
BH102_0.5-0.6	31/01/2020	Fill	No	No		<0.01	<0.001	
BH103_0.15-0.25	03/02/2020	Fill	No	No		<0.01	<0.001	
BH103_2.0-2.1	03/02/2020	Fill	No	No		<0.01	<0.001	
BH104_0.8-0.9	03/02/2020	Fill	No	No		<0.01	<0.001	
BH104_1.6-1.7	03/02/2020	Fill	No	No		<0.01	<0.001	
BH105_0.4-0.5	31/01/2020	Fill	No	No		<0.01	<0.001	
BH106_0.2-0.3	28/01/2020	Fill	No	No		<0.01	<0.001	
BH107_0.4-0.5	28/01/2020	Fill	**No***	No	Ch	<0.01	**0.002**	One fragment of degraded asbestos fibre board approximately 10x5x2 mm.
BH108_0.15-0.25	28/01/2020	Fill	No	No		<0.01	<0.001	
BH108_0.35-0.45	28/01/2020	Fill	No	No		<0.01	<0.001	
BH108_1.3-1.4	28/01/2020	Fill	No	No		<0.01	<0.001	
BH108_2.3-2.4	28/01/2020	Fill	No	No		<0.01	<0.001	
BH109_0.3-0.4	28/01/2020	Fill	**Yes**	No	Ch, Am, Cr	<0.01	**0.029**	Many fragments of degraded asbestos cement sheeting and large loose asbestos fibre bundles approximately 10x5x2 mm.
BH110_0.35-0.36	28/01/2020	Fill	**Yes**	No	Ch, Am, Cr	**0.50**	**0.020**	Two pieces of asbestos cement sheeting approximately 40x30x5 mm, one fragment of asbestos cement debris approximately 10x5x2 mm and loose asbestos fibre bundles.
BH110_0.4-0.6	28/01/2020	Fill	**Yes**	Yes	Ch, Am, Cr	0.03	**0.038**	Two pieces of asbestos cement sheeting approximately 20x15x2 mm and plenty of loose asbestos fibre bundles throughout.
BH111_0.3-0.4	30/01/2020	Fill	No	No		<0.01	<0.001	
BH111_0.65-0.75	30/01/2020	Fill	No	No		<0.01	<0.001	
BH113_0.2-0.3	29/01/2020	Fill	**Yes**	No	Ch	<0.01	**0.012**	Several fragments of degraded asbestos fibre board debris and several loose asbestos fibre bundles.
BH113_0.6-0.7	29/01/2020	Fill	No	No		<0.01	<0.001	
BH114_0.45-0.55	03/02/2020	Fill	**Yes**	No	Ch, Am	**0.20**	**0.110**	One piece of fibrous asbestos fibre board approximately 20x10x5 mm, several pieces of asbestos cement sheeting approximately 30x30x5 mm and plenty of smaller fragments of fibrous asbestos fibre board.
BH115_0.6-0.7	29/01/2020	Fill	**Yes**	No	Ch, Am	<0.01	**0.011**	One piece of asbestos rope-like material approximately 15x2x2 mm and one piece of asbestos cement sheeting approximately 5x5x2 mm with loose asbestos fibre bundles.
BH116_0.3-0.4	30/01/2020	Fill	No	No		<0.01	<0.001	
BH116_0.6-0.65	30/01/2020	Fill	No	No		<0.01	<0.001	
BH117_0.3-0.4	30/01/2020	Fill	No	No		<0.01	<0.001	
BH117_1.3-1.4	30/01/2020	Fill	**No***	No	Ch	<0.01	<0.001	One asbestos fibre bundle approximately 5x1x0.5 mm.

Notes

LOR = limit of reporting
< # = not detected above LOR
HSL D = commercial/industrial land use
Shade + Bold = result > HSL D
Not applicable due to the laboratory method
Ch = chrysotile, Cr = crocidolite, A = amosite
No* = asbestos present at concentrations below the LOR

n samples	28	28
n > criteria	**2**	**8**

NB: n samples and results > criteria applies to 2020 samples only

Table 6 - MLs and ESLs

Sample Location & Depth	Sample Date	Sample Type	PID	BTEX				TRH					
				Benzene	Toluene	Ethylbenzene	Xylenes	C6 - C10	C6 - C10 minus BTEX (F1)	>C10 - C16	>C10 - C16 minus Naphthalene (F2)	>C16 - C34 (F3)	>C34 - C40 (F4)
ESL - coarse soil (C/I)				**75**	**135**	**165**	**180**		**215**		**170**	**1700**	**3300**
Management Limits - coarse soil (C/I)									**700**		**1000**	**3500**	**10000**
BH01_1.0-1.1	21/08/2015	Fill	-	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	910	240
BH01_3.8-3.9	21/08/2015	Sandy Clay	-	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	<100	<100
QC102	21/08/2015	BH01_3.8-3.9		<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	<100	<100
BH02_0.4-0.5	29/08/2015	Fill	0.2	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	<100	<100
BH02_3.0-3.1	29/08/2015	Silty Clay	14.1	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	380	160
BH03_3.0-3.1	29/08/2015	Fill	0.1	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	<100	<100
BH03_1.0-1.2	29/08/2015	Sandy Clay	19.5	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	380	110
QC111	29/08/2015	BH03_1.0-1.2		<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	310	<100
BH04_0.5-0.6	20/08/2015	Fill	0.5	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	100	<100
BH04_2.3-2.4	20/08/2015	Silty Clay	0.1	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	230	240
BH05_0.5-0.6	20/08/2015	Fill	1.8	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	140	<100
BH05_2.3-2.4	20/08/2015	Sandy Silt	0.7	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	210	<100
BH07B_1.2-1.3	21/08/2015	Fill	0.9	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	850	180
QC201	21/08/2015	BH07B_1.2-1.3		<0.2	<0.5	<1	<2	<25	<25	<50	<50	730	170
BH07B_2.3-2.4	21/08/2015	Silty Clay	0.4	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	360	100
BH08_1.0-1.1	20/08/2015	Fill	0.2	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	350	<100
BH08_3.7-3.8	20/08/2015	Silty Sand	0.5	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	380	<100
BH09_4.5-4.6	21/08/2015	Sandy Clay	390.1	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	<100	<100
BH10_4.0-4.1	21/08/2015	Clayey Sand	20.1	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	<100	<100
BH11_2.3-2.4	20/08/2015	Fill	0.8	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	150	<100
BH11_3.3-3.4	20/08/2015	Sandy Silt	0.5	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	650	310
BH12_3.6-3.7	21/08/2015	Fill	3.5	<0.2	<0.5	<0.5	<0.5	<10	<10	70	70	1660	430
BH14_4.0-4.1	21/08/2015	Sandy Clay	150.1	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	<100	<100
BH16_0.7-0.8	21/08/2015	Fill	0	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	<100	<100
BH16_2.0-2.1	22/08/2015	Fill	0.9	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	370	220
BH17_1.0-1.1	21/08/2015	Fill	0.1	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	<100	<100
BH17_2.0-2.1	22/08/2015	Fill	15.2	<0.2	<0.5	<0.5	<0.5	16	16	2610	**2610**	**22300**	1620
BH18_0.7-0.8	29/08/2015	Fill	0	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	<100	<100
BH19_2.0-2.2	22/08/2015	Fill	1.9	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	440	270
BH20_2.0-2.1	29/08/2015	Fill	0.3	<0.2	<0.5	<0.5	<0.5	<10	<10	140	140	**3940**	780
BH21_0.7-0.8	21/08/2015	Fill	0.1	<0.2	<0.5	<0.5	<0.5	<10	<10	7440	**7400**	**47500**	**10100**
QC202	21/08/2015	BH21_0.7-0.8		<0.2	<0.5	<0.5	<0.5	<10	<10	3740	**3720**	**31900**	**6230**
BH21_2.7-2.8	22/08/2015	Fill	0.2	0.9	<0.5	<0.5	<0.5	<10	<10	80	80	960	500
BH21_3.0-3.1	22/08/2015	Sand	2.1	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	150	<100
BH22_2.2-2.3	21/08/2015	Fill	0.1	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	<100	<100
BH22_4.5-4.7	21/08/2015	Sandy Clay	26.7	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	<100	<100
QC100	21/08/2015	BH22_4.5-4.7		<0.2	<0.5	<1	<2	<25	<25	<50	<50	<100	<100
BH100_0.7-0.8	03/02/2020	Fill	0	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	230	<100
BH100_0.8-0.9	03/02/2020	Fill	0.6	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	<100	<100
BH101_0.7-0.8	31/01/2020	Fill	NR	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	230	<100
BH101_2.2-2.3	31/01/2020	Fill	0	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	280	110
BH102_0.5-0.6	31/01/2020	Fill	0	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	200	<100
BH103_0.15-0.25	03/02/2020	Fill	0.1	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	<100	<100
BH104_0.8-0.9	03/02/2020	Fill	0.1	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	580	<100
BH104_1.6-1.7	03/02/2020	Fill	0.2	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	1000	210
QC111	03/02/2020	BH104_1.6-1.7		<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	620	180
BH104_2.0-2.2	03/02/2020	Fill	0.1	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	930	200
BH105_0.4-0.5	31/01/2020	Fill	0.1	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	210	140
BH105_0.85-0.95	31/01/2020	Fill	0.1	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	330	150
BH106_0.2-0.3	28/01/2020	Fill	1.7	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	180	<100
QC100	28/01/2020	BH106_0.2-0.3		<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	170	<100
BH106_4.0-4.1	28/01/2020	Sandy Clay	3.2	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	<100	<100
BH107_0.5-0.6	28/01/2020	Fill	0.3	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	150	<100
QC 105	29/01/2020	BH107_0.5-0.6		<0.2	<0.5	<1	<3	<25	<25	<50	<50	140	<100
BH107_1.5-1.7	28/01/2020	Fill	3.5	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	<100	<100
BH108_1.3-1.4	28/01/2020	Fill	2.4	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	<100	<100
BH108_2.3-2.4	28/01/2020	Fill	0.7	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	<100	<100
BH108_4.1-4.2	28/01/2020	Fill	3.8	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	<100	<100
BH109_0.3-0.4	28/01/2020	Fill	0.3	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	160	<100
BH109_0.9-1.0	28/01/2020	Fill	0.4	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	<100	<100
QC 102	29/01/2020	BH109_0.9-1.0		<0.2	<0.5	<1	<3	<25	<25	<50	<50	<100	<100
BH110_0.35-0.36	28/01/2020	Fill	0.5	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	740	340
BH111_0.3-0.4	30/01/2020	Fill	0.2	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	<100	<100
BH113_0.2-0.3	29/01/2020	Fill	1.3	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	<100	<100
QC 106	29/01/2020	BH113_0.2-0.3		<0.2	<0.5	<1	<3	<25	<25	<50	<50	210	<100
BH113_0.6-0.7	29/01/2020	Fill	0.2	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	240	<100
BH114_0.45-0.55	03/02/2020	Fill	0.1	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	390	110
QC114	03/02/2020	BH114_0.45-0.55		<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	290	<100
BH114_1.3-1.4	03/02/2020	Fill	0	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	240	<100
BH115_0.6-0.7	29/01/2020	Fill	0.2	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	170	<100
BH115_2.5-2.6	29/01/2020	Fill	NR	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	<100	<100
BH116_0.3-0.4	30/01/2020	Fill	0.2	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	<100	<100
BH116_0.6-0.65	30/01/2020	Fill	0.3	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	180	<100
BH117_2.2-2.3	30/01/2020	Fill	0.3	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	1310	260

