REPORT TO

HAMMONDCARE

ON

REMEDIATION ACTION PLAN

FOR

PROPOSED HOSPITAL REDEVELOPMENT

AT

GREENWICH HOSPITAL, 97-115 RIVER ROAD, GREENWICH, NSW

Date: 5 May 2022

Ref: E32507BRrpt6Rev1

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Executive Summary

HammondCare ('the client') commissioned JK Environments (JKE) to prepare a Remediation Action Plan (RAP) for the proposed hospital redevelopment at Greenwich Hospital, 97-115 River Road, Greenwich, NSW.

This RAP is to be submitted to the Department of Planning and Environment (DPE) in support of a State Significant Development Application (SSD-13619238) for the redevelopment of Greenwich Hospital into an integrated hospital and seniors living facility on land identified as 97-115 River Road, Greenwich, NSW (the site).

The subject proposal is for the detail design and construction of the facility following its concept approval under SSD-8699. Specifically, SSD-13619238 seeks approval for the following:

- Demolition of the existing hospital building and associated facilities at the site;
- Construction of a new hospital facility and integrated healthcare campus comprising of hospital, residential aged care, seniors housing, overnight respite, across:
  - A new main hospital building up to RL 80.0;
  - Two new seniors living buildings, Northern building up to RL 56.36, and Southern building up to RL 60.65;
  - A new 2-3 storey respite care building up to RL 56.9;
- Construction of associated site facilities and services, including pedestrian and vehicular access and basement parking;
- Site landscaping and infrastructure works; and
- Preservation of Pallister House which will continue to host dementia care and administrative functions.

JKE note that the development plans issued to JKE on 20 April 2022 indicate the new main hospital building is to be constructed above set-down and mezzanine levels. The buildings will be terraced to account for the slope of the site.

In accordance with section 4.39 of the Environmental Planning & Assessment Act 1979 (EP&A Act), the Secretary's Environmental Assessment Requirements (SEARs) for SSD-13619238 were issued on 24 February, 2021. This report has been prepared to respond to the following SEARs:

SEAR	Relevant section of report
19. Contamination. Address contaminant conditions imposed under SSD-8699.	This report relates to the remediation action plan (RAP) regarding contamination at the site. The site characterisation and conceptual site model are presented in Section 3, the data gaps are outlined in Section 4, the remediation options are discussed in Section 5 and the conclusions are presented in Section 10.

JKE has reviewed the development plans prepared by Bickerton Masters (DD-SW-0200 to 0210, dated 1 April 2022). Based on review of these plans, we understand the proposed development includes:

- The demolition of the existing hospital building and associated facilities (excluding Pallister House);
- Construction of the main hospital building and two serviced seniors living buildings constructed over 1-2 levels of carparking;
- The proposed lowest (basement) car park finished floor reduced level (RL) will be formed at between RL37.95m Australian Height Datum (AHD) and RL38.6mAHD;
- Construction of a new 2-3 storey respite care building to the east of the main building; and
- Reconfiguration of the surrounds including new access roads, external parking areas, walkways and landscaped areas.

The proposed development includes major earthworks (cut/fill) over the majority of the site to achieve the development levels. The maximum cut is anticipated to be approximately 14m below ground level (BGL). Selected development plans issued to JKE are attached in the appendices.

The goal of the remediation is to render the site suitable for the proposed hospital redevelopment from a contamination viewpoint. The primary aim of the remediation at the site is to reduce the human health and environmental risks posed by site contamination to an acceptable level.

The primary objectives of the RAP are to:

- Summarise previous investigations and historical contamination data;
- Provide a methodology to remediate and validate the site;
- Provide a contingency plan and unexpected finds protocol for the remediation works; and
- Outline site management procedures to be implemented during remediation.

For the purpose of the RAP, the extent of soil remediation includes total recoverable hydrocarbon (TRH) impacts to fill in the south-west of the site including the TRH impacts to residual soil/bedrock in the vicinity of BH103, and the remediation of the UST and associated infrastructure. The extent (horizontal and vertical) of the TRH impacts to fill is limited to the landscaped areas and to the base of fill, or to a depth of approximately 2mBGL (whichever is lesser). The extent of remediation (horizontal and vertical) of the TRH impacts to residual soil/bedrock in the vicinity of BH103, and the UST and associated infrastructure are considered to be localised and will be guided by the validation. It is anticipated that the impacts to residual soil/bedrock may be localised to the soil/rock interface which is anticipated to be approximately 1.5m to 2mBGL. It is anticipated that the tank pit could be approximately 2-3m deep. The approximate extent of soil remediation is shown on Figure 5 attached in the appendices.

The Additional Site Investigation (ASI) undertaken at the site by JKE in 2022 identified heavy metals at concentrations above the site assessment criteria (SAC) for ecological receptors. The pH readings of the groundwater were also generally outside (i.e. below the lower threshold) the ecological SAC. JKE was of the opinion that the heavy metal concentrations of and pH of the groundwater were likely regional issued and did not pose a risk to on-site receptors in the context of the proposed development. The ASI also identified concentrations of TRH F1, acenaphthene (a PAH compound) and trihalomethanes (volatile organic compounds - VOCs) in selected groundwater samples. All of the TRH F1, acenaphthene and trihalomethane concentrations were below the SAC and were assessed to not pose risk to the on-site receptors in the context of the proposed land use.

Though the groundwater was assessed to not pose risk to onsite receptors, some treatment may be required for off-site disposal of groundwater to stormwater during dewatering activities.

The extent for mitigation/management of hazardous ground gases (HGG), will be based on the findings of the data gap investigation (DGI) outlined in Section 4. The DGI will largely need to be undertaken post-demolition of the existing structures.

Based on the information available, HHG may present a risk to site users and may require long-term management. Additional investigation is required to assess the risks posed by HGG in order to determine the appropriate management measures. Following the additional investigation, a Human Health Risk Assessment (HHRA) should be undertaken by an experienced health risk assessor to assess the potential for health risks associated with HGG. In the event the HHRA indicates there is a risk to human health, long-term management/mitigation of HGG may be required.

The preferred option for remediation of the UST, UST backfill and associated infrastructure, TRH-impacted fill and TRH-impacted residual soil/bedrock is removal of the material to an appropriate facility (Option 4 of Table 5-1). The management/mitigation options for HGG will be considered following the additional investigation. This will be addressed in a stand-alone remedial works plan (RWP) based on the results of the HHRA.

The preferred options for soil remediation are considered to be appropriate on the basis that:

- Considerable earthworks (cut/fill) are required to achieve design levels;
- The TRH impacts to the fill in the south-west of the site, and the residual soils/bedrock in the vicinity of BH3 appear to be localised;
- The potential hydrocarbon impacts associated with the UST and associated infrastructure are anticipated to be localised;
- The UST and associated infrastructure will be removed from site, removing a potential source of hydrocarbon impacts; and

- The strategies are sustainable, economically viable, commensurate with the level of risk posed by the contaminants and technically achievable to implement concurrently with the proposed development works.

The RAP includes a methodology to remediate and validate the site. A contingency plan for remediation is included together with site management procedures and an unexpected find protocol (UFP) to be implemented during remediation.

A site validation report is to be prepared on completion of remediation activities and submitted to the consent authority (DPE) to demonstrate that the site is suitable for the proposed development.

The conclusions and recommendations should be read in conjunction with the limitations presented in the body of this report.

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Attachments

Abbreviations

Ambient Background Concentrations	**ABC**
Asphaltic Concrete	**AC**
Australian Business Number	**ABN**
Added Contaminant Limits	**ACL**
Asbestos Containing Material	**ACM**
Additional Site Investigation	**ASI**
Australian Company Number	**ACN**
Area of Environmental Concern	**AEC**
Australian Height Datum	**AHD**
Acid Sulfate Soil	**ASS**
Below Ground Level	**BGL**
Benzo(a)pyrene Toxicity Equivalent Factor	**BaP TEQ**
Bureau of Meteorology	**BOM**
Benzene, Toluene, Ethylbenzene, Xylene	**BTEX**
Cation Exchange Capacity	**CEC**
Construction Environment Management Plan	**CEMP**
Contaminated Land Management	**CLM**
Carbon Monoxide	**CO**
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Department of Planning and Environment	**DPE**
Ecological Investigation Level	**EIL**
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Environmental Management Plan	**EMP**
Excavated Natural Material	**ENM**
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Ecological Screening Level	**ESL**
Excavated Natural Material	**ENM**
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Protection of the Environment Operations	**POEO**
Practical Quantitation Limit	**PQL**
Quality Assurance	**QA**
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Secretary Environmental Assessment Requirements	**SEARs**
Source, Pathway, Receptor	**SPR**
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Standing Water Level	**SWL**
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Upper Confidence Limit	**UCL**
Urban Residential and Public Open Spaces	**URPOS**
United States Environmental Protection Agency	**USEPA**
Underground Storage Tank	**UST**
Validation Assessment Criteria	**VAC**
Virgin Excavated Natural Material	**VENM**
Work Health and Safety	**WHS**

Units

Litres	**L**
Metres BGL	**mBGL**
Metres	**m**
Millilitres	**ml or mL**
Milligrams per Kilogram	**mg/kg**
Percentage	**%**
Percentage weight for weight	**%w/w**

1 INTRODUCTION

HammondCare ('the client') commissioned JK Environments (JKE) to prepare a Remediation Action Plan (RAP) for the proposed hospital redevelopment at Greenwich Hospital, 97-115 River Road, Greenwich, NSW.

This RAP is to be submitted to the Department of Planning and Environment (DPE) in support of a State Significant Development Application (SSD-13619238) for the redevelopment of Greenwich Hospital into an integrated hospital and seniors living facility on land identified as 97-115 River Road, Greenwich, NSW (the site). The extent of the site is shown below.

The subject proposal is for the detail design and construction of the facility following its concept approval under SSD-8699. Specifically, SSD-13619238 seeks approval for the following:

- Demolition of the existing hospital building and associated facilities at the site;
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1.1 Proposed Development Details

JKE has reviewed the development plans prepared by Bickerton Masters (DD-SW-0200 to 0210, dated 8 April 2022). Based on review of these plans, we understand the proposed development includes:

- The demolition of the existing hospital building and associated facilities (excluding Pallister House);
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- The proposed lowest (basement) car park finished floor reduced level (RL) will be formed at between RL37.95m Australian Height Datum (AHD) and RL38.6mAHD;
- Construction of a new 2-3 storey respect care building to the east of the main building; and
- Reconfiguration of the surrounds including new access roads, external parking areas, walkways and landscaped areas.

The proposed development includes major earthworks (cut/fill) over the majority of the site to achieve the development levels. The maximum cut is anticipated to be approximately 14m below ground level (BGL).

Selected development plans issued to JKE are attached in the appendices.

1.2 Remediation Goal, Aims and Objectives

The goal of the remediation is to render the site suitable for the proposed hospital redevelopment from a contamination viewpoint. The primary aim of the remediation at the site is to reduce the human health and environmental risks posed by site contamination to an acceptable level.

The primary objectives of the RAP are to:

- Summarise previous investigations and historical contamination data;

- Identify any data gaps which may require addressing prior to the commencement of remediation or during remediation works;
- Provide a methodology to remediate and validate the site;
- Provide a contingency plan and unexpected finds protocol for the remediation works; and
- Outline site management procedures to be implemented during remediation.

1.3 Scope of Work

The RAP was prepared generally in accordance with a JKE proposal (Ref: EP53931BR of 14 April 2021 and written acceptance in the form of a purchase order (PO No: 28737) issued by the client on 29 September 2021. The scope of work included consultation with the client, a review of previous reports and Conceptual Site Model (CSM), and preparation of the RAP.

The scope of work was undertaken with reference to the National Environmental Protection (Assessment of Site Contamination) Measure 1999 as amended (2013)[1], State Environmental Planning Policy (Resilience and Hazards) 2021[2] (formerly SEPP55) and other guidelines made under or with regards to the CLM Act 1997, including the Consultants Reporting on Contaminated Land (2020)[3] guidelines.

A list of reference documents/guidelines is included in the appendices.

[1] National Environment Protection Council (NEPC), (2013). *National Environmental Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013).* (referred to as NEPM 2013)

[2] *State Environmental Planning Policy (Resilience and Hazards) 2021* (NSW) (referred to as Resilience and Hazards SEPP)

[3] NSW EPA, (2020). *Consultants reporting on contaminated land, Contaminated Land Guidelines.* (referred to as Consultants Reporting Guidelines)

2 SITE INFORMATION

2.1 Background / Summary of Site History

2.1.1 Waste Classification Assessment

Environmental Investigation Services (EIS, now JKE) undertook soil sampling for waste classification purposes in 2014[4]. The investigation was limited to the south-west corner of the wider hospital site and was undertaken for the proposed development of a multi-level carpark. Soil samples were obtained from six boreholes. Three boreholes were drilled in the asphaltic concrete (AC) car park and three were drilled into the side of the steep batter slope.

The subsurface profile encountered in the carpark area generally consisted of fill to a depth of approximately 2.3m to 5.3mBGL underlain by sandstone bedrock. The fill material was varied and included silty sand and silty clay with various amounts of gravel. Silty clay fill material was also encountered in the batter slope to depths of approximately 0.5m to 0.6m (hand auger refusal). Foreign materials including bricks, metal fragments and plastic were observed within the batter slope fill profile.

The fill soil was provided a preliminary classification as General Solid Waste (non-putrescible). The natural soils and bedrock were considered to meet the definition of Virgin Excavated Natural Material (VENM).

2.1.2 Preliminary Site Investigation (PSI)

A Preliminary Site Investigation (PSI) was undertaken for the wider hospital property by Douglas Partners (DP) in 2018[5]. The scope of the PSI included a review of various historical documents comprising aerial photographs, historical titles deeds, the Section 10.7 planning certificates, SafeWork NSW licence information, NSW EPA contaminated land register, groundwater bore licence details, and a site walkover inspection.

The site history review and site inspection identified the following:

- Historical title deeds indicated that between the 1920s and 2008 the wider hospital site was owned by individuals, the Church of England Property Trust Diocese of Sydney, and Home of Peace Hospitals Limited. HammondCare took over ownership of the site in 2008. The PSI report indicated that the Church of England operated Pallister House as a home for girls in the mid-20th Century, prior to the property becoming a treating hospital in the mid-1960s;
- Aerial photographs indicated that the site was vacant in the 1930s with Pallister House present on the wider hospital property in the south-east. From 1942 onwards new buildings and structures (the existing hospital buildings and structures) were observed to be present on the site;

[4] Environmental Investigation Services, (2014). *Waste Classification Assessment, Proposed Development, Greenwich Hospital, 97-115 River Road, Greenwich.* (Ref: E23789Kletr, dated 2 July 2014). (Referred to as EIS 2014 report)

[5] Douglas Partners, (2018). *Report on Preliminary Site Investigation (Contamination), Greenwich Hospital, 97-115 River Road, Greenwich. Prepared for HammondCare.* (Ref: 86495.00, dated 22 August 2018). Referred to as DP PSI)

- The Section 10.7 Certificate for the site indicated that: the land is not significantly contaminated, is not the subject of a management order, is not the subject of an approved voluntary management proposal, is not the subject of an ongoing maintenance order, and is not the subject of a site audit statement;
- The SafeWork NSW licence information reviewed indicated that an underground storage tank (UST) of approximately 5000L capacity was located at the site. The information indicated that the UST was located to the west of the boilers and was used to store petrol. The documentation indicated that the UST was installed in 1968 and was still in use in the mid-1990s;
- A review of the EPA contaminated Land Register did not identify the wider hospital property as being significantly contaminated under the Contaminated Land Management Act 1997 as at 21 August 2018. The wider hospital site was not listed on the 2 August 2018 version of the 'List of NSW Contaminated Sites Notified to EPA';
- No licenced wells within or near the wider hospital site were identified during a search of licenced groundwater bores, indicating that the regional groundwater table is at significant depth and is not likely to be a beneficial resource for nearby sites;
- The site inspection undertaken as part of the PSI identified the UST gatic cover (which was not opened), in the south-west section of the site; and
- The Conceptual Site Model (CSM) identified the following potentially contaminating activities may have occurred on the wider hospital site:
  - Placement of filling on the site;
  - The use of hazardous materials in previous and existing structures;
  - Contaminants associated with building maintenance (e.g. pesticides);
  - The UST and related infrastructure;
  - Spillage of hospital wastes;
  - Placement of wastes and/or incinerator ash; and
  - Naturally occurring elements in the soils and rock underlying the site (e.g. heavy metals).

The report concluded that if characterisation of the site is required, a full detailed site investigation (DSI) should be undertaken. Further to this, recommendations were made for a hazardous building materials survey of the existing structures and waste classification for any material to be removed from the site as part of redevelopment.

2.1.3 Detailed Site Investigation (DSI)

A DSI was undertaken for the site by JKE in 2019[6]. The DSI included a review of historical information presented in the DP PSI, a walkover site inspection, soil sampling from 30 boreholes and groundwater sampling from three groundwater monitoring wells installed at the site.

The site inspection identified an abandoned UST to the south of the main hospital building (refer to Figure 2). A small self-bunded diesel cube (500L) was observed on the eastern side of the main hospital

[6] JKE, (2019). *Report to HammondCare on Detailed Site Investigation (DSI) for Proposed Hospital Redevelopment at Greenwich Hospital, 97-115 River Road, Greenwich, NSw.* (Ref: E32507BTrptRev1, dated 9 September 2019). (referred to as JKE DSI).

building positioned next to an external (transportable) generator and a small capacity incinerator was observed on the eastern side of the main hospital building. Review of the DP PSI indicated several potentially contaminating activities may have occurred on the site and wider hospital property including: placement of fill; use of hazardous materials in previous and existing structures; contaminants associated with building maintenance (e.g. pesticides); the UST and related infrastructure; spillage of hospital wastes; placement of wastes and/or incinerator ash; and naturally occurring elements in the soils and rock underlying the site (e.g. heavy metals).

Soil sampling for the DSI was undertaken from 30 borehole locations and groundwater sampling from three monitoring wells installed in three of the soil boreholes. One soil sample reported an elevated total recoverable hydrocarbons (TRH) F2 Fraction hydrocarbons concentration above the human health and ecological site assessment criteria (SAC), seven soil samples reported elevated TRH F3 concentrations above the ecological SAC and one groundwater sample reported an elevated copper concentration above the ecological SAC for freshwater.

The DSI concluded that the site could be made suitable for the proposed development provided that the following recommendations were implemented to address the data gaps and to better characterise the risks:

- When the site becomes fully accessible (i.e. after demolition), undertake an inspection and additional soil sampling in the footprints of buildings/structures and in the vicinity of the UST;
- Prepare a RAP to address the contamination issues identified at the site; and
- Undertake a validation assessment documenting the remediation works.