Notes	**n samples**	74				74					
Results = mg/kg	**n > ESL**	0	0	0	0	n/a	0	n/a	**3**	**4**	**2**
LOR = limit of reporting	**n > ML**	n/a	n/a	n/a	n/a	n/a	0	n/a	**3**	**4**	**1**
< # = not detected above LOR	**minimum**	<0.2	<0.5	<0.5	<0.5	<10	<10	<50	<50	<100	<100
Shade + Bold = result > criteria	**maximum**	0.9	<0.5	<1	<3	16	16	7440	7400	47500	10100

ESL: apply to 2 m. low reliability, except F1 & F2 (moderate reliability)

Client Name: Goodman
Project Name: Burrows IE
Project No: 60623599

Table 7 - TCLP Results

Sample ID_Depth	NSW EPA (2014) Waste Classification						BH04_1.0-1.1		BH16_2.0-2.1		BH17_2.0-2.1		BH21_0.7-0.8		BH22_2.2-2.3		BH102_0.5-0.6	
Sample Type							Soil	TCLP	Soil	TCLP	Soil	TCLP	Soil	TCLP	Soil	TCLP	Soil	TCLP
Material Type	GSW			RSW			Fill		Fill		Fill		Fill		Fill		Fill	
Date Sampled	CT1	TCLP1	SCC1	CT2	TCLP2	SCC2	20/08/2015		22/08/2015		22/08/2015		21/08/2015		21/08/2015		31/01/2020	
Units	mg/kg	mg/L	mg/kg	mg/kg	mg/L	mg/kg	mg/kg	mg/L	mg/kg	mg/L	mg/kg	mg/L	mg/kg	mg/L	mg/kg	mg/L	mg/kg	mg/L
Arsenic	100	5	500	400	20	2000	311	0.4	136		62		31		119	<0.1	9	
Cadmium	20	1	100	80	4	400	1		19		4		1		3		<1	
Chromium	100	5	1900	400	20	7600	105		109		607	<0.05	12		29		19	
Copper	-	-	-	-	-	-	293		3520		12200		155		550		367	
Lead	100	5	1500	400	20	6000	**10400**	15.9	**3290**		**1150**		234		**6300**	**47.1**	2010	0.9
Nickel	40	2	1050	160	8	4200	24		**167**		**738**		23		2700	0.6	12	
Zinc	-	-	-	-	-	-	1170		7710		2560		367		14500		712	
Mercury	4	0.2	50	16	0.8	200	1.6		20.4	<0.001	0.1		0.3		0.3		56.4	<0.0010
Benzo(a)pyrene	0.8	0.04	10	3.2	0.16	23	13.4	<0.0005			<0.5		**102**	<0.0005	<0.5		3.3	<0.0005
Sum of reported PAH	-	-	200	-	-	800	158				8.7		**2170**		<0.5		32.3	
Asbestos													**Yes**				No	
TPH C6-C9			650			2600			<10		<10		<10		<10		<10	
TPH C10-C36			10000			40000			450		25400		**58500**		<50		250	
Benzene	10	0.5	18	40	2	72			<0.2		<0.2		<0.2		<0.2		<0.2	
Toluene	288	14.4	518	1152	57.6	2073			<0.5		<0.5		<0.5		<0.5		<0.5	
Ethylbenzene	600	30	1080	2400	120	4320			<0.5		<0.5		<0.5		<0.5		<0.5	
Xylenes	1000	50	1800	4000	200	7200			<0.5		<0.5		<0.5		<0.5		<0.5	
Scheduled Chemicals			<50			<50												
PCB			<50			<50												

Notes:
mg/kg = milligrams per kilogram.
mg/L = milligrams per litre
< = not detected above LOR
- = not analysed and/or no criteria
Shading = Interpreted Classification
Red = interpreted Hazardous Waste