2.1.4 Additional Site Investigation (ASI)

An Additional Site Investigation (ASI) was undertaken by JKE in 2022[7]. The ASI included a review of site information and site history information (presented in the reports discussed above), soil sampling from an additional 19 locations throughout the site, groundwater sampling from eight monitoring wells installed on-site and a preliminary hazardous ground gases (HGG) screening program. A ground-penetrating radar (GPR) survey was also undertaken.

The GPR survey was limited to the approximate location of the known UST in the south-west of the site. The survey identified a subsurface anomaly which was consistent with the approximate dimensions of a 5,000L tank. JKE noted that the SafeWork NSW recorded presented in the DP PSI indicated that a 5,00L UST was present at the site. JKE was of the opinion that the GPR survey confirmed the location of this UST.

The site history information and the site inspection confirmed the potential sources of site contamination/AEC identified in the JKE DSI.

The ASI identified TRH F1 concentrations above the human health SAC in one location. The location was in the south-west of the site and in the vicinity of the UST. The ASI also identified TRH F3 at concentrations above the ecological SAC in two locations. The TRH F3 exceedance in one location was attributed to organic

[7] JK Environments, (2022). *Report to HammondCare on Additional Site Investigation for Proposed Hospital Redevelopment at Greenwich Hospital, 97-115 River Road, Greenwich, NSW.* (Ref: E332507BRrpt5) (Referred to as ASI)

interference in the analysis (i.e. non petroleum-based hydrocarbons). The TRH F3 exceedance in the other location was considered to have low potential to pose risk to ecological receptors due to an incomplete source-pathway-receptor (SPR) linkage.

The site inspection identified at least one UST within the south-west of the site. The UST, associated infrastructure and surrounding area were considered to potential sources of hydrocarbon contamination. However, JKE noted that the borehole observations and soil analysis results indicated the potential for extensive impacts from the UST/s was relatively low. Localised impacts are likely to be encountered in the vicinity of the UST and associated infrastructure, as odorous soils and elevated hydrocarbon concentrations were recorded in the borehole down-gradient of the UST.

The ASI identified heavy metals in groundwater at concentrations above the ecological SAC. The concentrations of heavy metals within the soils indicated the site was unlikely to be the source of the heavy metals within the groundwater. JKE was of the opinion that the concentrations were likely a regional issue and noted that the concentrations did not pose a risk to on-site receptors in the context of the proposed development. However, the concentrations may require some treatment for off-site disposal of groundwater to stormwater during dewatering activities.

The ASI identified that the pH readings of the groundwater samples were generally outside (i.e. below the lower threshold) the SAC for ecological receptors. JKE was of the opinion that the pH was likely a regional issue, however, would require some treatment prior to off-site disposal of groundwater to stormwater during dewatering activities.

The ASI identified concentrations of TRH F1, acenaphthene (a PAH compound) and trihalomethanes (VOCs) in selected groundwater samples. All of the TRH F1, acenaphthene and trihalomethane concentrations were below the SAC and were assessed to not pose risk to the on-site receptors in the context of the proposed land use. However, some treatment may be required for off-site disposal of groundwater to stormwater during dewatering activities.

Preliminary HGG screening was undertaken for the ASI and comprised three rounds of spot monitoring, and screening during borehole drilling. The screening identified carbon monoxide (CO) and carbon dioxide (CO_2) within the monitoring wells at concentrations which may pose risk to human health receptors. JKE note that the HGG screening was conducted at regular intervals and climatic variations may influence the HGG concentrations. A continuous HGG monitoring program was recommended to better assess the risks posed by HGG.

The ASI concluded that the site could be made suitable for the proposed development. The following was recommended:

- When the site becomes fully accessible (i.e. after demolition), undertake an inspection and additional soil sampling in the footprints of buildings/structures and in the vicinity of the UST;
- Prepare a RAP to address the contamination issues identified at the site; and
- Undertake a validation assessment documenting the remediation works.

2.1.5 Hazardous Building Material Survey (Hazmat) and Other JKE Reports

JKE were engaged by the client to complete the following reports for the SSD in conjunction with the ASI:

- An acid sulfate soil (ASS) assessment[8];
- A salinity investigation[9]; and
- A HAZMAT survey[10].

The ASS assessment included a desktop review of geological and ASS risk mapping, site walkover inspection and soil sampling from eight boreholes drilled for the ASI. The ASS information reviewed identified that the site was not located in an ASS risk area and was classed as having extremely low probability of ASS occurrence. The results of field tests and laboratory analysis were not indicative of ASS conditions. Based on the findings of the assessment, the JKE ASS report concluded that ASS or potential ASS was unlikely to be encountered and that an ASS management plan (ASSMP) was not considered necessary for the proposed development.

The salinity investigation included a desktop review of salinity information and mapping, site walkover inspection, soil sampling from eight boreholes drilled for the ASI and groundwater sampling from eight monitoring wells installed for the ASI. The salinity information indicated that the site was not located within a mapped dryland salinity risk area. No visual indications of saline conditions were observed during the inspection. The results of the soil and groundwater analysis identified the following:

- The soils were classed as very strongly acidic to very strongly alkaline;
- The soils were classed as non-saline with localised occurrences of slightly to moderately saline conditions;
- The soils were generally non-sodic;
- The soils were mildly aggressive toward buried concrete and steel;
- The groundwater was moderately aggressive towards buried concrete; and
- The groundwater was non-aggressive towards buried steel.

The salinity investigation recommended preparing a salinity management plan (SMP) for the proposed development.

The HAZMAT survey included an inspection and sampling of representative materials for: asbestos fibre containing materials; lead containing materials; polychlorinated biphenyls (PCBs) containing electrical equipment; and synthetic mineral fibre (SMF) containing materials. The inspection identified asbestos, in the form of bonded/non-friable asbestos containing material (ACM) and friable asbestos and lead in paint

[8] JKE, (2022a). *Report to HammondCare on Acid Sulfate Soil Assessment for Proposed Hospital Redevelopment at Greenwich Hospital, 97-115 River Road, Greenwich, NSW.* (Ref: E32507BRrpt3Rev1, dated 8 April 2022). (referred to as JKE ASS Report).

[9] JKE, (2022b). *Report to HammondCare on Salinity Investigation for Proposed Hospital Redevelopment at Greenwich Hospital, 97-115 River Road, Greenwich, NSW*. (Ref: E32507BRrpt4Rev1, dated April 2022. (referred to as JKE Salinity Report).

[10] JKE, (2022c). *Report to HammondCare on Hazardous Building Materials Survey for Proposed Demolition Works at Greenwich Hospital, 97-115 River Road, Greenwich, NSW.* (Ref: E32507BLrptRev1-HAZ). (referred to as JKE HAZMAT).

systems within the interior and exterior of buildings and structures at the site, and SMF within the interior of building and structures at the site. Light fittings potentially housing PCBs were visually identified within the site. Reference should be made to the JKE HAZMAT report for further details.

2.2 Site Identification

Table 2-1: Site Identification

Current Site Owner:	HammondCare
Site Address:	99-115 River Road, Greenwich, NSW
Lot & Deposited Plan:	Lot 3 and Lot 4 in DP 584287
Current Land Use:	Hospital
Proposed Land Use:	Hospital and Seniors Living
Local Government Authority:	Lane Cove Municipal Council
Current Zoning:	SP2: Infrastructure (Health Services)
Site Area (m^2) (approx.):	23,700 (Redevelopment Area)
RL (AHD in m) (approx.):	36 - 51
Geographical Location (decimal degrees):	Latitude: -33.827404 Longitude: 151.183875
Site Location Plan:	Figure 1
Sample Location Plan:	Figure 2

2.3 Site Condition and Surrounding Environment

2.3.1 Location and Regional Setting

The site is located in a predominantly residential area of Greenwich. The site is bounded by River Road to the north and St Vincents Road to the east as shown on Figure 1 attached in the appendices. The site is located approximately 75m to the north-east of the Gore Creek and 275m to the north-east of the Lane Cove River.

2.3.2 Topography

The site is located within undulating regional topography and sits on the southern edge of a topographic spur that falls steeply to the east, south and west. A significant fill batter slope exists along the western boundary. Parts of the site appear to have been levelled to account for the slope and accommodate the existing development.

2.3.3 Site Inspection

A walkover inspection of the site was undertaken by JKE on 20 September 2021 as a component of the ASI. At the time of the inspection, the main hospital buildings were located in the central to west portion of the site and include wards, theatres, two gas-fired boiler units, two emergency generators, clinical and general waste facilities, oxygen storage and maintenance equipment. A building to the east of the main hospital building contained non-clinical facilities. The main hospital buildings were a mix of brick, fibre cement, and concrete construction typically on concrete slab and between one and four storeys.

During the site inspection, a gatic cover assumed to be associated with the abandoned UST was observed to the south of the main hospital building. A small self-bunded diesel cube (500L) was observed on the eastern side of the main hospital building positioned next to an external (transportable) generator. A small capacity incinerator was observed on the eastern side of the main hospital building. There were no other visible or olfactory indicators of contamination observed during the site inspection.

Fill materials were identified in numerous areas around the site where exposed soil was present at the site surface. This included garden and landscaped areas, and unpaved or boundaries of carpark areas generally in the east of the site. Gas cylinders and flammable materials were observed to be stored appropriately in locked cages in paved storage areas and generally in the vicinity of the maintenance office. A fill stockpile/mound (approximately 50m x 9m x 2m) was observed in the north of the site. No inspection or sampling of this stockpile was undertaken.

A majority of the eastern portion of the site was grass covered with interspersed medium to large mature trees and small to medium shrubs. Medium to large trees were observed along the north, west and south boundaries of the site and small to medium shrubs were located in garden beds and around buildings across the site. The steep batter slope in the south-west corner of the site was densely vegetated with native and exotic shrubs and a small grass covered area was observed along the southern boundary (adjacent to the empty pool). The vegetation across the site appeared to be in reasonable condition based on a cursory inspection, with no obvious or extensive dieback observed. Grass coverage was generally good, with the exception of some areas beneath large trees and isolated areas adjacent to carparks and footpaths.

Gore Creek Reserve, an area zoned as E2 - Environmental Conservation, and Gore Creek extends along the south-west boundary of the site. These features are situated down-gradient of the site and are considered to be sensitive environments.

2.3.4 Surrounding Land Use

During the site inspection, JKE observed the following land uses in the immediate surrounds:

- North – Greenwich Public School and residential properties;
- South – Residential properties and Gore Creek Reserve;
- East – Garden and landscaped areas of the hospital, St Vincents Road and residential properties beyond; and
- West – Residential properties.

2.3.5 Climatic Conditions

Key meteorological fata for Sydney Botanic Gardens weather station was reviewed for the ASI. A summary is provided below:

- The highest mean rainfall occurs in March, with a total of 138.1mm;
- The lowest mean rainfall occurs in September, with a total of 67.9mm;
- In the week lead up to the JKE soil sampling event, a total of 15mm of rainfall was recorded; and
- In the week lead up to the JKE groundwater sampling event, a total of 15.2mm of rainfall was recorded. JKE note a total of 24mm of rainfall was recorded across the days of groundwater sampling.

2.4 Summary of Geology, Soils and Hydrogeology

2.4.1 Regional Geology

Regional geological information included in the ASI report indicated that the site is underlain by Hawkesbury Sandstone, which typically consists of medium to coarse grained quartz sandstone with minor shale and laminite lenses.

A summary of the subsurface conditions encountered in the ASI boreholes is provided below. Copies of the DSI and ASI borehole logs are attached in the appendices.

Table 2-2: ASI Summary - Subsurface Conditions

Profile	Description
Pavement	Asphaltic concrete (AC) pavement was encountered at the surface in BH101 to BH106, BH109, BH114, BH116 and BH119 and ranged in thickness from approximately 20mm to 100mm. Concrete pavement was encountered at the surface in BH112 and was approximately 220mm thick.
Fill	Fill was encountered at the surface or beneath the pavement in all boreholes and extended to depths of approximately 0.1mBGL (BH116) to 4.1mBGL (BH104). BH111 and BH117 were terminated in the fill at approximate depths of 0.8mBGL and 1.5mBGL. The fill typically comprised silty gravelly sand, sandy clay and silty clay, with occasional silty sand, clayey sand and sandy gravel, with inclusions of igneous, ironstone, sandstone and siltstone gravel, ash, slag, root fibres and building rubble (asphalt, brick, tile, ceramic, glass, metal and plastic fragments). Organic odours were not encountered in the fill during the investigation.
Natural Soil	Residual sandy clay, silty clay and silty sand was encountered beneath the fill in BH103, BH105, to BH107, BH109, BH110A, BH113 to BH116 and BH118 at depths of approximately 0.2mBGL (BH114) to 1.6mBGL (BH118). A hydrocarbon odour was encountered in the natural soils in BH103 at a depth of approximately 1.4mBGL. BH103 is located in close proximity of the UST as shown on Figure 2. No stained soils were encountered during the investigation.
Bedrock	Sandstone bedrock was encountered beneath the fill in BH101, BH102, BH104, BH108, BH112 and BH119, and beneath the residual soils in BH105 to BH107, BH109 and BH116 at depths of approximately 0.3mBGL (BH119) to 4.1mBGL (BH104).

Profile	Description
	A layer of siltstone approximately 500mm thick was encountered within the sandstone bedrock at a depth of approximately 11mBGL in BH109. The siltstone was assessed to be of low strength.
Groundwater	All boreholes were dry during and on completion of auger drilling. Potable water is introduced during core drilling activities, which inhibits meaningful groundwater seepage measurements during drilling.

2.4.2 Acid Sulfate Soil (ASS) Risk and Planning

Acid sulfate soil (ASS) information presented in the ASS report indicated the site is not located in an ASS risk area. The site is classed as having extremely low probability of ASS occurrence.

2.4.3 Hydrogeology

hydrogeological information included in the ASI report indicated that:

- The subsurface conditions at the site are expected to consist of relatively low permeability (residual) soils overlying shallow bedrock. The potential for viable groundwater abstraction and use of groundwater under these conditions is considered to be low. There is a reticulated water supply in the area and consumption of groundwater is not expected to occur. Use of groundwater is not proposed as part of the development; and
- The site location and regional topography indicates that surface water flows are expected to flow towards the west to south-west and enter Gore Creek, located approximately 75m to the south-west of the site. Gore Creek in turn flows into the Lane Cove River, approximately 275m to the south of the site. These water bodies are considered to be potential receptors.

A summary of the field screening results during groundwater sampling in the ASI is presented in the following table:

Table 2-3: ASI Summary - Groundwater Field Screening

Aspect	Details
Groundwater Depth & Flow	SWL measured in the monitoring wells installed at the site ranged from approximately 3.58mBGL to 9.9mBGL. The surface RLs of the monitoring wells were interpolated from spot height measurements on the provided survey and are approximate. Groundwater RLs calculated on these measurements ranged from approximately 34mAHD to 42mAHD. The groundwater RLs indicate that excavation for the proposed basement may intercept groundwater.
Groundwater Field Parameters	Field measurements recorded during sampling were as follows: - pH ranged from pH 4.07 to pH 6.46; - EC ranged from 71.7µS/cm to 660µS/cm; - Eh ranged from -16.2mV to -53.2mV; and - DO ranged from 1.1ppm to 6.5ppm.
Light non-aqueous phase liquids (LNAPL) e.g.	Phase separated product (i.e. LNAPL) were not detected using the interphase probe during groundwater sampling.

Aspect	Details
petroleum hydrocarbons	

2.4.4 Receiving Water Bodies

Information included in the ASI report indicated that the receiving water bodies included Gore Creek located approximately 75m to the south-west of the site, which in turn flows into the Lane Cove River which is located approximately 275m south of the site.

3 SITE CHARACTERISATION AND CONCEPTUAL SITE MODEL

NEPM (2013) defines a CSM as a representation of site related information regarding contamination sources, receptors and exposure pathways between those sources and receptors. The CSM for the site is presented in the following sub-sections and is based on the previous investigation data, site history and site information presented in Section 2.

3.1 Summary of Contamination (Site Characterisation)

A copy of the soil and groundwater data summary tables and borehole logs from the ASI and DSI reports is included in Appendix B. The SAC exceedances are shown on Figure 3 in Appendix A. The following exceedances of the SAC were reported during the ASI:

- A TRH F1 concentration above the human health-based SAC in residual soil at BH103;
- TRH F3 concentrations above the ecological-based SAC in fill soils at BH104 and BH108. It is noted that following silica gel cleanup analysis of the sample to remove interference from non-petroleum-based hydrocarbons (i.e. organic compounds), the TRH F3 concentration in BH108 was below the ecological-based SAC;
- Concentrations of heavy metals (cadmium, copper, nickel and/or zinc) above the ecological SAC in the groundwater; and
- pH readings outside (i.e. below the lower threshold) of ecological SAC in the majority of the groundwater samples.

The preliminary HGG screening also recorded elevated CO and CO_2 concentrations during the drilling activities and/or screening events. The concentrations indicated gas protection measures may be necessary. These concentrations are not shown on the figures. The ASI HGG field screening records are attached in the appendices.

The following exceedances of the SAC were reported during the DSI:

- A TRH F2 concentration above the human health-based and ecological SAC in fill soil at BH23; and
- TRH F3 concentrations above the ecological SAC in fill soils at BH5, BH13, BH14, BH17, BH19 and BH23.

The UST and associated infrastructure were also considered potential source/s of localised hydrocarbon impacts.

3.2 CSM

The table below includes a review of the CSM which has been used to design the soil remediation strategy. The CSM will require further review if additional site data becomes available.

Table 3-1: CSM

Contaminant source(s) and contaminants of concern	**<u>Contamination sources:</u>** historically imported fill soil; UST and associated infrastructure; use of pesticides; hazardous building materials; and on-site incinerator and hospital waste. **<u>Contaminants of concern for the RAP include:</u>** Heavy metals; TRHs; BTEX; PAHs; and HGG. **<u>The Contamination of Potential Concern (CoPC) for the ASI included:</u>** heavy metals, BTEX, TRH, PAHs, organochlorine pesticides (OCPs), organophosphorus pesticides (OPPs), polychlorinated biphenyls (PCBs), per-and polyfluoroalkyl substances (PFAS) and asbestos. The ASI included analysis of groundwater for volatile organic compounds (VOCs). The ASI also included a preliminary screening for HGG.
Affected media	Soil and HGG are the affected media. The groundwater has been impacted by heavy metals. The source of the contaminants is likely associated with leaks/spills from potable water supply and regional issues. Groundwater has not been identified as a medium requiring remediation under this RAP as the contaminants are not considered to pose a risk to on-site receptors. However, some level of treatment may be required for off-site disposal of groundwater during dewatering. JKE note that HGG requires further investigation. This has been identified as a data gap in this RAP.
Receptor identification	Human receptors include construction workers, intrusive maintenance workers and current and future site users. The risk of TRH/BTEX to future site users (including accumulating in confined spaces and buildings) should be addressed in relation to the proposed development. The DSI identified TRH F2 and F3 at concentrations that pose a risk to ecological receptors at the site. The impacts were generally limited to the surficial and near-surface soils in the landscaped (existing and proposed) areas. These risks should be addressed in relation to the proposed development.
Exposure pathways and mechanisms	Potential exposure pathways relevant to the human receptors include primary contact and inhalation of vapours (TRH/BTEX and HGG). The potential for exposure would typically be associated with the construction and excavation works, and future use of the site. Potential exposure pathways for ecological receptors include primary contact and ingestion. Exposure to human receptors during future site use could occur via inhalation of HGG and/or vapours within enclosed spaces such as buildings and basements, and during soil disturbance. Exposure to ecological receptors during future site use could occur via primary contact and ingestion of soils in unpaved areas, including landscaped areas and during soil disturbance. The following have been identified as potential exposure mechanisms for site contamination: • Vapour/HGG intrusion into confined spaces including service trenches; • Vapour/HGG intrusion into buildings; and • Contact (dermal or inhalation) exposure to TRH (ecological receptors).