Table 7 - TCLP Results

Sample ID_Depth	NSW EPA (2014) Waste Classification						BH105_0.8-0.95		BH105_1.7-1.8		QC100 (BH106_0.2-0.3)		BH107_1.5-1.7		BH108_1.3-1.4		BH109_0.9-1.0	
Sample Type							Soil	TCLP	Soil	TCLP	Soil	TCLP	Soil	TCLP	Soil	TCLP	Soil	TCLP
Material Type	GSW			RSW			Fill		Fill		Fill		Fill		Fill		Fill	
Date Sampled	CT1	TCLP1	SCC1	CT2	TCLP2	SCC2	31/01/2020		31/01/2020		28/01/2020		28/01/2020		28/01/2020		28/01/2020	
Units	mg/kg	mg/L	mg/kg	mg/kg	mg/L	mg/kg	mg/kg	mg/L	mg/kg	mg/L	mg/kg	mg/L	mg/kg	mg/L	mg/kg	mg/L	mg/kg	mg/L
Arsenic	100	5	500	400	20	2000	25		66		6		94		30		28	
Cadmium	20	1	100	80	4	400	3		7		<1		2		96	1.73	13	
Chromium	100	5	1900	400	20	7600	20		76		8		180	0.02	320	<0.01	241	<0.01
Copper	-	-	-	-	-	-	2130		431		46		986		15500		10800	
Lead	100	5	1500	400	20	6000	2260	8.6	**11800**	**20.6**	113	0.2	5350	8.7	3160	**33.7**	3780	2.3
Nickel	40	2	1050	160	8	4200	135		283	0.2	10		185	<0.1	823	2.0	241	0.6
Zinc	-	-	-	-	-	-	4890		1320		106		1110		23400		12400	
Mercury	4	0.2	50	16	0.8	200	0.4		0.3		<0.1		1.0		<0.1		2.2	
Benzo(a)pyrene	0.8	0.04	10	3.2	0.16	23	3.4	<0.0005	<0.5		3.1	<0.0005	<0.5		<0.5		<0.5	
Sum of reported PAH	-	-	200	-	-	800	31.2		<0.5		28.9		<0.5		<0.5		<0.5	
Asbestos											No				No			
TPH C6-C9			650			2600	<10				<10		<10		<10		<10	
TPH C10-C36			10000			40000	400				110		<50		<50		<50	
Benzene	10	0.5	18	40	2	72	<0.2				<0.2		<0.2		<0.2		<0.2	
Toluene	288	14.4	518	1152	57.6	2073	<0.5				<0.5		<0.5		<0.5		<0.5	
Ethylbenzene	600	30	1080	2400	120	4320	<0.5				<0.5		<0.5		<0.5		<0.5	
Xylenes	1000	50	1800	4000	200	7200	<0.5				<0.5		<0.5		<0.5		<0.5	
Scheduled Chemicals			<50			<50												
PCB			<50			<50												

Notes:
mg/kg = milligrams per kilogram.
mg/L = milligrams per litre
< = not detected above LOR
- = not analysed and/or no criteria
Shading = Interpreted Classification
Red = interpreted Hazardous Waste

Table 7 - TCLP Results

Sample ID_Depth	NSW EPA (2014) Waste Classification						BH111_0.65-0.75		BH114_1.3-1.4		BH115_2.5-2.6		BH117_2.2-2.3	
Sample Type							Soil	TCLP	Soil	TCLP	Soil	TCLP	Soil	TCLP
Material Type	GSW			RSW			Fill		Fill		Fill		Fill	
Date Sampled	CT1	TCLP1	SCC1	CT2	TCLP2	SCC2	30/01/2020		3/02/2020		29/01/2020		30/01/2020	
Units	mg/kg	mg/L	mg/kg	mg/kg	mg/L	mg/kg	mg/kg	mg/L	mg/kg	mg/L	mg/kg	mg/L	mg/kg	mg/L
Arsenic	100	5	500	400	20	2000	102		55		117	<0.1	52	
Cadmium	20	1	100	80	4	400	12		23		13		7	
Chromium	100	5	1900	400	20	7600	120		1240	<0.01	38		90	
Copper	-	-	-	-	-	-	4920		2870		872		1250	
Lead	100	5	1500	400	20	6000	**8960**	**32.9**	**4600**		**6390**	**54.1**	**2240**	
Nickel	40	2	1050	160	8	4200	**179**		**885**		145	0.2	64	
Zinc	-	-	-	-	-	-	14000		9880		2930		3720	
Mercury	4	0.2	50	16	0.8	200	<0.1		2.8		<0.1		1.0	
Benzo(a)pyrene	0.8	0.04	10	3.2	0.16	23	<0.5		<0.5		<0.5		8.7	<0.0005
Sum of reported PAH	-	-	200	-	-	800	<0.5		<0.5		<0.5		95.5	
Asbestos							No							
TPH C6-C9			650			2600			<10		<10		<10	
TPH C10-C36			10000			40000			280		<50		1450	
Benzene	10	0.5	18	40	2	72			<0.2		<0.2		<0.2	
Toluene	288	14.4	518	1152	57.6	2073			<0.5		<0.5		<0.5	
Ethylbenzene	600	30	1080	2400	120	4320			<0.5		<0.5		<0.5	
Xylenes	1000	50	1800	4000	200	7200			<0.5		<0.5		<0.5	
Scheduled Chemicals			<50			<50								
PCB			<50			<50								

Notes:
mg/kg = milligrams per kilogram.
mg/L = milligrams per litre
< = not detected above LOR
- = not analysed and/or no criteria
Shading = Interpreted Classification
Red = interpreted Hazardous Waste