Evaluation of data gaps	The ASI recommended further investigation to assess soil conditions beneath existing structures and additional HGG monitoring as outlined in Section 4.

3.3 Remediation Extent

For the purpose of the RAP, the extent of remediation includes TRH impacts to fill in the south-west of the site, and relatively localised TRH impacts to residual soil/bedrock in one location (BH103). Remediation of the UST and associated infrastructure is also required. The remediation extent has been determined after consideration of the potential for complete SPR linkages to exist before and/or after development.

The depth of fill in the south-west of the site ranged from approximately 0.4mBGL to 5.3mBGL. However, as the TRH impacts to fill pose a potential risk to ecological receptors only, the vertical extent of remediation is will be the depth of fill, or 2mBGL, whichever is lesser. The lateral extent of the remediation for TRH impacts to fill is limited to the landscaped areas in the south-west of the site.

The TRH impacts to residual soil/bedrock in BH103 were encountered at a depth of approximately 1.4mBGL. The extent of remediation (horizontal and vertical) associated with the TRH impacts in the vicinity of BH103 will be guided by the validation. It is anticipated that impacts may be limited to the soil/rock interface, which is anticipated to be approximately 1.5mBGL to 2mBGL.

The extent of remediation (horizontal and vertical) associated with the UST and associated infrastructure will be guided by the validation. It is anticipated that the tank pit could be approximately 2-3m deep. The extent of remediation will be guided by the validation.

The approximate soil remediation extents are shown on Figure 5 in the appendices.

The site is also impacted by HGG. The preliminary HGG screening (a component of the ASI) identified CO and CO_2 at concentrations that may require gas protection measures. It is noted that the screening was conducted from spot monitoring at regular intervals, and that climatic variations may influence the HGG concentrations. Additional investigation of the HGG is required in order to confirm the extent of HGG impacts and assist to identify the necessary protection measures.

Following the data gap investigation (DGI), a Human Health Risk Assessment (HHRA) should be undertaken to assess the potential for health risks associated with the HGG. In the event the HHRA indicates there is a risk to human health, long-term management of HGG may be required. Potential options for the management of HGG based on the findings of the DGI and the HHRA will be included in a remediation works plan (RWP).

4 DATA GAP INVESTIGATION

The ASI recommended further investigation to close out the identified data gaps. The data gaps included that the fill soil mound located on the north-east site boundary was not assessed, the existing building footprints were not assessed, and that HGG screening was undertaken at nominated intervals and may not have captured the worst-case scenario. The data gap investigation (DGI) will largely need to be undertaken post-demolition of the existing structures.

The following sub-sections outline the plan to close out the data gaps.

4.1 Fill Soil Mound

The DGI will include soil sampling from the existing fill soil mound (stockpile) in the north of the site, as shown on Figure 2 attached in the appendices. At the time of reporting, the volume of the stockpile is unknown. A quantity survey is to be prepared to provide an approximation of the stockpile volume.

Soil sampling is to be undertaken from test pits using an excavator (where possible). Sampling and analysis of soils is to be undertaken at the frequencies outlined in the NEPM (2013) (i.e. minimum of one sample per $25m^3$). A reduced analytical frequency may be acceptable, in the event that the fill mound composition is relatively consistent, and the adoption of sound statistical analysis of results.

As a minimum, one soil sample per sampling location is to be analysed for the following CoPC: heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), TRH/BTEX, PAHs, OCPs, OPPs and asbestos (500mL quantification sample). A bulk (10L) sample (to the extent achievable based on sample return) from each fill profile encountered (at each location) is to be screened in the field for the presence of asbestos. TCLP analysis for selected metals and PAHs may also be required for waste classification purposes.

4.2 Soils Beneath Existing Building Footprints

The DGI will include soil sampling from 15 additional sampling locations (as a minimum) as nominated on Figure 6 attached in the appendices (BH201 to BH215 inclusive). Additional samples are also to be collected if any visual or olfactory indicators of potential contamination are observed in other areas. The nominated locations target the footprints of the existing buildings.

Soil sampling is to be undertaken from test pits using an excavator (where possible). The use of a drill rig and/or hand tools may be necessary due to access in some areas (i.e. sloping ground).

As a minimum, one soil sample per fill profile encountered (at each location) is to be analysed for heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), TRH/BTEX, PAHs, OCPs, OPPs and asbestos (500mL quantification sample). A bulk (10L) sample (to the extent achievable based on sample return) from each fill profile encountered (at each location) is to be screened in the field for the presence of asbestos. Additional testing may be required in areas of deep fill.

As a minimum, one sample of the natural profile is to be collected from each sampling location and is to be analysed for heavy metals, TRH/BTEX and PAHs for waste classification purposes. The samples are to be selected based on the results of the fill soil analysis and field observations.

A record of any additional USTs and/or potential point source/s of contamination identified after demolition is to be maintained. After removal of the infrastructure/point source, the USTs and/or point source/s of contamination are to be assessed in accordance with the validation plan outlined in Section 7.1. Any deviation to the remediation strategy should be documented in a RWP.

4.3 HGG

A continuous HGG monitoring program is to be implemented. As a minimum, continuous gas monitors are to be installed at locations BH/MW104 and BH/MW109 and operated continuously for a period of at least 6-8 weeks. The continuous gas monitors are required to log data on an hourly basis (at a minimum) and monitor the concentrations of methane (CH_4), carbon dioxide (CO_2), carbon monoxide (CO), oxygen (O_2) and hydrogen sulphide (H_2S). The meters are also to collect data relating to humidity, pressure (gauge, pump and barometric), and borehole flow rates. The monitoring program may need to be extended in the event that the atmospheric conditions remain relatively consistent during the monitoring period.

4.4 DGI Reporting Requirements

On completion of the DGI, a stand-alone report should be prepared in accordance with the Consultants Reporting Guidelines. Based on the findings of the DGI, a HHRA may be prepared to better assess the risks posed by contamination and HGG, and outline specific remediation/management measures to be implemented during the proposed development in order to mitigate the risk posed to site receptors. If the remediation approach varies from this RAP, a remedial works plan (RWP) is to be prepared and consider the HHRA.

5 REMEDIATION OPTIONS

5.1 Soil Remediation

The NSW EPA follows the hierarchy set out in NEPM 2013 for the remediation of contaminated sites. The preferred order for soil remediation and management is as follows:

1. On-site treatment of soil so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level;
2. Off-site treatment of excavated material so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level, after which the soil is returned to the site;

Or if the above are not practicable:

3. Consolidation and isolation of the soil by on-site containment within a properly designed barrier; and
4. Removal of contaminated material to an approved site or facility, followed where necessary by replacement with clean material; or
5. Where the assessment indicates that remediation would have no net environmental benefit or would have a net adverse environmental effect, implementation of an appropriate management strategy.

For simplicity herein, the above hierarchy are respectively referred to as Option 1, Option 2, Option 3 etc.

The NEPM 2013 and Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia (2009)[11] prefer the following asbestos remediation hierarchy:

1. Minimisation of public risk;
2. Minimisation of contaminated soil disturbance; and
3. Minimisation of contaminated material/soil moved to landfill.

The NSW EPA Contaminated Land Management Guidelines for the NSW Site Auditor Scheme (3rd Edition) (2017)[12] provides the following additional requirements to be taken into consideration:

- Remediation should not proceed in the event that it is likely to cause a greater adverse effect than leaving the site undisturbed; and
- Where there are large quantities of soil with low levels of contamination, alternative strategies should be considered or developed.

The table below discusses and assesses a range of soil remediation options:

[11] Western Australian (WA) Department of Health (DoH), (2009). Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia. (referred to as WA DoH 2009)

[12] NSW EPA, (2017). *Contaminated land Management, Guidelines for the NSW Site Auditor Scheme (3rd ed.).* (referred to as Site Auditor Guidelines 2017)

Table 5-1: Consideration of Soil Remediation Options

Option	Discussion	Assessment/Applicability
<u>**Option 1**</u> **On-site treatment of contaminated soil**	On-site treatment can provide a mechanism to reuse the processed material, and in some instances, avoid the need for large scale earthworks. Treatment options are contaminant-specific and can include bio-remediation, soil washing, air sparging and soil vapour extraction, and thermal desorption. Depending on the treatment option, licences may be necessary for specific individual waste streams due to the potential for air pollution and the formation of harmful by-products during incineration processes. Licences for re-use of treated material/waste may also be required.	Potentially applicable for the contaminants of concern. However, treatment is unlikely to be viable on such a small scale and would not be the preferred option due to the extent of earthworks proposed.
<u>**Option 2**</u> **Off-site treatment of contaminated soil**	Contaminated soils are excavated, transported to an approved/licensed treatment facility, treated to remove/stabilise the contaminants then returned to the subject site, transported to an alternative site or disposed to an approved landfill facility. This option is also contaminant-specific. The cost per tonne for transport to and from the site and for treatment is considered to be relatively high. The material would also have to be assessed in terms of suitability for reuse as part of the proposed development works under the waste and resource recovery regulatory framework.	Not feasible option for the project due to the relatively localised impacted and the extent of earthworks proposed.
<u>**Option 3**</u> **Consolidation and isolation of impacted soil by cap and containment**	This would include the consolidation of hydrocarbon impacted soil within an appropriately designed cell, followed by the placement of an appropriate barrier over the material to reduce the potential for future disturbance. The capping and/or containment must be appropriate for the specific contaminants of concern. An ongoing environmental management plan (EMP) will be required and will need to be publicly notified and made to be legally enforceable (e.g. via listings in the Section 10.7 planning certificate and on the land title).	Technically feasible however given the likely small-scale of hydrocarbon impacted soil, this would not be the preferred option due to the ongoing liabilities associated with complying with the EMP.
<u>**Option 4**</u> **Removal of contaminated material to an appropriate facility and reinstatement with clean material**	Contaminated soils would be classified in accordance with NSW EPA guidelines for waste disposal, excavated and disposed of off-site to a licensed landfill. The material would have to meet the requirements for landfill disposal. Landfill gate fees (which may be significant) would apply in addition to transport costs.	This option is the most applicable for the remediation of the USTs/infrastructure as it: aligns with the construction work (i.e. bulk excavation is required in the vicinity of the UST); is technically feasible; and economically viable. This option is applicable for the remediation of TRH impacted fill and natural soils given the likely small-scale of hydrocarbon impacted soil and extent of

Option	Discussion	Assessment/Applicability
		development proposed at the site.
Option 5 Implementation of management strategy	Contaminated soils would be managed in such a way to reduce risks to the receptors and monitor the conditions over time so that there is an on-going minimisation of risk. This may occur via the implementation of monitoring programs.	Not applicable given the extent of the proposed development.

5.2 HGG Management

Various strategies for the mitigation/management of HGG intrusion may be applicable for the proposed development. The HGG mitigation/management options will be considered following completion of the DGI, and the HHRA. The mitigation/management options and the implementation and validation methodologies are to be outlined in a RWP.

5.3 Rationale for the Preferred Option for Soil Remediation

The preferred soil remediation approach is Option 4 which includes excavation and off-site disposal of the UST and the associated infrastructure including any backfill, TRH impacted fill in the south-west of the site and TRH impacted residual soil/bedrock in the vicinity of BH103.

The preferred options for remediation are considered to be appropriate on the basis that:

- Considerable earthworks (cut/fill) will be required to achieve the design levels;
- The TRH impacts to fill are localised to the south-west of the site and appear typically limited to the surficial soils;
- The TRH impacts to residual soil/bedrock in the vicinity of BH103 appear to be localised;
- The potential hydrocarbon impacts associated with the UST and associated infrastructure are anticipated to be localised;
- The UST and associated infrastructure will be removed from site, removing a potential source of hydrocarbon impacts; and
- The strategies are sustainable, economically viable, commensurate with the level of risk posed by the contaminants and technically achievable to implement concurrently with the proposed development works.

6 SOIL REMEDIATION DETAILS

6.1 Roles and Responsibilities

Table 6-1: Roles and Responsibilities

Role	Responsibility
Client / Developer	HammondCare Contact: TBC The client/developer is required to appoint the project team for the remediation and must provide all investigation reports including this RAP to the project manager, remediation contractor, consent authority and any other relevant parties involved in the project.
Project Manager	To be appointed. The project manager is required to review all documents prepared for the project and manage the implementation of the procedures outlined in this RAP. The project manager is to take reasonable steps so that the remediation contractor and others have understood the RAP and will implement it in its totality. The project manager will review the RAP and other documents and will update the parties involved of any changes to the development or remediation sequence (in consultation with the validation consultant).
Remediation Contractor	To be appointed. The remediation contractor is required to review all documents prepared for the project, apply for any relevant removal licences or permits and implement the remediation requirements outlined in this RAP. The remediation contractor may also be the construction contractor. The remediation contractor is required to collect all necessary documentation associated with the remediation activities and forward this documentation onto the client, project manager and validation consultant as they become available. The remediation contractor is required to advise the validation consultant at key points in the remediation and validation program, and implement various aspects of the validation plan assigned to them.
Validation Consultant	JKE – Subject to formal engagement Contact: Vittal Boggaram The validation consultant[13] provides consulting advice and validation services in relation to the remediation, and prepares the site validation report, and any other associated documentation such as the Asbestos Management Plan (AMP), Data Gap Investigation (DGI) report, RWP etc. The validation is required to review any deviation to this RAP or in the event of unexpected finds if and when encountered during the site work. It is recommended that the validation consultant has a Licensed Asbestos Assessor (LAA) on staff. The validation consultant is required to liaise with the client, project manager and remediation contractor on all matters pertaining to the site contamination, remediation and validation, carry out the required site inspections during capping, and collect validation samples for imported materials.

[13] It is recommended that the consultant be a certified practitioner (specialising in site contamination), under one of the NSW EPA endorsed certification schemes

Role	Responsibility
Site Auditor	To be appointed. The site auditor would review the information provided by the validation consultant, including (but not limited to) the site validation report. The auditor is to be engaged to review the RAP prior to commencement of the remediation. The developer, project manager and validation consultant are to consult with the auditor in the event of unexpected finds and/or deviations to the RAP.

6.2 Pre-commencement

The project team is to have a pre-commencement meeting to discuss the sequence of remediation, and the remediation and validation tasks. The site management plan for remediation works (see Section 9) should be reviewed by the project manager and remediation contractor, and appropriate steps are to be taken to ensure the adequate implementation of the plan.

6.3 Remediation and Associated Tasks

The following general sequence of works is anticipated:

- Preparation of Asbestos Management Plan (AMP) for the proposed development. JKE note that this is a requirement of the JKE HAZMAT report;
- Site establishment and demolition;
- **Hold Point** – A site inspection should be completed by the validation consultant on completion of demolition to identify any additional sources of contamination such as ACM, USTs etc. An LAA should be appointed to provide a site clearance certificate. Any such areas identified should be targeted as part of the DGI;
- Completion of the DGI as outlined in Section 4;
- Completion of the HHRA for HGG, based on the results of the DGI;
- Preparation of a RWP based on the data gap investigation and HHRA;
- Decommissioning and removal of the USTs, backfill and associated infrastructure, followed by excavation and off-site disposal of soils associated with the tank pit and other impacted areas; and
- Remediation of TRH impacted fill and residual soil in the south-west of the site.

Validation of the works would occur progressively throughout the remediation program.

Details in relation to the above are outlined in the following subsections.

6.3.1 Asbestos Management Plan (AMP)

An AMP should be prepared for the site by a LAA and implemented for the site demolition, remediation and development works. The AMP should include the minimum PPE, WHS and other requirements outlined in the documents published by Safe Work Australia, WorkCover Authority of NSW, National Occupational Health and Safety Commission, and other relevant authorities as applicable.

6.3.2 Site Establishment and Demolition

The remediation contractor is to establish on site as required to facilitate the remediation. Consideration must be given to the work sequence and extent of remediation so that the site establishment (e.g. site sheds, fencing, access points etc) does not inhibit the remediation works.

The hazardous building materials in the existing structures should be demolished in accordance with the relevant codes and standards outlined in the JKE Hazmat report. An AMP is to be prepared prior to the commencement of demolition (as discussed in Section 6.3.1). A clearance certificate is to be obtained from a LAA by the demolition contractor following the removal of any hazardous materials. The concrete slabs should be inspected for potential ACM post-demolition by the LAA.

All waste from the demolition is to be disposed to facilities that are licenced by the NSW EPA to accept the waste. The demolition contractor is to maintain adequate records and retain all documentation for such activities including:

- A summary register including details such as waste disposal dates, waste materials descriptions, disposal locations (i.e. facility details) and reconciliation of this information with waste disposal docket numbers;
- Waste tracking records and transport certificates (where waste is required to be tracked/transported in accordance with the regulations); and
- Disposal dockets for the waste. Legible dockets are to be provided for all waste materials so they can be reconciled with the register.

The above information is to be supplied to the validation consultant for assessment and inclusion in the site validation report.

6.3.3 Tank Remediation

The UST and associated infrastructure (i.e. underground pipe work, vent pipes etc) are to be removed from the site in accordance with the Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation (2019)[14], Guidelines for the Implementation of the Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2019 (2020)[15] and the Australian Standard for The Removal and Disposal of Underground Petroleum Storage Tanks (AS4976-2008)[16]. Reference is also to be made to the UPSS Technical Note: Decommissioning, Abandonment and Removal of UPSS (2010)[17] and the UPSS Technical Note: Site Validation Reporting (2010)[18].