Table 8 - Groundwater Results

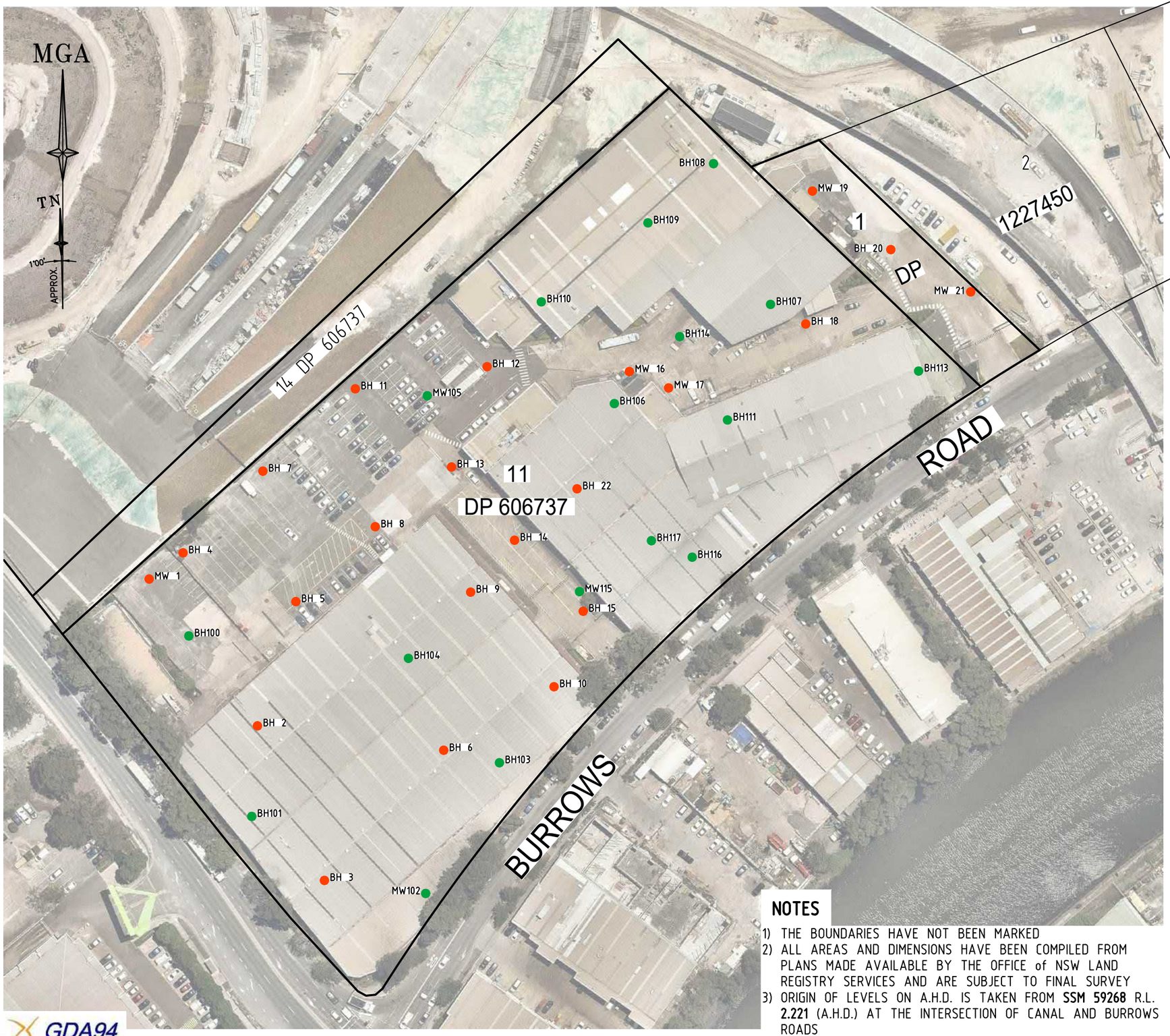
Sample Location	Sample Type	Sample Date	SWL (m)	BTEXN							TRH						Metals								PAH	VHC							
				Benzene	Toluene	Ethylbenzene	Xylene (m & p)	Xylene (o)	Xylene Total	Naphthalene	C6 - C10	C6 - C10 minus BTEX (F1)	>C10 - C16	>C10 - C16 minus Naphthalene (F2)	>C16 - C34	>C34 - C40	Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc	Mercury	B(a)P	Tetrachloroethene (PCE)	Trichloroethene (TCE)	1,2-Dichloroethene (1,2-DCE)	1,1-Dichloroethene (1,1-DCE)	Chloroethene (Vinyl chloride)	Tetrachloromethane (carbon tetrachloride)	Hexachlorobutadiene
ASC NEPM HSL D (SAND 2-<4m)				5000	NL	NL			NL	NL		6000		NL																		
ASC NEPM Marine Water GIL				500						50								5.5	27	1.3	4.4	70	15	0.1								
ASC NEPM Drinking Water GIL				1	800	300			600								10	2	50	2000	10	20		1	0.01	50		60	30	0.3	3	0.7
MW01	Primary	31/08/2015	1.096	<1	<2	<2	<2	<2	<2	<5	<20	<20	<100	<100	<100	<100	6	<0.1	<1	<1	<1	3	**92**	<0.1	<0.5	<5	<5	<5	<5	<1	<5	<5
QC200	MW01	31/08/2015		<1	<1	<1	<2	<1	<2	<1	<10	<10	<50	<50	<100	<100	5	<0.1	<1	<1	<1	2	**80**	<0.05	<1	<1	<1	<1	<1	<0.3	<1	<1
RPD				nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	***40***	14	nc	nc	nc	nc	nc	nc	nc	nc	nc
MW16	Primary	31/08/2015	3.16	<1	<2	<2	<2	<2	<2	<5	<20	<20	<100	<100	<100	<100	8	<0.1	<1	**2**	4	7	**291**	<0.1	<0.5	<5	<5	<5	<5	<1	<5	<5
MW17	Primary	31/08/2015	3.065	<1	<2	<2	<2	<2	<2	<5	<20	<20	<100	<100	<100	<100	9	0.2	<1	**2**	4	**26**	**889**	<0.1	<0.5	<5	<5	<5	<5	<1	<5	<5
MW19	Primary	31/08/2015	2.449	<1	<2	<2	<2	<2	<2	<5	<20	<20	<100	<100	<100	<100	9	**6.1**	<1	**153**	**9**	**128**	**4180**	<0.1	<0.5	<5	<5	<5	<5	<1	<5	<5
MW21	Primary	31/08/2015	2.026	<1	<2	<2	<2	<2	<2	8	<20	<20	170	160	120	<100	1	0.2	<1	1	<1	4	**66**	<0.1	<0.5	<5	<5	<5	<5	<1	<5	<5
QC201	Rinsate	31/08/2015		<1	<2	<2	<2	<2	<2	<5	<20	<20	<100	<100	<100	<100																	
TB	Trip Blank	31/08/2015		<1	<2	<2	<2	<2	<2	<5	<20	<20																					
MW01	Primary	12/02/2020	0.677	<1	<2	<2	<2	<2	<2	<5	<20	<20	<100	<100	<100	<100	2	<0.1	<1	<1	<1	2	**87**	<0.1		<5	<5	<5	<5	<1	<5	<5
MW16	Primary	12/02/2020	2.749	<1	<2	<2	<2	<2	<2	<5	<20	<20	<100	<100	<100	<100	<1	**2.6**	2	**231**	**8**	**45**	**2560**	<0.1		<5	<5	<5	<5	<1	<5	<5
MW17	Primary	12/02/2020	2.647	<1	<2	<2	<2	<2	<2	<5	<20	<20	<100	<100	<100	<100	<1	0.6	<1	**32**	1	**39**	**1280**	<0.1		<5	<5	<5	<5	<1	<5	<5
MW19	Primary	12/02/2020	2.034	<1	<2	<2	<2	<2	<2	<5	<20	<20	<100	<100	<100	<100	**139**	**4.2**	4	**247**	**5**	**294**	**3360**	<0.1		<5	<5	<5	<5	<1	<5	<5
MW21	Primary	12/02/2020	1.643	<1	<2	<2	<2	<2	<2	<5	<20	<20	<100	<100	<100	<100	<1	<0.1	10	<1	<1	2	**59**	<0.1		<5	<5	<5	<5	<1	<5	<5
MW102	Primary	12/02/2020	0.941	<1	<2	<2	<2	<2	<2	<5	<20	<20	<100	<100	<100	<100	2	<0.1	<1	<1	<1	2	6	<0.1		<5	<5	<5	<5	<1	<5	<5
QC306	MW102	12/02/2020		<1	<1	<1	<2	<1	<2	<1	<10	<10	<50	<50	<100	<100	5	<0.1	<1	<1	<1	1	5	<0.05		<1	<1	<1	<1	<0.3	<1	<1
RPD				nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	**86**	nc	nc	nc	nc	**67**	18	nc		nc	nc	nc	nc	nc	nc	nc
MW105	Primary	12/02/2020	1.811	<1	<2	<2	<2	<2	<2	<5	<20	<20	<100	<100	<100	<100	3	0.7	<1	<1	3	**29**	**1760**	<0.1		<5	<5	<5	<5	<1	<5	<5
MW115	Primary	12/02/2020	1.438	<1	<2	<2	<2	<2	<2	<5	<20	<20	<100	<100	<100	<100	**18**	<0.1	<1	<1	4	**23**	**455**	<0.1		<5	<5	<5	<5	<1	<5	<5
QC304	Rinsate	12/02/2020		<1	<2	<2	<2	<2	<2	<5	<20	<20																				
QC305	Trip Blank	12/02/2020		<1	<2	<2	<2	<2	<2	<5	<20	<20																				

Notes

µg/L = micrograms per litre
All results and criteria = µg/L
LOR = Limit of Reporting
RPD = Relative Percentage Difference
nc = not calculated, result(s)<LOR
NL - Not Limiting – A vapour source concentration for a petroleum mixture could not exceed a level that would result in the maximum allowable vapour risk for the given scenario.
< denotes result less than LOR
Marine water GIL for Cadmium and Nickel: ANZG (2018) DGV, 95% protection level
Bold/Italic = RPD>30%
ES2005113: sample MW11S is MW115 (mislabelled by laboratory)
Shading/bold = result > HSL D or GIL

Appendix C

Development Plans



LEGEND

BORE HOLE 2015	BH
MONITORING WELL 2015	MW
BORE HOLE 2020	BH
MONITORING WELL 2020	MW

2015 Bore Hole & Monitoring Wells

Code	Easting	Northing	RL (AHD)
MW 1	331543.404	6245408.202	2.21
MW 19	331743.935	6245525.412	3.51
MW 21	331791.781	6245494.973	3.12
BH 18	331741.891	6245485.266	3.42
BH 20	331767.618	6245507.731	3.24
BH 22	331672.77	6245435.465	3.37
BH2	331576.145	6245363.848	2.58
BH 3	331596.394	6245317.163	2.32
BH4	331553.645	6245416.112	2.25
BH5	331587.754	6245401.397	2.19
BH6	331632.445	6245356.492	2.69
BH7	331577.783	6245440.796	2.56
BH8	331611.759	6245424.019	2.6
BH9	331640.584	6245404.251	3.04
BH10	331665.802	6245375.677	2.91
BH11	331605.73	6245465.678	3.12
BH12	331645.559	6245472.364	3.62
BH13	331634.823	6245442.06	2.96
BH14	331653.883	6245419.946	2.93
BH15	331674.617	6245398.482	2.7

2020 Bore Holes & Monitoring Wells

Code	Easting	Northing	RL(AHD)	Description
BH100	331555.408	6245391.019	2.035	
BH101	331574.416	6245336.499	2.422	
MW102	331627.004	6245313.221	2.385	Road Cover
			2.3	PVC Casing
BH103	331649.295	6245352.702	2.786	
BH104	331621.782	6245384.239	2.852	
MW105	331627.489	6245463.586	3.287	Road Cover
			3.202	PVC Casing
BH106	331684.03	6245461.203	3.467	
BH107	331731.264	6245491.173	4.32	
BH108	331714.016	6245533.699	4.935	
BH109	331694.186	6245515.801	4.924	
BH110	331661.963	6245491.955	4.888	
BH111	331718.244	6245456.264	3.455	
BH113	331776.03	6245471.041	3.473	
BH114	331703.793	6245481.454	4.335	
MW115	331673.5	6245404.4	2.883	Road Cover
			2.843	PVC Casing
BH116	331707.577	6245414.797	3.382	
BH117	331695.246	6245419.79	3.367	

NOTES

1) THE BOUNDARIES HAVE NOT BEEN MARKED
2) ALL AREAS AND DIMENSIONS HAVE BEEN COMPILED FROM PLANS MADE AVAILABLE BY THE OFFICE of NSW LAND REGISTRY SERVICES AND ARE SUBJECT TO FINAL SURVEY
3) ORIGIN OF LEVELS ON A.H.D. IS TAKEN FROM **SSM 59268** R.L. **2.221** (A.H.D.) AT THE INTERSECTION OF CANAL AND BURROWS ROADS

Revision	Date	Description	Reference
D	00/00/00	-	00
C	00/00/00	-	00
B	00/00/00	-	00
A	00/00/00	-	00

LTS CONFIDENCE TOGETHER
www.ltsl.com.au | P 1300 587 000

THIS IS THE PLAN REFERRED TO IN MY LETTER DATED:

Registered Surveyor NSW

Client AECOM AUSTRALIA PTY LTD

Drawing title
PLAN OF BORE HOLE & MONITORING WELL LOCATIONS OVER LOT 11 DP 606737 AND LOT 1 DP 1227450 AT No.1-3 BURROWS ROAD, ALEXANDRIA

datum AHD
site Area N/A
LGA SYDNEY

reference number 50937 001MON
scale 1:1250 @A3
date of survey 07/02/20
SHEET 1 OF 1

PROPOSED PAD
BEL 5.30

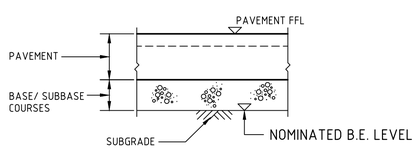
PROPOSED PAD
BEL 2.10

PRELIMINARY BULK EARTHWORKS PLAN
1:500 SCALE

LEGEND

LEVELS DATUM IS AHD.

- 30.50 – EXISTING CONTOUR
- 30.50 – B.E.L. CONTOUR (MAJOR - 0.5m)
- 30.40 – B.E.L. CONTOUR (MINOR - 0.1m)



NOMINATED B.E.L. DETAIL
N.T.S.

EARTHWORK ESTIMATES

STRIP = 6,900m³ (BLEND OR DISPOSE)

CUT = -14,900m³
FILL = +43,600m³
DET. EXCAV. = - 6,000m³(1,750m³/Ha)

BALANCE = +22,700m³ (i.e. IMPORT)

VOLUMES BASED ON AVERAGE 200mm STRIP OVER SITE. EARTHWORK VOLUMES ARE APPROXIMATE ONLY AND ALLOW FOR A 200mm STRUCTURAL PAVEMENT.
NO ALLOWANCE HAS BEEN MADE FOR DELETERIOUS MATERIAL, EROSION AND SEDIMENT CONTROL, BULKING OR COMPACTION OF FILLED SOILS.

DEPTH RANGE

No.	FROM DEPTH	TO DEPTH	COLOUR
1	-3.000	-2.000	
2	-2.000	-1.000	
3	-1.000	0.000	
4	0.000	1.000	
5	1.000	2.000	
6	2.000	3.000	
7	3.000	4.000	

CONTAMINATION NOTE:

THE SUBJECT PROPERTY HAS BEEN IDENTIFIED TO CONTAIN CONTAMINATED MATERIAL. CONTAMINATED MATERIAL ENCOUNTERED DURING THE WORKS ARE TO BE RETAINED ON SITE AND A CAPPING LAYER CONSISTING OF COMPACTED CLAY FILL TO A MINIMUM DEPTH OF 500mm IS TO BE PROVIDED OVER THE SITE TO ALL EXTERNAL AREAS.

FILL IMPORT NOTE:

ALL FILL IMPORT MATERIAL SHALL BE VENM OR ENM

5m 0 10 20 30 40 50m
SCALE 1:500 AT A1 SHEET SIZE

FOR PLANNING PROPOSAL

AMENDMENTS	DATE	ISSUE
ISSUED FOR PLANNING PROPOSAL	27.02.20	C
ISSUED FOR INFORMATION	04.02.20	B
ISSUED FOR INFORMATION	01.11.19	A

ARCHITECT
SBA ARCHITECTS

CLIENT
Goodman
LEVEL 17,
60 Castlereagh Street
SYDNEY
NSW, 2000, Australia
Tel (02) 9230 7400
Fax (02) 9230 7444

PROJECT
BURROWS INDUSTRIAL ESTATE
1-3 BURROWS ROAD, ALEXANDRIA
NEW SOUTH WALES

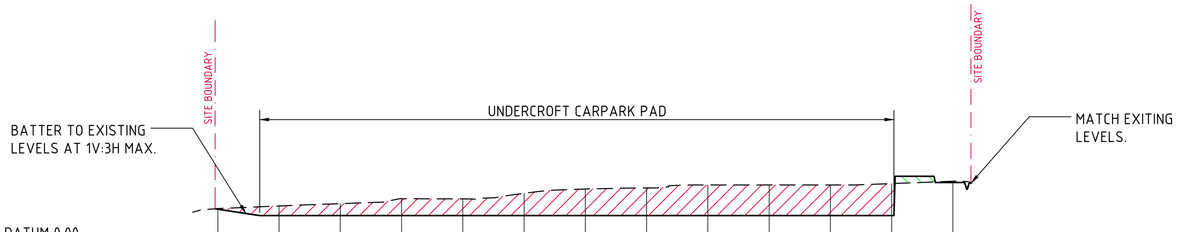
DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
XC	DM	NOV'	MW	A1	AS SHOWN	C011035.03-SK SK11

Costin Roe Consulting Pty Ltd.
Consulting Engineers ACN 003 696 448
Level 1, 8 Windmill Street
Walsh Bay, Sydney NSW 2000
Tel: (02) 9251-7699 Fax: (02) 9241-3731
email: mail@costinroe.com.au ©