[14] *Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2019* (NSW). (referred to as UPSS Regulation 2019)

[15] NSW EPA, (2020). *Guidelines for the Implementation of the Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2019.* (referred to as UPSS Guidelines 2020)

[16] Standards Australia, (2008). *The Removal and Disposal of Underground Petroleum Storage Tanks.* (referred to as AS4976-2008)

[17] NSW DECCW, (2010). *UPSS Technical Note: Decommissioning, Abandonment and Removal of UPSS*

[18] NSW DECCW, (2010). *UPSS Technical Note: Site Validation Reporting*

It is noted that various guidelines are outdated and/or are currently being updated to reflect the UPSS Regulation 2019. The remediation is to occur in accordance with the current regulation and best practice guidelines available when the remediation commences.

Table 6-2: Remediation – UST and Associated Infrastructure

Step	Primary Role/ Responsibility	Procedure
1.	Remediation contractor	<u>Address Stability Issues and Underground Services</u>: Geotechnical advice should be sought regarding the stability of the adjacent structures and/or adjacent areas prior to commencing remediation (as required). Stability issues should be addressed to the satisfaction of a suitably qualified geotechnical engineer. This may require the installation of temporary shoring. All underground services are to be appropriately disconnected or rerouted to facilitate the works.
2.	Remediation contractor (or their nominated sub-contractor)	<u>Initial Preparation:</u> The pavement in the remediation area should be cut and removed with care using an excavator, or similar. An experienced contractor should be engaged for the removal of the UST. Liquid and/or sludge within the UST and associated pipe work should be pumped out and disposed of lawfully by a licensed liquid waste operator.
3.	Remediation contractor (or their nominated sub-contractor) and validation consultant	<u>Removal of the USTs/infrastructure, impacted soils, followed by validation:</u> The UST and associated infrastructure are to be removed by an appropriately licensed contractor in accordance with AS4976-2008 and with regards to the Work Health and Safety Regulation (2017)[19]. Following removal, remediation of the area will be undertaken as follows: • The backfill soils (most likely to be sandy fill) surrounding the UST should be excavated and stockpiled separately (all stockpiles should be placed on the adjacent hardstand with appropriate silt control). This material is to be validated by the validation consultant (for waste classification purposes) as outlined in Section 7.1; • Submit an application to dispose of the backfill soil (in accordance with the assigned waste classification) to a facility that is appropriately licensed to receive the waste, and obtain authorisation to dispose; • Load the backfill soil onto trucks and dispose in accordance with the assigned waste classification; • Depending on the contamination status of the backfill, excavation of additional material at the base and walls of the tank pits may be required. This should initially involve excavation of material to extend the pits (say 0.5m initially) in the direction of the suspected impact. The validation consultant should be present during the excavation to provide advice on the potential extent of contamination based on visual and olfactory indicators, and PID screening results; • Stockpile the excavated material separately (to the backfill that was initially excavated) and undertake a waste classification outlined above, then load the soil onto trucks and dispose in accordance with the assigned waste classification; • The validation consultant is to obtain validation samples from the walls and base of the excavation (see the Validation Plan in Section 7); and • Subject to successful validation, backfill or isolate the remedial excavation. All documents including landfill disposal dockets, UST disposal/destruction dockets, liquid waste disposal etc. should be retained by the remediation contractor and

[19] *Work Health and Safety Regulation 2017* (NSW). (Referred to as WHS regulation 2017)

Step	Primary Role/ Responsibility	Procedure
		forwarded to the client and validation consultant. This documentation forms a key part of the validation process and is to be included in the validation report.
4.	Validation consultant	Validation sampling of the tank pit, waste classification sampling of stockpiled backfill and any groundwater seepage as outlined in Section 7. Review of documentation issued by the remediation contractor and inclusion into validation report.

The detailed validation plan relevant to the above items is provided in Section 7.

6.3.4 Excavation and Disposal of TRH-Impacted Fill and Residual Soil/Bedrock

The procedure for excavation of fill soil is outlined below:

Table 6-3: Remediation Details – Excavation and disposal of TRH-impacted fill and residual soil/Bedrock

Step	Primary Role/ Responsibility	Procedure
1.	Remediation contractor (or their nominated sub-contractor)	<u>Removal of contaminated fill/residual soil/bedrock:</u> Excavation of the remediation area will be undertaken as follows: • Submit an application to dispose the fill (in accordance with the assigned waste classification) to a landfill licensed by the NSW EPA to receive the waste and obtain authorisation to dispose; • A water system will need to be in place to spray the excavated soil during excavation/ remediation works and to decontaminate trucks entering the work area. The general site area should be kept damp during remediation works to minimise the generation of dust; • The remediation area should be excavated to the base of the fill and down to the surface of the underlying natural soil (or 2mBGL, whichever is encountered first). The lateral extent of remediation required is limited to the landscaping areas in the south-west of the site. The approximate remediation extents are shown on Figure 5 in the appendices; • The remediation area in the vicinity of BH103 should be excavated to the surface of the underlying bedrock. The lateral extent of remediation required for the TRH-impacted residual soils/bedrock will be determined based on the results of validation sampling. The approximate remediation extents are shown on Figure 5 in the appendices; • The details of the excavation works will need to be agreed with the remediation contractor. The works should be done in the most efficient manner that minimises cross contamination. We note that the natural soil/rock levels may vary across the site and provisions will need to be made for careful, detailed excavation and removal of all fill. Even minor amount of fill, if left present at the surface, will result in validation failure and the need for further excavation; • Load the fill and TRH-impacted residual soil onto trucks and dispose in accordance with the assigned waste classification. The receiving licenced landfill facility; and • All documents including landfill dockets should be retained and forwarded to the client and validation consultant for inclusion into the validation report.

Step	Primary Role/ Responsibility	Procedure
2.	Validation consultant	Validation of Excavation Base and Walls: • The base and walls of the excavation should be validated (by the validation consultant) in accordance with Section 7.1; • If the validation fails, the contaminated area should be chased out until the validation is successful; and • If the validation is successful, the excavation can be continued to achieve the finished levels of the basement (additional waste classification documentation will be required to dispose or reuse the underlying natural soil/bedrock).

6.4 Remediation Documentation

The remediation contractor must retain all documentation associated with the remediation, including but not limited to:

- Waste register (see below);
- Asbestos management documentation, including all relevant notifications and monitoring reports;
- Photographs of remediation works;
- Waste tracking documentation (where applicable);
- Survey information; and
- Imported materials documentation from suppliers, including any routine analysis reports, product specifications and dockets for imported materials.

Copies of these documents must be forwarded to the project manager and the validation consultant on completion of the remediation for inclusion in the validation report.

6.4.1 Waste Register

All waste removed from the site is to be appropriately tracked and managed in accordance with the relevant regulations. The remediation contractor (and/or their nominated construction contractor) is to maintain adequate records and retain all documentation for waste disposal activities including:

- A summary register including details such as waste disposal dates, waste materials descriptions, disposal locations (i.e. facility details) and reconciliation of this information with waste disposal docket numbers; and
- Waste tracking records and transport certificates (where waste is required to be tracked/transported in accordance with the regulations); and
- Disposal dockets for the waste. Legible dockets are to be provided for all waste materials so they can be reconciled with the register.

Any soil waste classification documentation is to be prepared in accordance with the reporting requirements specified by the NSW EPA. Reports are to include:

- The full name, address, Australian Company Number (ACN) or Australian Business Number (ABN) of the organisation and person(s) providing the waste classification;
- Location of the site where the waste was generated, including the source site address;

- History of the material and the processes and activities that have taken place to produce the waste;
- Potential contaminating activities that may have occurred at the site where the waste was generated;
- Description of the waste, including photographs, visible signs of contamination, such as discolouration, staining, odours, etc;
- Quantity of the waste;
- Number of samples collected and analysed;
- Sampling method including pattern, depth, locations, sampling devices, procedures, and photos of the sample locations and samples;
- Contaminants tested;
- Laboratory documentation – chain-of-custody (COC), sample receipt, laboratory report;
- All results regardless of whether they are not used in the classification process;
- Results of sample mean, sample standard deviation and the 95% upper confidence limit (UCL) where relevant;
- Brief summary of findings including discussion of results; and
- A clear statement of the classification of the waste as at the time of the report.

A soil volume analysis should be undertaken on completion of remediation and reconciled with the quantities shown on the soil disposal dockets. This information is to be reviewed by the validation consultant on completion of the works and an assessment of the quantities of soil disposed off-site (e.g. comparison with the estimated and actual volumes) is to be included in the validation report. A review of the disposal facility's licence issued under the Protection of the Environment Operations (POEO) Act (1997)[20] should also be undertaken to assess whether the facility is appropriately licensed to receive the waste.

6.4.2 Imported Materials Register

The remediation contractor (and/or their nominated construction contractor) is to maintain for the duration of the project an imported material register. This must include a register (preferably in Microsoft Excel format) with details of each imported material type, supplier details, summary record of where the imported materials were placed on site, and importation docket numbers and a tally of quantities (separated for each import stream). Legible dockets for imported materials are to be provided electronically so these can be reconciled with the register.

The above information is to be provided to the validation consultant for inclusion in the validation report. It is recommended that the register be set up at the beginning of the project and provided to the validation consultant regularly (say on a monthly or two-monthly basis) so the details can be checked and any rectification of the record keeping process can occur in a timely manner.

[20]NSW Government, (1997)). *Protection of Environment Operations Act.* (referred to as POEO Act 1997)

7 VALIDATION PLAN

Validation is necessary to demonstrate that remedial measures described in the RAP have been successful and that the site is suitable for the intended land use. The sampling program for the validation is outlined in Section 7.1. This is the minimum requirement based on the remedial strategies provided. Additional validation sampling may be required based on observations made during remediation or in the event of an unexpected find.

7.1 Validation Sampling and Documentation – Soil Media

The table below outlines the validation requirements for the site:

Table 7-1: Validation Requirements for Soil Media

Aspect	Sampling	Analysis	Observations and Documentation
TRH-Impacted Fill and Residual Soil/Bedrock			
Fill in landscaped areas in south-west of the site	Sampling from the base of the excavation on a grid-based pattern to meet the minimum sampling density for hotspot identification as outlined in the NSW EPA Contaminated Sites Sampling Design Guidelines (1995)[21]. One sample per vertical metre of excavation wall, per base sampling grid. Additional sampling is also to target obvious indicators of contamination and changes in soil profile.	TRH/BTEXN For waste classification purposes heavy metals, PAHs and TCLPs should be undertaken if required.	Samples to be screened using PID. Observations of staining and odour to be recorded. Photographs to be taken. Disposal dockets to be retained.
Fill/Residual soil/bedrock in vicinity of BH103	One sample per 25m^2 from base of excavation. One sample per excavation wall and per vertical metre. Additional sampling is also to target obvious indicators of	TRH/BTEXN For waste classification purposes heavy metals, PAHs and TCLPs should be undertaken if required.	As above

[21] NSW EPA, (1995). *Contaminated Sites Sampling Design Guidelines.* (referred to as EPA Sampling Design Guidelines 1995)

Aspect	Sampling	Analysis	Observations and Documentation
	contamination and changes in soil profile.		
UST, Associated Infrastructure and Impacted Soils			
UST backfill	One sample per $25m^3$, collected using hand equipment.	Heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), TRHs, BTEX, PAHs and asbestos. TCLP testing may be required for waste classification.	Samples to be screened using photo-ionisation detection (PID) meter. Observations of staining and odour to be recorded. Photographs to be taken. Disposal dockets to be retained.
UST pit chase out spoil (if required)	One sample per $25m^3$, collected using hand equipment.	As above. Other analytes to be considered based on remediation failures.	As above.
UST pit – excavation base UST pit – excavation walls	Minimum of two samples per UST to be collected using the excavator after removal of the tank. One sample per excavation wall and per vertical metre. Additional sampling is also to target obvious indicators of contamination and changes in soil profile.	Lead, TRH/BTEXN	Samples to be screened using PID. Observations of staining and odour to be recorded. Photographs to be taken.
Pipe trenches	One sample per 5m lineal, obtained from the base of the trench. Additional samples to target any areas of staining or odours.	As above.	As above.
Imported Materials – validation of imported materials is required for any materials imported onto the site during the remediation and to the point in time that the site validation report is prepared (e.g. general fill to raise the site levels or reinstate remedial excavations, imported materials to create piling platform, gravels for site preparation, material used for capping layers etc).			
Imported VENM backfill (if required)	Minimum of three samples per source	Heavy metals (as above), TRHs, BTEX, PAHs, OCPs, PCBs and asbestos	**Remediation contractor** to supply existing VENM documentation/report (report to be prepared in accordance with the NSW EPA

Aspect	Sampling	Analysis	Observations and Documentation
Imported garden mix/topsoil and mulches	Minimum of three samples per source	(500ml). Additional analysis may be required depending on the site history of the source property. Analysis for CoPC outlined above.	waste classification reporting requirements). A hold point remains until the **validation consultant** approves the material for importation or advises on the next steps. Material is to be inspected upon importation by the **validation consultant** and samples obtained for analysis. Material to be inspected during sampling to confirm it is free of visible/olfactory indicators of contamination and is consistent with documentation. Photographic documentation and an inspection log are to be maintained. Where check sampling occurs by the **validation consultant** due to deficiencies or irregularities in existing VENM documentation, the following is required: - Date of sampling and description of material sampled; - An estimate of the volume of material imported at the time of sampling; - Sample location plan; and - Analytical reports and tabulated results with comparison to the Validation Assessment Criteria (VAC).
Imported engineering materials such as recycled aggregate, road base etc or Excavated Natural Material (ENM)	Minimum of three samples per source/material type. Additional testing may be required for ENM to meet the specification within the ENM Order.	Heavy metals (as above), TRHs, BTEX, PAHs, OCPs, PCBs and asbestos (500ml quantification). Additional testing may be required for ENM (e.g. foreign materials, pH and electrical conductivity) depending on available documentation.	**Remediation contractor** to provide product specification and documentation to confirm the material has been classified with reference to a relevant Resource Recovery Order/Exemption. A hold point remains until the **validation consultant** approves the material for importation or advises on the next steps. Review of the facility's Environment Protection Licence (EPL). Material is to be inspected by the **validation consultant** upon importation to confirm it is free of visible/olfactory indicators of contamination and is consistent with documentation. Where check sampling occurs by the **validation consultant** due to deficiencies or irregularities in existing documentation, the following is required: - Date of sampling and description of material sampled;

Aspect	Sampling	Analysis	Observations and Documentation
			- An estimate of the volume of material imported at the time of sampling; - Sample location plan; and - Analytical reports and tabulated results with comparison to the VAC.
Imported engineering materials comprising only natural quarried products.	At the validation consultant's discretion based on robustness of supplier documentation.	At the validation consultant's discretion based on robustness of supplier documentation.	**Remediation contractor** to provide documentation from the supplier confirming the material is a product comprising only VENM (i.e. natural quarried product). A hold point remains until the **validation consultant** approves the material for importation or advises on the next steps. Review of the quarry's EPL. Material is to be inspected by the **validation consultant** upon importation to confirm it is free of anthropogenic materials, visible and olfactory indicators of contamination, and is consistent with documentation. Where check sampling occurs by the **validation consultant** due to deficiencies or irregularities in existing documentation, the following is required: - Date of sampling and description of material sampled; - An estimate of the volume of material imported at the time of sampling; - Sample location plan; and - Analytical reports and tabulated results with comparison to the VAC.

7.2 Validation Assessment Criteria and Data Assessment

The VAC to be adopted for the validation assessment are outlined in the table below:

Table 7-2: VAC

Validation Aspect	VAC
Soil validation	<u>Landscaped areas Impacted by TRH:</u> • TRH/BTEX = HSLs for low/high density residential land use; • TRH/BTEX = ESLs for urban residential and public open space (URPOS); and • Free of staining and odours. <u>Vicinity of BH103 impacted by TRH:</u> • TRH/BTEX = HSLs for low/high density residential land use; and • Free of staining and odours.

Validation Aspect	VAC
	UST/infrastructure: • TRH/BTEX = HSLs for low/high density residential land use; • Lead = 1,200mg/kg (based on HIL for 'residential with minimal opportunities for soil access' exposure scenario); and • Free of staining and odours The presence of odours or exceedances of the VAC may compromise the VENM classification. However, from a risk perspective in the context of the proposed land use, such traces are unlikely to result in an unacceptable risk to future site users. In the event that persistent traces of TRH/BTEXN are reported above the VAC, these concentrations can be assessed in the context of human health risks, in accordance with Schedule B1 of NEPM (2013) and an alternative classification (other than VENM) would need to be pursued for this material if it is to be disposed off-site.
Waste classification (backfill/chase out soils associated with remediation of USTs, and supplementary waste classification of fill	In accordance with the procedures and criteria outlined in Part 1 of the Waste Classification Guidelines 2014 and any other exemptions/approvals as required.
Imported materials	Material imported as general fill must only be VENM or ENM. VENM is defined in the POEO Act 1997 as 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; • That does not contain sulfidic ores or other waste; and • Includes excavated natural material that meets such criteria for virgin excavated natural material as may be approved from time to time by a notice published in the NSW Government Gazette. ENM and recycled materials are to meet the criteria of the relevant exemption/order under which they are produced. Analytical results for VENM and other imported materials will need to be consistent with expectations for those materials. For VENM, it is expected that: - Heavy metal concentrations are to be less than the most conservative Added Contaminant Limit (ACL) concentrations for an urban residential and public open space (URPOS) exposure setting presented in Schedule B1 of the NEPM 2013; and - Organic compounds are to be less than the laboratory PQLs and asbestos to be absent. All materials imported onto the site must also be adequately assessed as being appropriate for the final use of the site, including ecological considerations. A risk-based assessment approach is to be adopted with regards to the tier 1 screening criteria presented in Schedule B1 of NEPM 2013. Aesthetics: all imported materials are to be free of staining and odours.

Data should initially be assessed as above or below the VAC. Statistical analysis may be applied if deemed appropriate by the validation consultant and undertaken in accordance with the NEPM 2013.

7.3 Validation Sampling, Analysis and Quality Plan (SAQP)

Appropriate QA/QC samples should be obtained during the validation (where applicable) and analysed for the same suite of contaminants as the primary samples. As a minimum, QA/QC sampling should include duplicates (5% inter-laboratory and 5% intra-laboratory), trip spikes and trip blanks. Rinsate samples should be obtained if re-usable sampling equipment is utilised.

Data Quality Objectives (DQOs) and Data Quality Indicators (DQIs) should be clearly outlined and assessed as part of the validation process. A framework for the DQO and DQI process is outlined below and should be reflected in the validation report.

DQOs have been broadly established for the validation with regards to the seven-step process outlined NEPM (2013). The seven steps include the following which are detailed further in the following subsections:

- State the problem;
- Identify the decisions/goal of the study;
- Identify information inputs;
- Define the study boundary;
- Develop the analytical approach/decision rule;
- Specify the performance/acceptance criteria; and
- Optimise the design for obtaining the data.

DQIs are to be assessed based on field and laboratory considerations for precision, accuracy, representativeness, completeness and comparability.