Costin Roe Consulting
PRECISION | COMMUNICATION | ACCOUNTABILITY

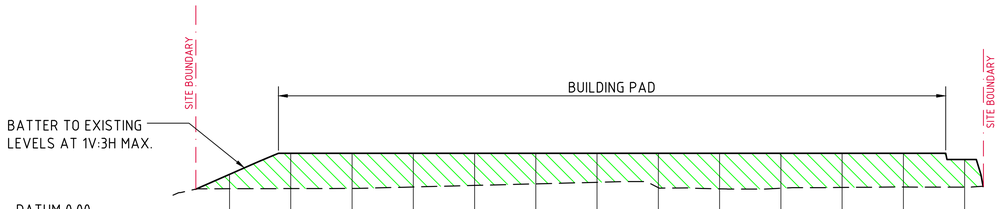
DRAWING TITLE
BULK EARTHWORKS PLAN

DRAWING No C011035.03-SK11
ISSUE C



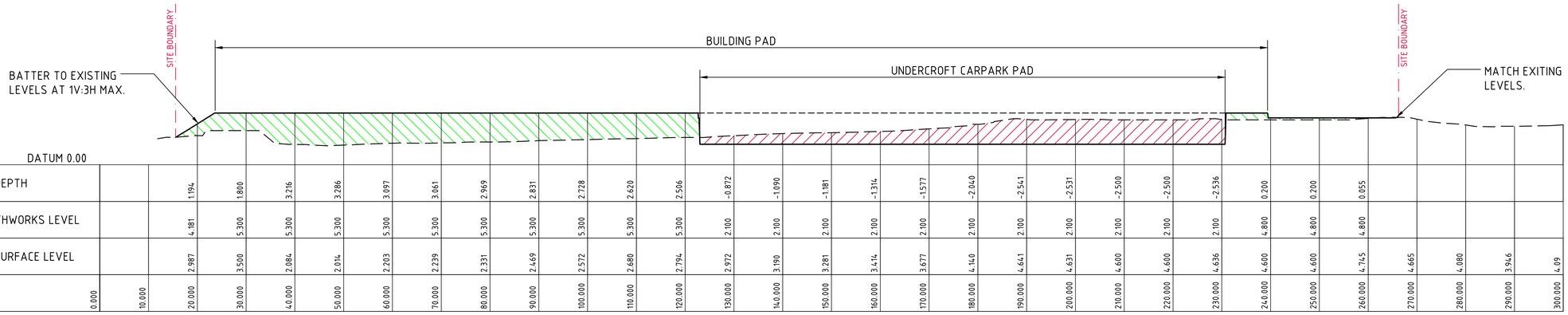
DATUM 0.00																							
CUT/FILL DEPTH		-0.049	-0.781	-0.972	-1.373	-1.359	-1.811	-2.162	-2.250	-2.500	-2.500	-2.500	-2.610	-0.101									
BULK EARTHWORKS LEVEL		2.618	2.100	2.100	2.100	2.100	2.100	2.100	2.100	2.100	2.100	2.100	2.100	4.800									
EXISTING SURFACE LEVEL		2.667	2.881	3.072	3.473	3.459	3.911	4.262	4.350	4.600	4.600	4.600	4.710	4.901									
CHAINAGE	0.000	10.000	20.000	30.000	40.000	50.000	60.000	70.000	80.000	90.000	100.000	110.000	120.000	130.000	140.000	150.000	160.000						

SECTION 3
HORIZONTAL SCALE 1:500
VERTICAL SCALE 1:250



DATUM 0.00																							
CUT/FILL DEPTH		1.175	2.878	2.867	2.748	2.620	2.492	2.364	2.801	2.897	2.849	2.784	2.752	2.258									
BULK EARTHWORKS LEVEL		3.588	5.300	5.300	5.300	5.300	5.300	5.300	5.300	5.300	5.300	5.300	5.300	4.800									
EXISTING SURFACE LEVEL		2.412	2.422	2.433	2.552	2.680	2.808	2.936	2.499	2.403	2.451	2.516	2.548	2.542									
CHAINAGE	0.000	10.000	20.000	30.000	40.000	50.000	60.000	70.000	80.000	90.000	100.000	110.000	120.000	130.000	140.000	150.000	160.000						

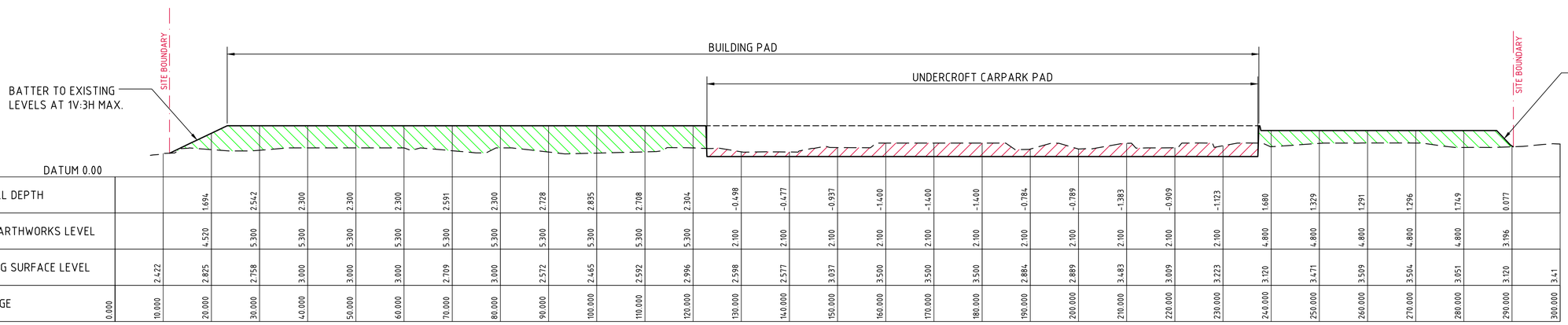
SECTION 4
HORIZONTAL SCALE 1:500
VERTICAL SCALE 1:250



DATUM 0.00																							
CUT/FILL DEPTH		1.194	1.800	3.216	3.286	3.097	3.061	2.969	2.831	2.728	2.620	2.506	-0.872	-1.090	-1.181	-1.314	-1.577	-2.040	-2.541	-2.531	-2.500	-2.500	-2.536
BULK EARTHWORKS LEVEL		4.181	5.300	5.300	5.300	5.300	5.300	5.300	5.300	5.300	5.300	5.300	2.100	2.100	2.100	2.100	2.100	2.100	2.100	2.100	2.100	2.100	2.100
EXISTING SURFACE LEVEL		2.987	3.500	2.084	2.014	2.203	2.239	2.331	2.469	2.572	2.680	2.794	2.972	3.190	3.281	3.414	3.677	4.140	4.641	4.631	4.600	4.600	4.636
CHAINAGE	0.000	10.000	20.000	30.000	40.000	50.000	60.000	70.000	80.000	90.000	100.000	110.000	120.000	130.000	140.000	150.000	160.000	170.000	180.000	190.000	200.000	210.000	220.000	230.000

CUT/FILL DEPTH	0.200	0.200	0.055																				
BULK EARTHWORKS LEVEL	4.800	4.800	4.800																				
EXISTING SURFACE LEVEL	4.600	4.600	4.745	4.665	4.080	3.946	4.09																
CHAINAGE	240.000	250.000	260.000	270.000	280.000	290.000	300.000																

SECTION 2
HORIZONTAL SCALE 1:500
VERTICAL SCALE 1:250



DATUM 0.00																							
CUT/FILL DEPTH		1.694	2.542	2.300	2.300	2.300	2.591	2.300	2.728	2.835	2.708	2.304	-0.498	-0.477	-0.937	-1.400	-1.400	-1.400	-0.784	-0.789	-1.383	-0.909	-1.123
BULK EARTHWORKS LEVEL		4.520	5.300	5.300	5.300	5.300	5.300	5.300	5.300	5.300	5.300	5.300	2.100	2.100	2.100	2.100	2.100	2.100	2.100	2.100	2.100	2.100	2.100
EXISTING SURFACE LEVEL	2.422	2.825	2.758	3.000	3.000	3.000	2.709	3.000	2.572	2.465	2.592	2.996	2.598	2.577	3.037	3.500	3.500	3.500	2.884	2.889	3.483	3.009	3.223
CHAINAGE	0.000	10.000	20.000	30.000	40.000	50.000	60.000	70.000	80.000	90.000	100.000	110.000	120.000	130.000	140.000	150.000	160.000	170.000	180.000	190.000	200.000	210.000	220.000	230.000