7.3.1 Step 1 - State the Problem

Validation data is required to demonstrate that the remediation is successful and that the site is suitable for the proposed land use described in Section 1.1.

7.3.2 Step 2 - Identify the Decisions of the Study

The remediation goal, aims and objectives are defined in Section 1.2. The decisions to be made reflect these objectives and are as follows:

- Was the remediation undertaken in accordance with the RAP?
- If there were any deviations, what were these and how do they impact the outcome of the validation?
- Are any of the validation results above the VAC?
- Is the site suitable for the proposed development from a contamination viewpoint?

7.3.3 Step 3 - Identify Information Inputs

The primary information inputs required to address the decisions outlined in Step 2 include the following:

- Existing relevant data from previous reports;
- Site information, including site observations, inspections, survey information, as-built drawings, waste and imported materials registers;

- Validation sampling of imported materials; and
- Field and laboratory QA/QC data.

7.3.4 Step 4 - Define the Study Boundary

The remediation and validation will be confined to the impacted areas within the site boundaries as shown in Figures 2 and 5 in Appendix A and will be limited vertically to approximately 2mBGL for the remediation and validation of TRH impacts to ecological receptors in the south-west of the site. The validation will guide the horizontal and vertical extent of the remediation associated with the UST and TRH-impacted residual soil/bedrock in the vicinity of BH103, though it is anticipated to be approximately 2m to 3m deep.

The DGI will be confined to the site boundaries as shown in Figure 2 in the appendices and will be limited vertically to the initial 0.5m of natural soil, anticipated to range from 1mBGL to 2mBGL. Localised deeper fill may be encountered.

The DGI and HHRA, as discussed in Section 4, will guide the mitigation/management of HGG.

7.3.5 Step 5 - Develop an Analytical Approach (or Decision Rule)

7.3.5.1 VAC

The validation data will be assessed in accordance with the requirements outlined in Section 7.2.

7.3.5.2 Field and Laboratory QA/QC

Field QA/QC is to include analysis of inter-laboratory duplicates (5% frequency), intra-laboratory duplicates (5% frequency), trip spike, trip blank and rinsate samples (one each for the assessment to demonstrate adequacy of standard sampling/handling procedures). Field QA/QC samples are to be analysed for the contaminants of concern, except asbestos. The trip spike will only be analysed for BTEX as BTEX will be considered a surrogate to assess potential loss of volatiles from TRH (F2).

DQIs for field and laboratory QA/QC samples are defined below:

Field Duplicates
Acceptable targets for precision of field duplicates will be 30% or less, consistent with NEPM (2013). RPD failures will be considered qualitatively on a case-by-case basis taking into account factors such as the concentrations used to calculate the RPD (i.e. RPD exceedance where concentrations are close to the PQL are typically not as significant as those where concentrations are reported at least five or 10 times the PQL), sample type, collection methods and the specific analyte where the RPD exceedance was reported.

Trip Blanks
Acceptable targets for trip blank samples will be less than the PQL for organic analytes. Metals will be considered on a case-by-case basis with regards to the reference material used as the blank medium.

Trip Spikes
Acceptable targets for trip spike samples will be 70% to 130%.

Laboratory QA/QC
The suitability of the laboratory data will be assessed against the laboratory QA/QC criteria. These criteria are developed and implemented in accordance with the laboratory's NATA accreditation and align with the acceptable limits for QA/QC samples as outlined in NEPM (2013) and other relevant guidelines.

A summary of the typical limits is provided below:

RPDs
- Results that are <5 times the PQL, any RPD is acceptable; and
- Results >5 times the PQL, RPDs between 0-50% are acceptable.

Laboratory Control Samples (LCS) and Matrix Spikes
- 70-130% recovery acceptable for metals and inorganics; and
- 60-140% recovery acceptable for organics.

Surrogate Spikes
- 60-140% recovery acceptable for general organics.

Method Blanks
- All results less than PQL.

In the event that acceptable limits are not met by the laboratory analysis, other lines of evidence will be reviewed (e.g. field observations of samples, preservation, handling etc) and, where required, consultation with the laboratory is to be undertaken in an effort to establish the cause of the non-conformance. Where uncertainty exists, the validation consultant is to adopt the most conservative concentration reported.

7.3.5.3 Appropriateness of PQLs

The PQLs of the analytical methods are to be considered in relation to the VAC to confirm that the PQLs are less than the VAC. In cases where the PQLs are greater than the VAC, a discussion of this is to be provided.

7.3.6 Step 6 – Specify Limits on Decision Errors

To limit the potential for decision errors, a range of quality assurance processes are adopted. A quantitative assessment of the potential for false positives and false negatives in the analytical results is to be undertaken with reference to Schedule B(3) of NEPM (2013) using the data quality assurance information collected.

7.3.7 Step 7 - Optimise the Design for Obtaining Data

The design is to be optimised via the collection of validation data to demonstrate the success of the key aspects of the remediation. Data collection will be via various methods including inspections and sampling.

7.3.8 Sampling Plan

The proposed sampling plan for the validation of imported materials is described in Section 7.1.

7.4 Validation Report and LTEMP

As part of the site validation process, a validation report will be prepared by the validation consultant. The report will present the results of the validation assessment and will be prepared in accordance with the Consultants Reporting Guidelines.

A long-term environmental management plan (LTEMP) may be required for the mitigation/management of HGG at the site. This will be assessed based on the results of the DGI and HHRA. The LTEMP will require public notification by notation on title or Section 10.7 certificates.

8 CONTINGENCY PLAN

A review of the proposed remediation works has indicated that the greatest risks that may affect the success of the remediation include unexpected finds. A contingency plan for the remediation is provided below:

8.1 Unexpected Finds

Residual hazards that may exist at the site would generally be expected to be detectable through visual or olfactory means. The procedure to be followed in the event of an unexpected find is presented below:

- In the event of an unexpected find, all work in the immediate vicinity should cease and the remediation contractor should contact the validation consultant and the project manager;
- Temporary barricades should be erected to isolate the area from access to workers;
- The validation consultant is to attend the site, adequately characterise the contamination and provide advice in relation to site management and remediation. In the event that remediation differs from the procedures outlined in this RAP, an addendum RAP or RWP must be prepared in consultation with the project stakeholders and submitted to the site auditor and consent authority; and
- Contamination should be remediated and validated in accordance with the advice provided, and the results should be included in the validation report.

A summary of the unexpected finds protocol (UFP) is provided in the appendices.

8.2 Importation Failure for VENM or other Imported Materials

Where material to be imported onto the site does not meet the importation VAC detailed in Section 7.2, the material should not be imported. Alternative material must be sourced that meets the importation requirements.

8.3 Contingency for Failure of Remediation Strategy

8.3.1 Hydrocarbon Impacted Soil Remaining On-site

In the unexpected event that 'pockets' of hydrocarbon impacted soil/bedrock cannot be excavated and disposed off-site, this material must be validated to assess its suitability to remain on-site and the potential risks posed by this soil in the context of the future land use.

In the event that the soils present a potentially unacceptable risk, there may be a need to implement a 'cap and contain' strategy or other mitigation measures. The strategy would need to be documented in an addendum RAP and submitted to the auditor and consent authority. It is noted that this would result in a long-term EMP for the site to manage the contamination.

Alternatively, a site-specific HHRA could be considered to establish whether the risks warrant long-term management via an EMP.

9 SITE MANAGEMENT PLAN FOR REMEDIATION WORKS

The information outlined in this section of the RAP is for the remediation work only. The client should make reference to the development consent for specific site management requirements for the overall development of the site.

9.1 Asbestos Management Plan (AMP)

An AMP is to be prepared for the site demolition works. It is anticipated that demolition and remediation will occur concurrently in some areas of the site. On this basis, the AMP is also applicable to the remediation works. The AMP is to document the asbestos-related management requirements for the stages of development. The AMP is to be implemented by the remediation contractor (and their nominated subcontractors where relevant) throughout the remediation.

9.2 Project Contacts

Emergency procedures and contact telephone numbers should be displayed in a prominent position at the site entrance gate and within the main site working areas. The available contact details are summarised in the following table:

Table 9-1: Project Contacts

Role	Company	Contact Details
Client/developer	HammondCare	-
Project Manager	To be appointed	-
Remediation Contractor	To be appointed	-
Validation Consultant	JKE – subject to formal engagement	Vittal Boggaram **vboggaram@jkenvironments.com.au** 02 9888 5000
Certifier	To be appointed	-
NSW EPA	Pollution Line	131 555
NSW EPA Site Auditor	To be appointed	-
Emergency Services	Ambulance, Police, Fire	000

9.3 Security

Appropriate fencing should be installed as required to secure the site. Warning signs should be erected, which outline the personal protective equipment (PPE) required for remediation work.

9.4 Timing and Sequencing of Remediation Works

The anticipated sequence of remediation works is outlined in Section 6.3. Remediation will occur concurrently with the development works as the excavation for the development, and the built form of the development, form part of the remediation approach.

9.5 Site Soil and Water Management Plan

The remediation contractor should prepare a detailed soil and water management plan prior to the commencement of site works and this should consider the requirements of the AMP. Silt fences should be used to control the surface water runoff at all appropriate locations of the site and appropriate measures are to be implemented to manage soil/water disturbance to the satisfaction of the regulator/determining authority. Reference should be made to the consent conditions for further details.

All stockpiled materials should be placed within an erosion containment boundary with silt fences and sandbags employed to limit sediment movement. The containment area should be located away from drainage lines/low-points, gutters, stormwater pits and inlets and the site boundary. No liquid waste or runoff should be discharged to the stormwater or sewerage system without the approval of the appropriate authorities.

9.6 Noise and Vibration Control Plan

The guidelines for minimisation of noise on construction sites outlined in AS-2460 (2002)[22] should be adopted. Other measures specified in the consent conditions should also be complied with. Noise producing machinery and equipment should only be operated between the hours approved by the determining authority (refer to consent documents).

All practicable measures should be taken to reduce the generation of noise and vibration to within acceptable limits. In the event that short-term noisy operations are necessary, and where these are likely to affect residences, notifications should be provided to the relevant authorities and the residents by the project manager, specifying the expected duration of the noisy works.

9.7 Dust Control Plan

All practicable measures should be taken to reduce dust emanating from the site. Factors that contribute to dust production are:

- Wind over a cleared surface;
- Wind over stockpiled material; and
- Movement of machinery in unpaved areas.

Visible dust should not be present at the site boundary. Measures to minimise the potential for dust generation include:

[22] Australian Standard, (2002). *AS2460: Acoustics - Measurement of the Reverberation Time in Rooms.*

- Use of water sprays on unsealed or exposed soil surfaces;
- Covering of stockpiled materials and excavation faces (particularly during periods of site inactivity and/or during windy conditions) or alternatively the erection of hessian fences around stockpiled soil or large exposed areas of soil;
- Establishment of dust screens consisting of a 2m high shade cloth or similar material secured to a chain wire fence;
- Maintenance of dust control measures to keep the facilities in good operating condition;
- Stopping work during strong winds;
- Loading or unloading of dry soil as close as possible to stockpiles to prevent spreading of loose material around the development area; and
- Geofabric/geotextile could be placed over exposed soils in the event that excavation is staged.

If stockpiles are to remain on-site or soil remains exposed for a period of longer than several days, dust monitoring should be undertaken at the site. If excessive dust is generated all site activities should cease until either wind conditions are more acceptable or a revised method of excavation/remediation is developed. Reference is also to be made to the AMP in this regard.

Dust is also produced during the transfer of material to and from the site. All material should be covered during transport and should be properly disposed of on delivery. No material is to be left in an exposed, un-monitored condition.

All equipment and machinery should be brushed or washed down before leaving the site to limit dust and sediment movement off-site. In the event of prolonged rain and lack of paved areas all vehicles should be washed down prior to exit from the site, and any soil or dirt on the wheels of the vehicles removed. Water used to clean the vehicles should be collected and tested prior to appropriate disposal under the relevant waste classification guidelines.

9.8 Dewatering

Temporary dewatering may be required as part of the remediation works. Based on the information presented in the ASI, minor treatment of seepage water may be required during the development. The seepage water should be managed appropriately on site in accordance with the remediation contractor's soil and water management plan. This water should not be pumped to stormwater or sewer unless a prior application is made and this is approved by the relevant authorities.

9.9 Air Monitoring

Reference is to be made to the AMP for details regarding asbestos air fibre monitoring. Air monitoring must only be carried out by personnel registered and accredited by NATA (National Association of Testing Authorities). Filter analysis must only be carried out within a NATA certified laboratory. The monitoring results must conform to the requirements of the NOHSC Guidance note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Edition [NOHSC:3003 (2005)].

A monitoring program will be used to assess whether the control procedures being applied are satisfactory and that criteria for airborne asbestos fibre levels are not being exceeded. The following levels will be used as action criteria during the air monitoring:

- <0.01 Fibres/ml: Work procedures deemed to be successful;
- 0.01 to 0.02 Fibres/ml: Inspection of the site and review of procedures; and
- >0.02 Fibres/ml: Stop work, inspection of the site, review of procedures, clean-up, rectification works where required and notify the relevant regulator.

9.10 Odour Control Plan

All activities undertaken at the site should be completed in a manner that minimises emissions of smoke, fumes and vapour into the atmosphere and any odours arising from the works or stockpiled material should be controlled. Control measures may include:

- Maintenance of construction equipment so that exhaust emissions comply with the Clean Air Regulations issued under the POEO Act 1997;
- Demolition materials and other combustible waste should not be burnt on site;
- The spraying of a suitable proprietary product to suppress any odours that may be generated by excavated materials; and
- Use of protective covers (e.g. builder's plastic).

All practicable measures should be taken to reduce fugitive emissions emanating from the site so that associated odours do not constitute a nuisance and that the ambient air quality is not adversely impacted.

The following odour management plan should be implemented to limit the exposure of site personnel and surrounding residents to unpleasant odours:

- Excavation and stockpiling of material should be scheduled during periods with low winds if possible;
- A suitable proprietary product could be sprayed on material during excavation and following stockpiling to reduce odours (subject to an appropriate assessment of the product by the validation consultant);
- All complaints from workers and neighbours should be logged and a response provided. Work should be rescheduled as necessary to minimise odour problems;
- The site foreman should consider the following odour control measures:
    - reduce the exposed surface of the odorous materials;
    - time excavation activities to reduce off-site nuisance (particularly during strong winds); and
    - cover exposed excavation faces overnight or during periods of low excavation activity.
- If continued complaints are received, alternative odour management strategies should be considered and implemented.

9.11 Work Health and Safety (WHS) Plan

A site specific WHS plan should be prepared by the remediation contractor for all work to be undertaken at the site. The WHS plan should meet all the requirements outlined in SafeWork NSW WHS regulations.

As a minimum requirement, personnel must wear appropriate protective clothing, including long sleeve shirts, long trousers, steel cap boots and hard hats. Additional asbestos-related PPE will be required and this will be specified in the AMP. Washroom and lunchroom facilities should also be provided to allow workers to remove potential contamination from their hands and clothing prior to eating or drinking.

9.12 Waste Management

Prior to commencement of remedial works and excavation for the proposed development, the remediation contractor should develop a waste management or recycling plan to minimise the amount of waste produced by the site. Consideration should be given to re-use material wherever possible.

9.13 Incident Management Contingency

The validation consultant should be contacted if any unexpected conditions are encountered at the site. This should enable the scope of remedial/validation works to be adjusted as required. Similarly, if any incident occurs at the site, the validation consultant should be advised to assess potential impacts on contamination conditions and the remediation/validation timetable.

9.14 Hours of Operation

Hours of operation should be between those approved by the determining authority under the development approval process.

9.15 Community Consultation and Complaints

The remediation contractor should provide details for managing community consultation and complaints within their construction environment management plan (CEMP).

10 CONCLUSIONS

Previous investigations by JKE have identified TRH impacts to fill in the south-west of the site, and TRH impacts to residual soil/bedrock in the vicinity of BH103. The source of the TRH impacts to fill is considered likely associated with impacted fill historically imported to the site, though may also be attributable to localised surficial leaks/spills. The source of TRH impacts to the residual soil/bedrock in the vicinity of BH103 is considered likely associated with the UST and associated infrastructure. The previous investigations also identified at least one UST and associated infrastructure on-site. The investigations concluded the potential for extensive impacts from hydrocarbons associated with the UST/s and infrastructure was low. However, localised impacts may be encountered in the vicinity of the UST/s and associated infrastructure. The UST/s and infrastructure will be removed during the remediation process, and the residual risks assessed by the validation process.

The groundwater has been impacted by heavy metals. The heavy metal impacts were considered likely a regional/background issue. Concentrations of TRH, VOCs and PAH were recorded, though were assessed to not pose a risk to receptors in the context of the development. The source of the TRH and VOC impacts is considered likely associated with leaks/spills from potable water supply entering the groundwater.

A preliminary HGG screening was also undertaken by JKE, which identified CO and CO_2 at concentrations which may pose risk to receptors. Further investigation is required to assess the potential risks associated with HGG.

The remediation strategy for soil includes excavation and off-site disposal of the UST, UST backfill and associated infrastructure, TRH-impacted fill in the south-west of the site and TRH-impacted residual soil/bedrock. The mitigation/management strategies for HGG will be determined based on the findings of the DGI and HHRA.

The remediation methods outlined in the RAP are assessed to be sustainable, economically viable, commensurate with the level of risk posed by the contaminants and technically achievable to implement concurrently with the proposed development works. On this basis, JKE are of the opinion that the site can be made suitable for the proposed development provided this RAP (and any addendums or revisions) and any requirements under a RWP is implemented should a RWP be prepared.

A site validation report is to be prepared on completion of remediation activities and submitted to the determining authority to demonstrate that the site is suitable for the proposed development. Any LTEMP prepared for the site will require appropriate public notification.

The RAP has met the objectives outlined in Section 1.2.

10.1 Regulatory Requirements

The regulatory requirements applicable for the remediation are discussed in the following table:

Table 10-1: Regulatory Requirement

Guideline / Legislation / Policy	Applicability
Resilience and Hazards SEPP	Due to the identified heritage items on-site, JKE is of the opinion that the remediation is classed as Category 1 remediation work. Approval is required from the consent authority for Category 1 remediation work. JKE recommend the client to clarify the remediation category with the project planner or consent authority prior to the commencement of remediation works. Prior notification to the consent authority may be required prior to the commencement of remediation work. Under Section 4.14 of Resilience and Hazards SEPP, a notice of completion of remediation work is to be given to council within 30 days of completion of the work regardless of whether the remediation is classed as Category 1 or Category 2 remediation work. The notice of completion of remediation works must be in accordance with Section 4.15 of Resilience and Hazards SEPP.
POEO Act 1997	Section 143 of the POEO Act 1997 states that if waste is transported to a place that cannot lawfully be used as a waste facility for that waste, then the transporter and owner of the waste are each guilty of an offence. The transporter and owner of the waste have a duty to ensure that the waste is disposed of in an appropriate manner. Appropriate waste tracking is required for all waste that is disposed off-site. Activities should be carried out in a manner which does not result in the pollution of waters.
POEO (Waste) Regulation 2014	Part 7 of the POEO Waste Regulation 2014 set outs the requirements for the transportation and management of asbestos waste and Clause 79 of the POEO Waste Regulation requires waste transporters to provide information to the NSW EPA regarding the movement of any load in NSW of more than 10 square meters of asbestos sheeting, or 100 kilograms of asbestos waste. To fulfil these legal obligations, asbestos waste transporters must use WasteLocate.
SafeWork NSW Code of Practice: How to manage and control asbestos in the workplace (2019)	Sites with asbestos become a ‘workplace’ when work is carried out there and require a register and AMP. Appropriate SafeWork NSW notification will be required for licensed (e.g. Class A) asbestos removal works or handling.

11 LIMITATIONS

The report limitations are outlined below:

- JKE accepts no responsibility for any unidentified contamination issues at the site. Any unexpected problems/subsurface features that may be encountered during development works should be inspected by an environmental consultant as soon as possible;
- Previous use of this site may have involved excavation for the foundations of buildings, services, and similar facilities. In addition, unrecorded excavation and burial of material may have occurred on the site. Backfilling of excavations could have been undertaken with potentially contaminated material that may be discovered in discrete, isolated locations across the site during construction work;
- This report has been prepared based on site conditions which existed at the time of the investigation; scope of work and limitation outlined in the JKE proposal; and terms of contract between JKE and the client (as applicable);
- The conclusions presented in this report are based on investigation of conditions at specific locations, chosen to be as representative as possible under the given circumstances, visual observations of the site and immediate surrounds and documents reviewed as described in the report;
- Subsurface soil and rock conditions encountered between investigation locations may be found to be different from those expected. Groundwater conditions may also vary, especially after climatic changes;
- The investigation and preparation of this report have been undertaken in accordance with accepted practice for environmental consultants, with reference to applicable environmental regulatory authority and industry standards, guidelines and the assessment criteria outlined in the report;
- Where information has been provided by third parties, JKE has not undertaken any verification process, except where specifically stated in the report;
- JKE has not undertaken any assessment of off-site areas that may be potential contamination sources or may have been impacted by site contamination, except where specifically stated in the report;
- JKE accept no responsibility for potentially asbestos containing materials that may exist at the site. These materials may be associated with demolition of pre-1990 constructed buildings or fill material at the site;
- JKE have not and will not make any determination regarding finances associated with the site;
- Additional investigation work may be required in the event of changes to the proposed development or land use. JKE should be contacted immediately in such circumstances;
- Material considered to be suitable from a geotechnical point of view may be unsatisfactory from a soil contamination viewpoint, and vice versa; and
- This report has been prepared for the particular project described and no responsibility is accepted for the use of any part of this report in any other context or for any other purpose.

Important Information About This Report

These notes have been prepared by JKE to assist with the assessment and interpretation of this report.

The Report is based on a Unique Set of Project Specific Factors
This report has been prepared in response to specific project requirements as stated in the JKE proposal document which may have been limited by instructions from the client. This report should be reviewed, and if necessary, revised if any of the following occur:

- The proposed land use is altered;
- The defined subject site is increased or sub-divided;
- The proposed development details including size, configuration, location, orientation of the structures or landscaped areas are modified;
- The proposed development levels are altered, eg addition of basement levels; or
- Ownership of the site changes.

JKE will not accept any responsibility whatsoever for situations where one or more of the above factors have changed since completion of the assessment. If the subject site is sold, ownership of the assessment report should be transferred by JKE to the new site owners who will be informed of the conditions and limitations under which the assessment was undertaken. No person should apply an assessment for any purpose other than that originally intended without first conferring with the consultant.

Changes in Subsurface Conditions
Subsurface conditions are influenced by natural geological and hydrogeological process and human activities. Groundwater conditions are likely to vary over time with changes in climatic conditions and human activities within the catchment (e.g. water extraction for irrigation or industrial uses, subsurface waste water disposal, construction related dewatering). Soil and groundwater contaminant concentrations may also vary over time through contaminant migration, natural attenuation of organic contaminants, ongoing contaminating activities and placement or removal of fill material. The conclusions of an assessment report may have been affected by the above factors if a significant period of time has elapsed prior to commencement of the proposed development.

This Report is based on Professional Interpretations of Factual Data
Site assessments identify actual subsurface conditions at the actual sampling locations at the time of the investigation. Data obtained from the sampling and subsequent laboratory analyses, available site history information and published regional information is interpreted by geologists, engineers or environmental scientists and opinions are drawn about the overall subsurface conditions, the nature and extent of contamination, the likely impact on the proposed development and appropriate remediation measures.

Actual conditions may differ from those inferred, because no professional, no matter how qualified, and no subsurface exploration program, no matter how comprehensive, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than an assessment indicates. Actual conditions in areas not sampled may differ from predictions. Nothing can be done to prevent the unanticipated, but steps can be taken to help minimise the impact. For this reason, site owners should retain the services of their consultants throughout the development stage of the project, to identify variances, conduct additional tests which may be needed, and to recommend solutions to problems encountered on site.

Assessment Limitations
Although information provided by a site assessment can reduce exposure to the risk of the presence of contamination, no environmental site assessment can eliminate the risk. Even a rigorous professional assessment may not detect all contamination on a site. Contaminants may be present in areas that were not surveyed or sampled, or may migrate to areas which showed no signs of contamination when sampled. Contaminant analysis cannot possibly cover every type of contaminant which may occur; only the most likely contaminants are screened.

Misinterpretation of Site Assessments by Design Professionals
Costly problems can occur when other design professionals develop plans based on misinterpretation of an assessment report. To minimise problems associated with misinterpretations, the environmental consultant should be retained to work with appropriate professionals to explain relevant findings and to review the adequacy of plans and specifications relevant to contamination issues.

Logs Should not be Separated from the Assessment Report
Borehole and test pit logs are prepared by environmental scientists, engineers or geologists based upon interpretation of field conditions and laboratory evaluation of field samples. Logs are normally provided in our reports and these should not be re-drawn for inclusion in site remediation or other design drawings, as subtle but significant drafting errors or omissions may occur in the transfer process. Photographic reproduction can eliminate this problem, however contractors can still misinterpret the logs during bid preparation if separated from the text of the assessment. If this occurs, delays, disputes and unanticipated costs may result. In all cases it is necessary to refer to the rest of the report to obtain a proper understanding of the assessment. Please note that logs with the 'Environmental Log' header are not suitable for geotechnical purposes as they have not been peer reviewed by a Senior Geotechnical Engineer.

To reduce the likelihood of borehole and test pit log misinterpretation, the complete assessment should be available to persons or organisations involved in the project, such as contractors, for their use. Denial of such access and disclaiming responsibility for the accuracy of subsurface information does not insulate an owner from the attendant liability. It is critical that the site owner provides all available site information to persons and organisations such as contractors.

Read Responsibility Clauses Closely
Because an environmental site assessment is based extensively on judgement and opinion, it is necessarily less exact than other disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. To help prevent this problem, model clauses have been developed for use in written transmittals. These are definitive clauses designed to indicate consultant responsibility. Their use helps all parties involved recognise individual responsibilities and formulate appropriate action. Some of these definitive clauses are likely to appear in the environmental site assessment, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to any questions.

Appendix A: Report Figures

AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM

This plan should be read in conjunction with the Environmental report.

Title:	SITE LOCATION PLAN
Location:	95-115 RIVER ROAD, GREENWICH, NSW
Project No:	E32507BR
Figure No:	1

JKEnvironments

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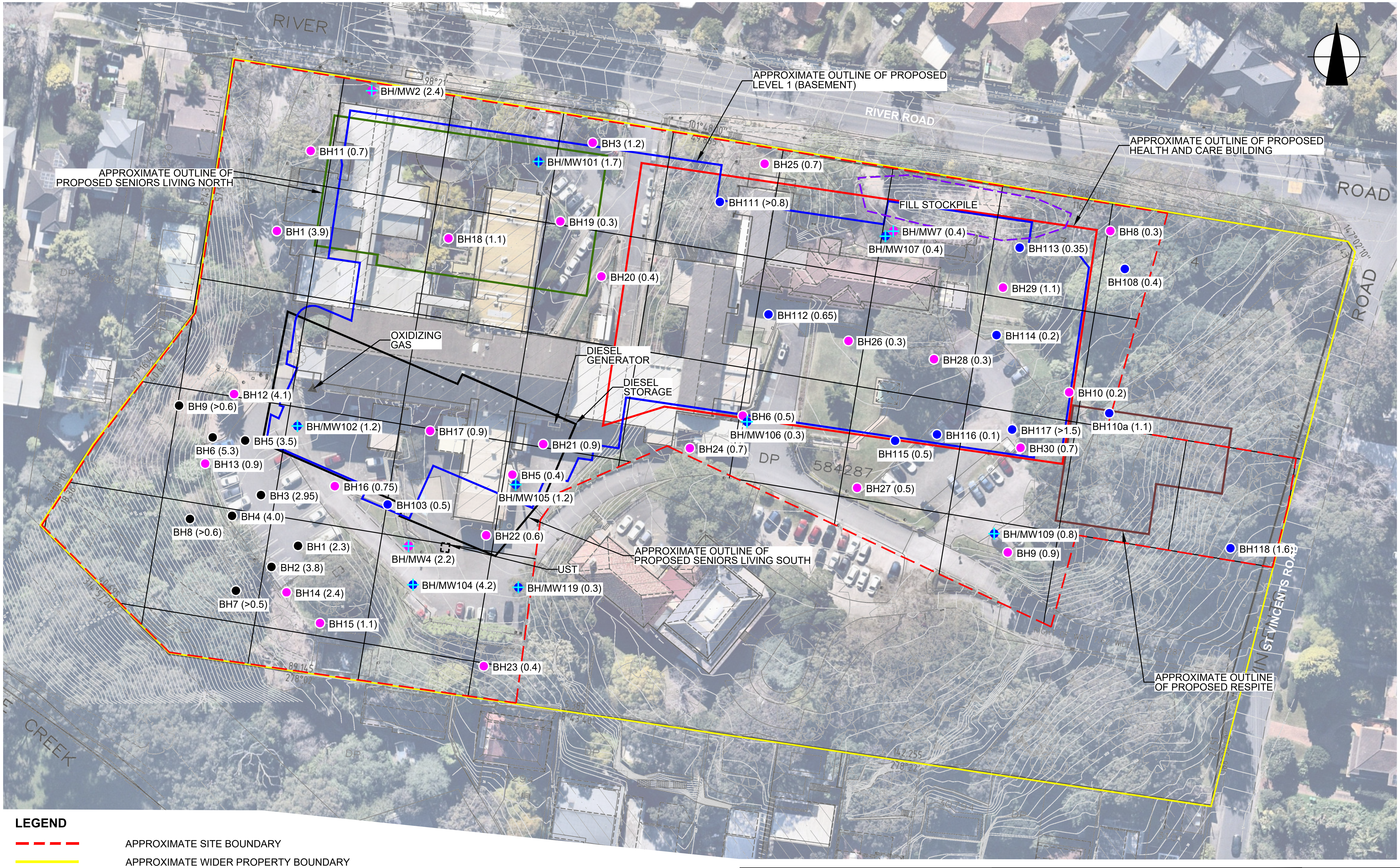

LEGEND

(red dashed line)	APPROXIMATE SITE BOUNDARY
(yellow line)	APPROXIMATE WIDER PROPERTY BOUNDARY
BH(Fill Depth)	BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, 2019)
BH/MW(Fill Depth)	BOREHOLE AND GROUNDWATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, 2019)
BH/MW(Fill Depth)	BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) (EIS, 2014)
BH(Fill Depth)	BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m)
BH(Fill Depth)	BOREHOLE AND GROUNDWATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m)

AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM

0 8 16 24 32 40
SCALE 1:800 @A3 METRES

This plan should be read in conjunction with the Environmental report.

Title: **SAMPLE LOCATION PLAN**

Location: 95-115 RIVER ROAD, GREENWICH, NSW

Project No: E32507BR

Figure No: 2

JKEnvironments

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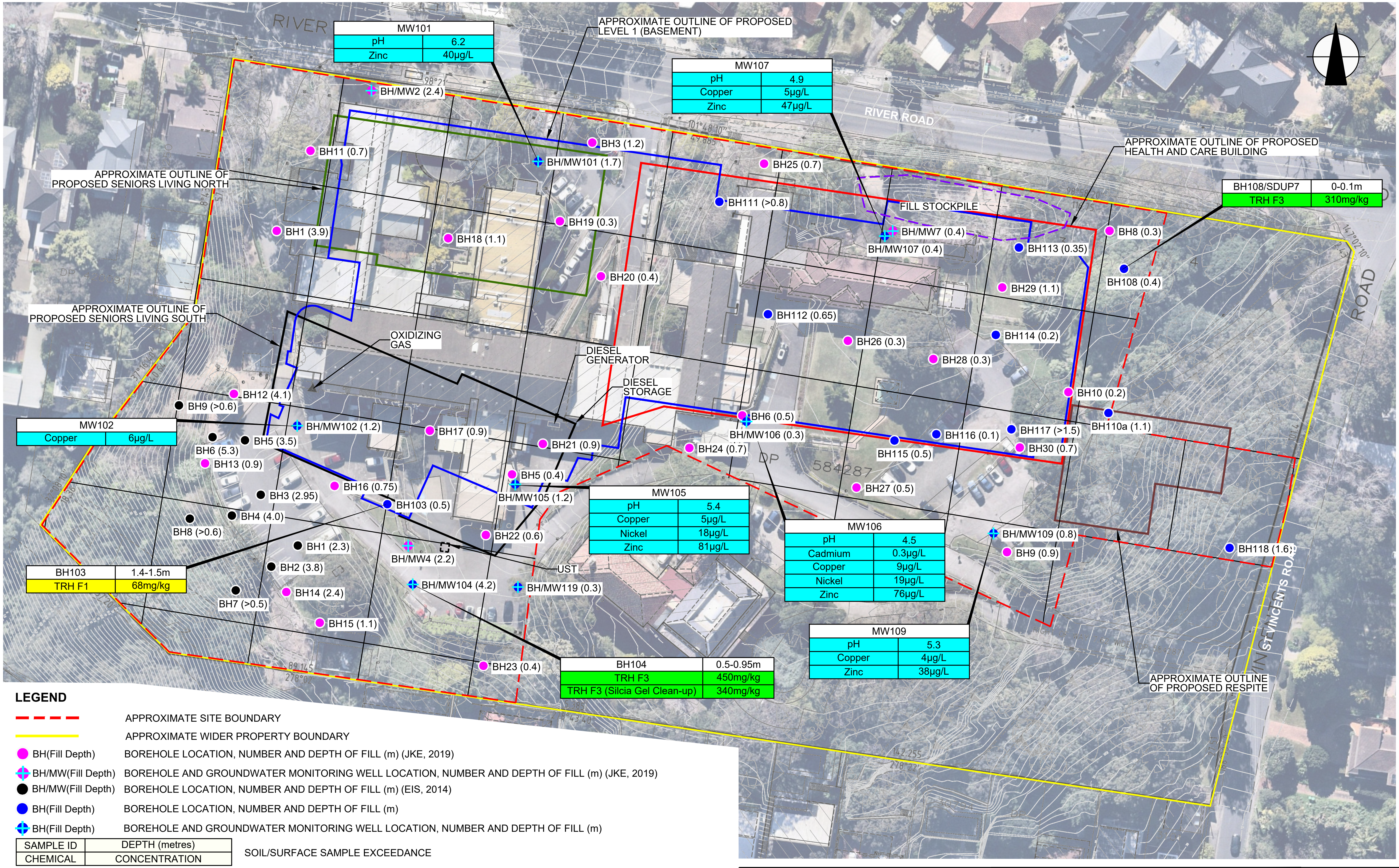

LEGEND

- APPROXIMATE SITE BOUNDARY
- APPROXIMATE WIDER PROPERTY BOUNDARY
- BH(Fill Depth) BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, 2019)
- BH/MW(Fill Depth) BOREHOLE AND GROUNDWATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, 2019)
- BH/MW(Fill Depth) BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) (EIS, 2014)
- BH(Fill Depth) BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m)
- BH(Fill Depth) BOREHOLE AND GROUNDWATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m)

SAMPLE ID	DEPTH (metres)
CHEMICAL	CONCENTRATION

SOIL/SURFACE SAMPLE EXCEEDANCE

SAMPLE ID	-
CHEMICAL	CONCENTRATION (µg/L)

GROUNDWATER SAMPLE EXCEEDANCE

- SOIL/SURFACE CONTAMINATION ABOVE SAC FOR HUMAN HEALTH RISK
- SOIL CONTAMINATION ABOVE SAC FOR ECOLOGICAL RISK
- GROUNDWATER CONTAMINATION ABOVE SAC

AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM

0 8 16 24 32 40
SCALE 1:800 @A3 METRES

This plan should be read in conjunction with the Environmental report.