CUT/FILL DEPTH	1.680	1.329	1.291	1.296	1.749	0.077																	
BULK EARTHWORKS LEVEL	4.800	4.800	4.800	4.800	4.800	3.196																	
EXISTING SURFACE LEVEL	3.120	3.471	3.509	3.504	3.051	3.120	3.41																
CHAINAGE	240.000	250.000	260.000	270.000	280.000	290.000	300.000																

SECTION 1
HORIZONTAL SCALE 1:500
VERTICAL SCALE 1:250

FOR PLANNING PROPOSAL

AMENDMENTS	DATE	ISSUE
ISSUED FOR PLANNING PROPOSAL	27.02.20	C
ISSUED FOR INFORMATION	04.02.20	B
ISSUED FOR INFORMATION	01.11.19	A

ARCHITECT
SBA ARCHITECTS

CLIENT
Goodman
LEVEL 17,
60 Castlereagh Street
SYDNEY
NSW, 2000, Australia
Tel (02) 9230 7400
Fax (02) 9230 7444

PROJECT
BURROWS INDUSTRIAL ESTATE
1-3 BURROWS ROAD, ALEXANDRIA
NEW SOUTH WALES

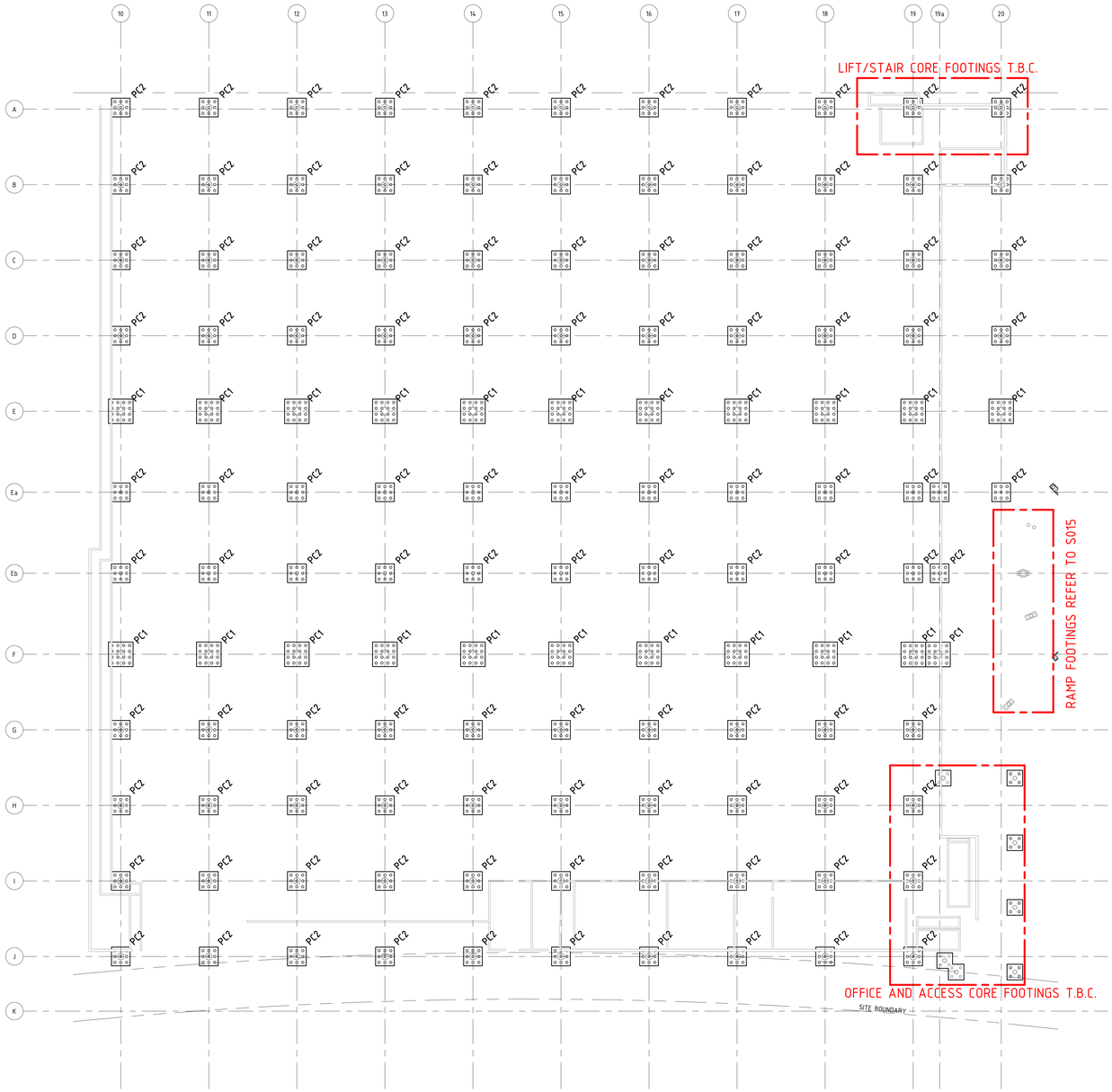
DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
XC	DM	NOV'	MW	A1	AS SHOWN	C011035.03-SK12

Costin Roe Consulting Pty Ltd.
Consulting Engineers ACN 003 696 448
Level 1, 8 Windmill Street
Walsh Bay, Sydney NSW 2000
Tel: (02) 9251-7699 Fax: (02) 9241-3731
email: mail@costinroe.com.au ©

Costin Roe Consulting
PRECISION | COMMUNICATION | ACCOUNTABILITY

DRAWING TITLE
BULK EARTHWORKS SECTIONS

DRAWING No C011035.03-SK12
ISSUE C



CAR PARK PILED FOOTING LAYOUT PLAN

1 : 250

CONCRETE QUALITY					
ELEMENT	SLUMP	AGGREGATE (MAX SIZE)	CEMENT TYPE	ADMIXTURE	F'c (MPa)
FOOTINGS	80	20	GP	NIL	40
PILE CAP U.N.O.	80	20	GP	NIL	40
LIFT/STAIR CORE	80	20	GP	NIL	65
NOMINAL 56 DAY SHRINKAGE 650 MICROSTRAIN					

PILE CAP SCHEDULE						
	FOOTING SIZE				REINFORCEMENT	
TAG	L	W	D	PILES	BOTTOM	TOP
PCT1	2700	2700	1000	16xP1	TBA	TBA
PCT2	1950	1950	1000	9xP2	TBA	TBA

NOTE: OFFICE AND STAIR CORE FOOTINGS T.B.C.

LEGEND:

DENOTES 250 THICK SHEAR WALLS OVER

PILE SCHEDULE			
	PILE SIZE		
TAG	DIA.(mm)	SOCKET(m)	NO. PILE + S.W.L.
P1	300	#1	16x1100kN
P2	300	#1	9x1100kN

- #1 TENDER NOTE ROCK DEPTH 13.5m REFER TO GEO. TECH. RPT.

FOOTING LEVELS
TOP OF FOOTING R.L.'S TO BE AT R.L. TBA U.N.O.
R.L'S SHOWN ON PLAN REFER TO TOP OF FOOTING/PILE CAP U.N.O.
WHERE PILES DO NOT HAVE A PILE CAP THE R.L. GIVEN DENOTES THE TOP OF PILE LEVEL.

FOOTING POSITIONING:
ALL FOOTINGS TO BE CENTRAL WITH COLUMNS OR WALLS U.N.O.