Title: **ASI SAC EXCEEDANCE PLAN**

Location: 95-115 RIVER ROAD, GREENWICH, NSW

Project No: E32507BR

Figure No: 3A

JKEnvironments

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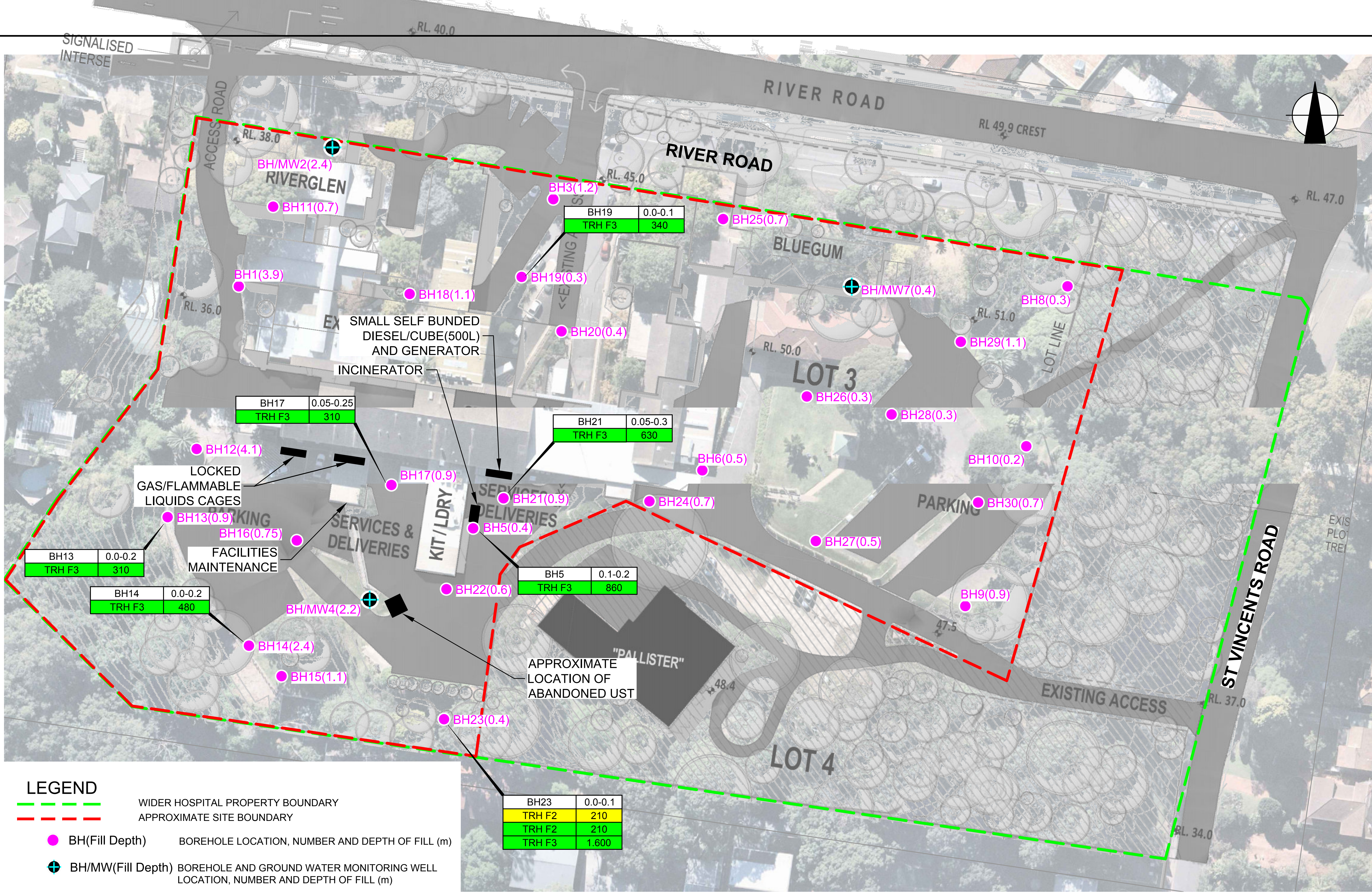

LEGEND

- WIDER HOSPITAL PROPERTY BOUNDARY
- APPROXIMATE SITE BOUNDARY
- BH(Fill Depth) BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m)
- BH/MW(Fill Depth) BOREHOLE AND GROUND WATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m)
- SOIL CONTAMINATION ABOVE SAC FOR HUMAN HEALTH RISK (mg/kg)
- SOIL CONTAMINATION ABOVE SAC FOR ECOLOGICAL RISK (mg/kg)
- GROUND WATER CONTA,MINATION ABOVE SAC FOR ECOLOGICAL RISK MG/L

AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM, 12 MAY 2019.

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This plan should be read in conjunction with the Environmental report.

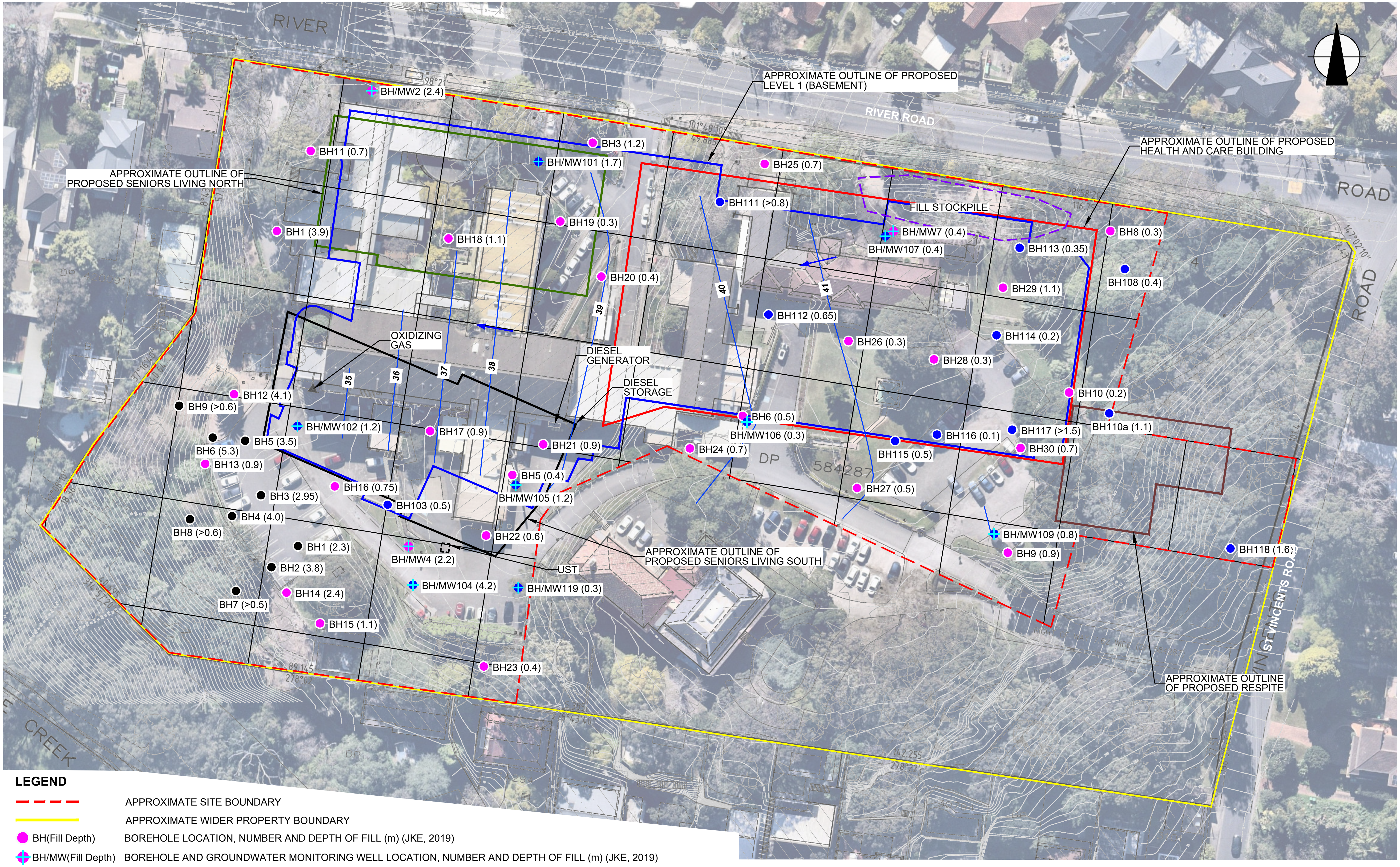
Title: **DSI SAC EXCEEDANCE PLAN**

Location: 97-115 RIVER ROAD GREENWICH, NSW

Report No: E32507BT

Figure No: 3B

JKEnvironments



LEGEND

APPROXIMATE SITE BOUNDARY

APPROXIMATE WIDER PROPERTY BOUNDARY

BH(Fill Depth) BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, 2019)

BH/MW(Fill Depth) BOREHOLE AND GROUNDWATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, 2019)

BH/MW(Fill Depth) BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) (EIS, 2014)

BH(Fill Depth) BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m)

BH(Fill Depth) BOREHOLE AND GROUNDWATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m)

37 GROUNDWATER CONTOUR INTERVALS (m)

INFERRED GROUNDWATER FLOW DIRECTION

AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM

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SCALE 1:800 @A3 METRES

This plan should be read in conjunction with the Environmental report.

Title:	GROUNDWATER CONTOUR PLAN
Location:	95-115 RIVER ROAD, GREENWICH, NSW
Project No:	E32507BR
Figure No:	4

JKEnvironments

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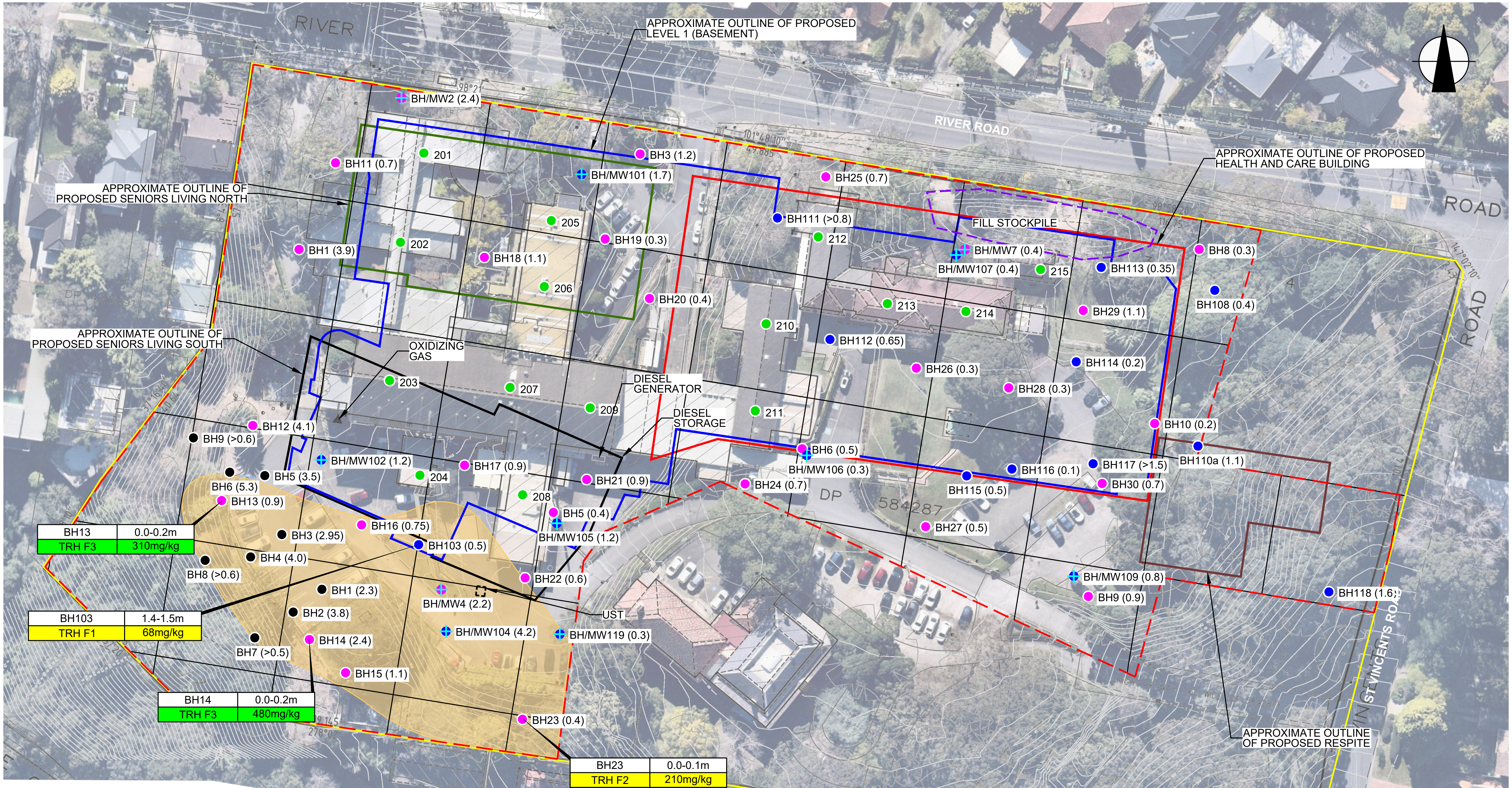

LEGEND

- APPROXIMATE SITE BOUNDARY
- APPROXIMATE WIDER PROPERTY BOUNDARY
- BH(Fill Depth) — BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, 2019)
- BH/MW(Fill Depth) — BOREHOLE AND GROUNDWATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, 2019)
- BH/MW(Fill Depth) — BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) (EIS, 2014)
- BH(Fill Depth) — BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m)
- BH(Fill Depth) — BOREHOLE AND GROUNDWATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m)

SAMPLE ID	DEPTH (metres)
CHEMICAL	CONCENTRATION

SOIL/SURFACE SAMPLE EXCEEDANCE

- SOIL/SURFACE CONTAMINATION ABOVE SAC FOR HUMAN HEALTH RISK
- SOIL CONTAMINATION ABOVE SAC FOR ECOLOGICAL RISK
- SOIL REMEDIATION AREA

AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM

SCALE 0 8 16 24 32 40 METRES 1:800 @A3

This plan should be read in conjunction with the Environmental report.

Title: **SOIL REMEDIATION PLAN**

Location: 95-115 RIVER ROAD, GREENWICH, NSW

Project No: E32507BR

Figure No: 5

JKEnvironments

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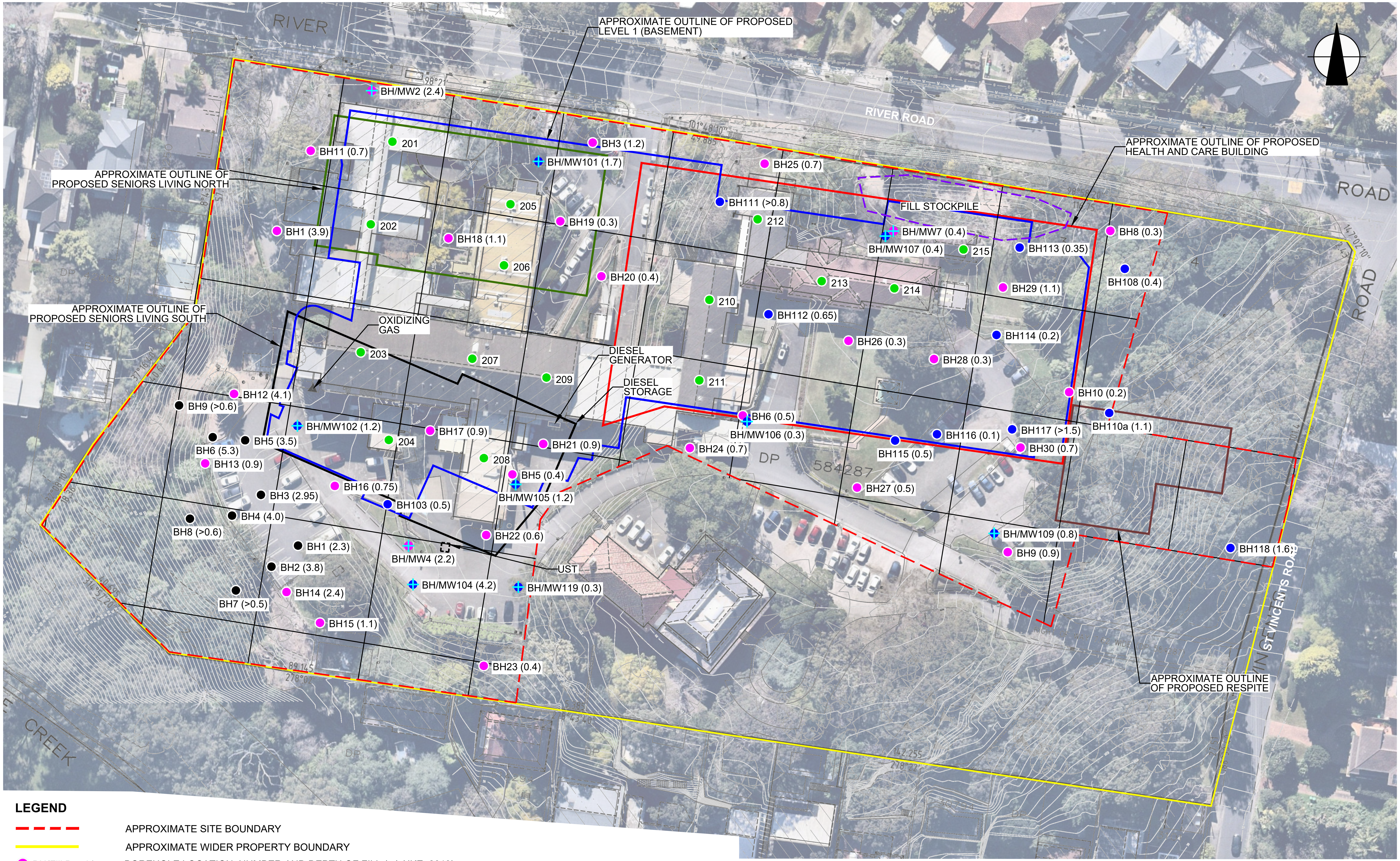


LEGEND

(red dashed line)	APPROXIMATE SITE BOUNDARY
(yellow line)	APPROXIMATE WIDER PROPERTY BOUNDARY
BH(Fill Depth)	BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, 2019)
BH/MW(Fill Depth)	BOREHOLE AND GROUNDWATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, 2019)
BH/MW(Fill Depth)	BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) (EIS, 2014)
BH(Fill Depth)	BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m)
BH(Fill Depth)	BOREHOLE AND GROUNDWATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m)
201	PROPOSED BOREHOLE LOCATION AND NUMBER

AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM

0 8 16 24 32 40
SCALE 1:800 @A3 METRES

This plan should be read in conjunction with the Environmental report.