FOOTING / STORMWATER COORDINATION NOTE:
IF STORMWATER PIPES ARE INSTALLED
AFTER FOOTINGS ARE CONSTRUCTED
DISCUSS WITH STRUCTURAL ENGINEER
FOR COORDINATION OF FOOTING LEVELS.

CONCRETE COVER
U.N.O. FOOTINGS AND PILE CAPS TO HAVE 75mm BOTTOM COVER AND 50mm COVER TO TOP AND SIDES.
PCx - TO HAVE 65mm COVER TO TOP & SIDES MIN.

OPTIONAL FIBRE REINFORCEMENT NOTE: (EXCEPT PADS TAGGED #)
FIBRE REINFORCE WITH THE FOLLOWING,
IN LIEU OF REINFORCEMENT NOTED IN SCHEDULE:
DRAMIX 80/60 15kg/m^3
OR
NOVOCON HE1060 15kg/m^3

FOOTINGS TO BE FOUNDED ON SBV 1000kPa TYPICAL U.N.O.

FOR INFORMATION

2m 0 5 10 15 20 25m

SCALE 1:250 AT A0 SIZE SHEET

AMENDMENTS	DATE	ISSUE
DRG. NO. REVISED FROM S20	28.02.20	B
ISSUED FOR INFORMATION	13.11.19	A

NORTH

ARCHITECT
SBA ARCHITECTS

CLIENT
Goodman
LEVEL 17,
60 Castlereagh Street
SYDNEY
NSW, 2000, Australia
Tel (02) 9230 7400
Fax (02) 9230 7444

PROJECT
BURROWS INDUSTRIAL ESTATE
1-3 BURROWS ROAD, ALEXANDRIA
NEW SOUTH WALES

DESIGNED	DRAWN	DATE	SIZE	SCALE	CAD REF:
P.T.	N.H.	AUG. 2019	A0	AS NOTED	C011035.03 - S010

CONSULT AUSTRALIA

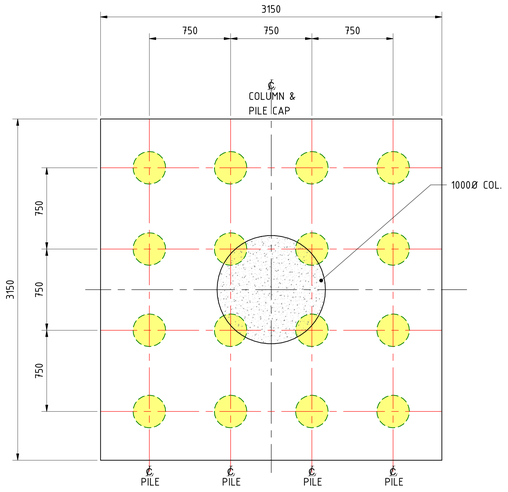
Costin Roe Consulting Pty Ltd.
Consulting Engineers ACN 003 696 446
Level 1, 8 Windmill Street
Walsh Bay, Sydney NSW 2000
Tel: (02) 9251-7600 Fax: (02) 9241-3731
email: mail@costinroe.com.au

Costin Roe Consulting

PRECISION | COMMUNICATION | ACCOUNTABILITY

DRAWING TITLE
CAR PARK FOOTING LAYOUT PLAN

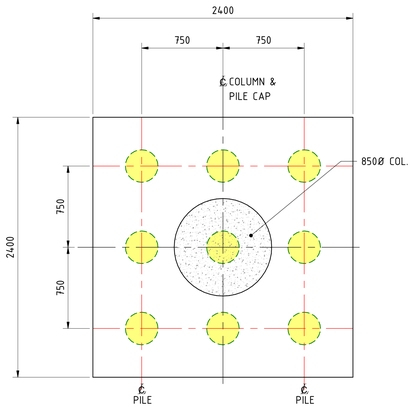
DRAWING No. C011035.03 - S010 ISSUE B



TYPICAL PC1 - PILE CAP DETAIL

PLAN

SCALE 1:20



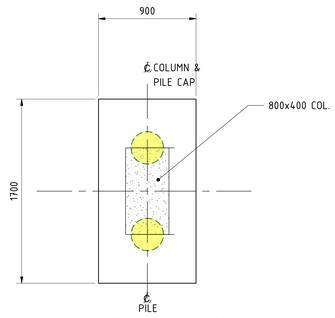
TYPICAL PC2 - PILE CAP DETAIL

PLAN

SCALE 1:20

FOOTING REINFORCEMENT

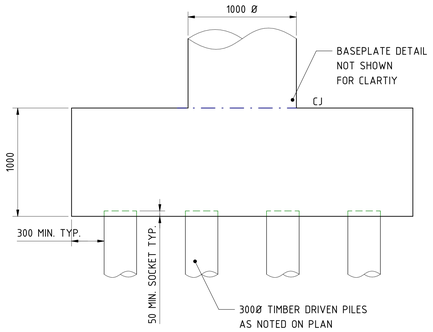
FOOTING REINFORCEMENT RATE - 180kg/m³



TYPICAL PC3 - PILE CAP DETAIL

PLAN

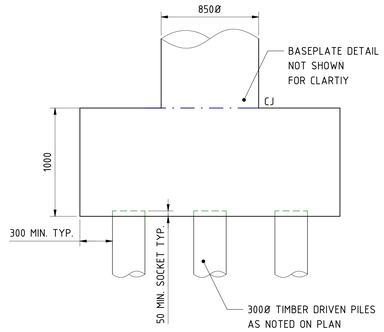
SCALE 1:20



TYPICAL PC1 - PILE CAP DETAIL

ELEVATION

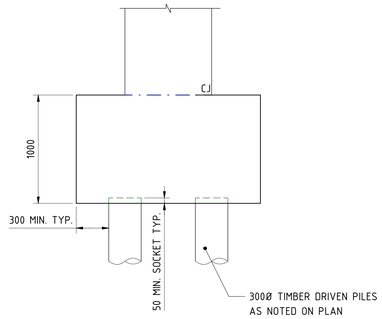
SCALE 1:20



TYPICAL PC2 - PILE CAP DETAIL

ELEVATION

SCALE 1:20



TYPICAL PC3 - PILE CAP DETAIL

ELEVATION

SCALE 1:20

FOOTING USEAGE NOTE:

HARDSTAND ADJACENT COLUMNS & RAMP TRANSFER BEAMS

FOOTING USEAGE NOTE:

END WALL AND WAREHOUSE INTERNAL COLUMNS

FOOTING USEAGE NOTE:

RAMP COLUMNS NON-TRANSFER BEAM ONLY

FOR INFORMATION

200mm 0 500 1000 1500 2000mm

SCALE 1:20 AT A0 SIZE SHEET

AMENDMENTS	DATE	ISSUE
DRG NO. REVISED FROM S18	28.02.20	B
ISSUED FOR INFORMATION	29.08.19	A

NORTH

ARCHITECT SBA ARCHITECTS

CLIENT Goodman

LEVEL 17,
60 Castlereagh Street
SYDNEY
NSW, 2000, Australia

Tel (02) 9230 7400
Fax (02) 9230 7444

PROJECT
BURROWS INDUSTRIAL ESTATE
1-3 BURROWS ROAD, ALEXANDRIA
NEW SOUTH WALES

DESIGNED	DRAWN	DATE	SIZE	SCALE	CAD REF
P.T.	N.H.	AUG. 2019	A0	AS NOTED	C011035.03 - S020

CONSULT AUSTRALIA

Costin Roe Consulting Pty Ltd.
Consulting Engineers ACN 003 696 446
Level 1, 8 Windmill Street
Walsh Bay, Sydney NSW 2000
Tel: (02) 9251-7699 Fax: (02) 9241-3731
email: mail@costinroe.com.au

Costin Roe Consulting

PRECISION | COMMUNICATION | ACCOUNTABILITY

DRAWING TITLE
FOOTING DETAILS SHEET

DRAWING No. C011035.03 - S020

ISSUE B