Title: **PROPOSED DGI SAMPLING LOCATIONS**

Location: 95-115 RIVER ROAD, GREENWICH, NSW

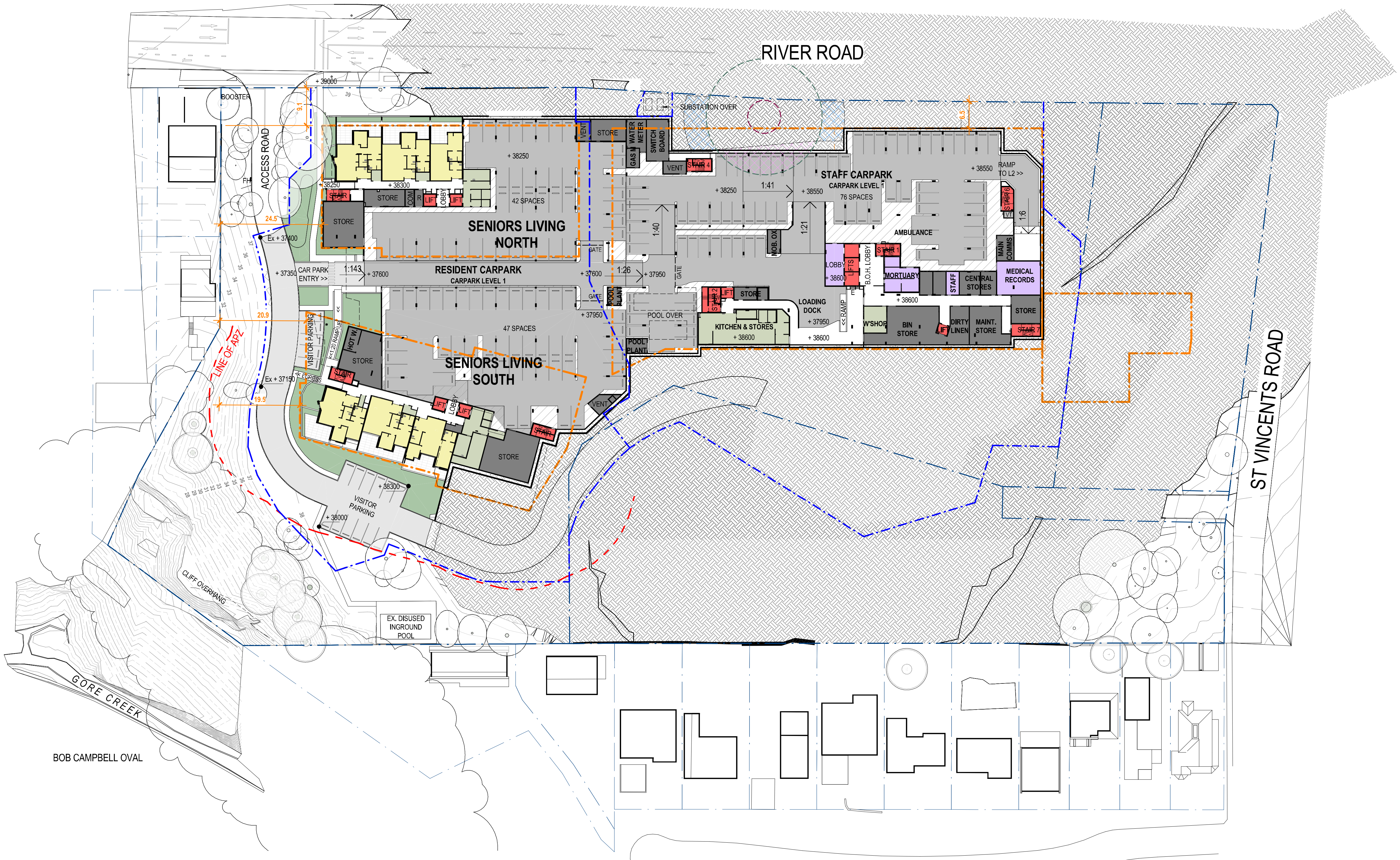
Project No: E32507BR

Figure No: 6

JKEnvironments

PLOT DATE: 11/04/2022 1:21:00 PM DWG FILE: S:\5 EIS\5C EIS JOBS\32000'S\E32507BT GREENWICH\CAD\BR\E32507BR.DWG

Appendix B: Selected Development Plans



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P17	2022.03.25	ISSUE TO CONSULTANTS	AMac
P16	2022.03.18	ISSUE TO CONSULTANTS	AMac
P15	2022.03.16	SSD UPDATE	NAH

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DATE: 01/11/21
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DRAWING TITLE: SITE LEVEL PLAN - LEVEL 1 (BASEMENT)
DRAWN: NAH
CHECKED:
SCALE: 1 : 500 @A1

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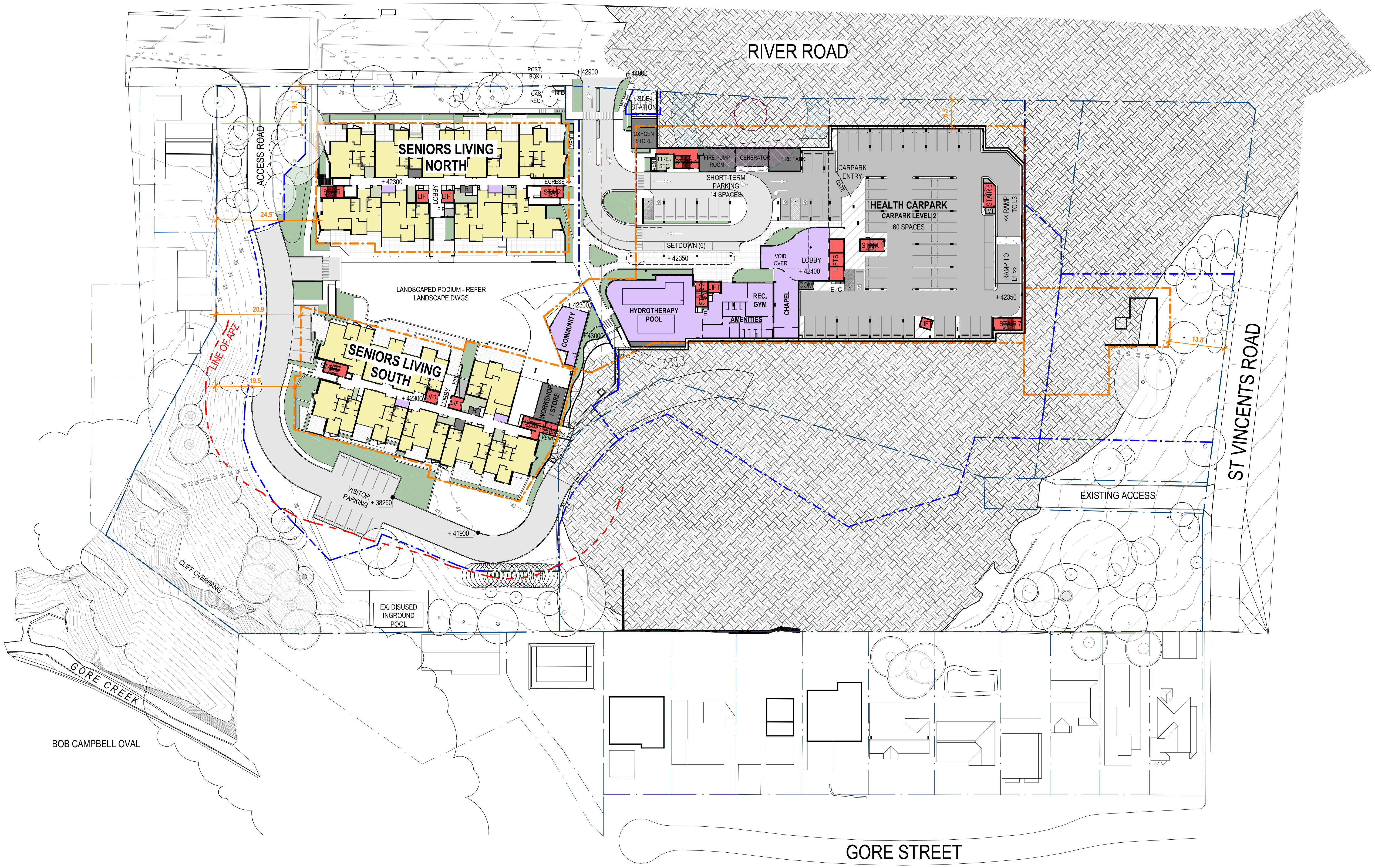

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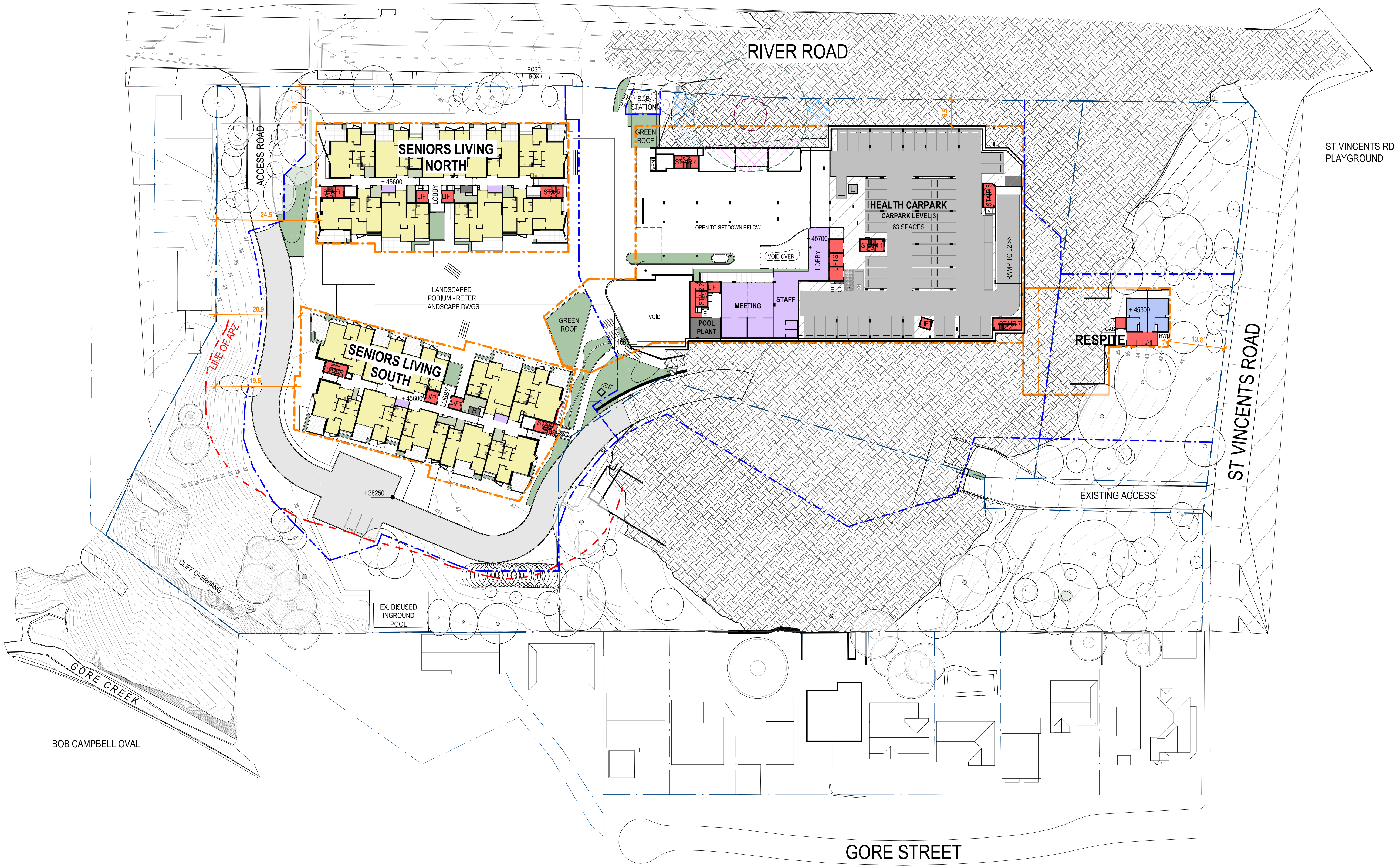

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DATE: 11/04/21

DRAWING No: DD-SW-0202

DRAWING TITLE:
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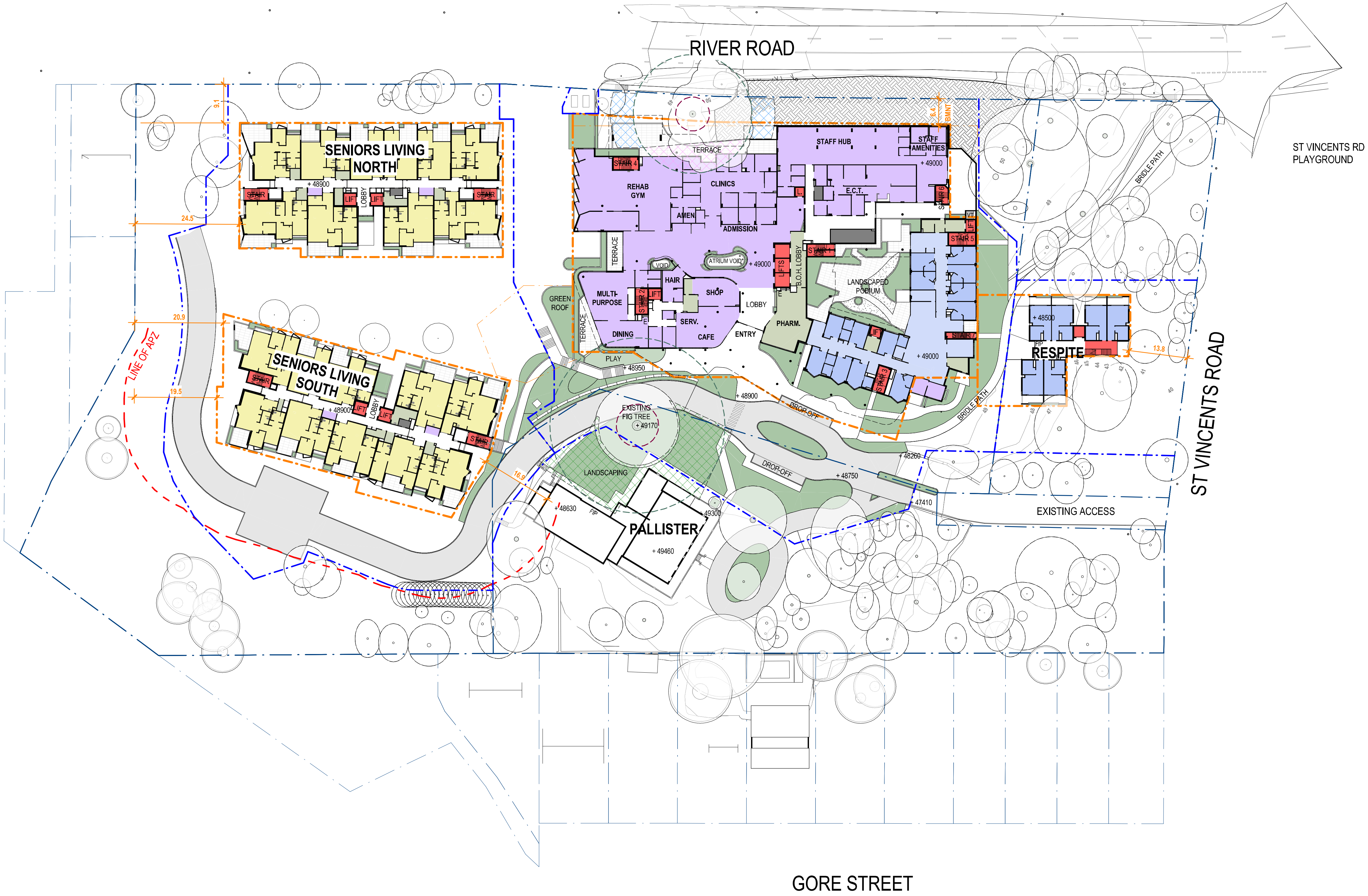

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P14	2022.03.16	SSD UPDATE	NAH

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DRAWING No: DD-SW-0203

DRAWING TITLE:
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DRAWING No: DD-SW-0204

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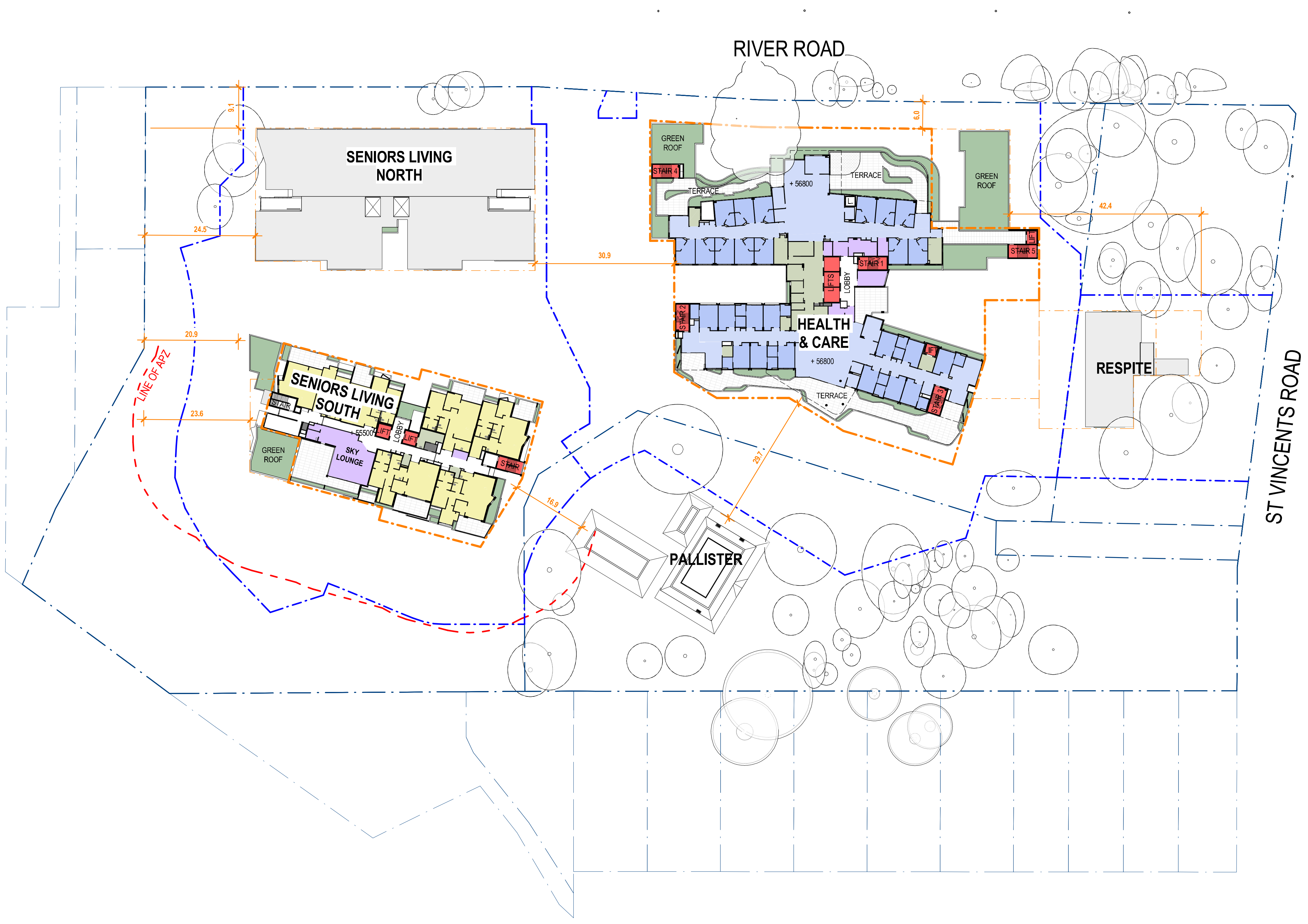

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DRAWING No: DD-SW-0205

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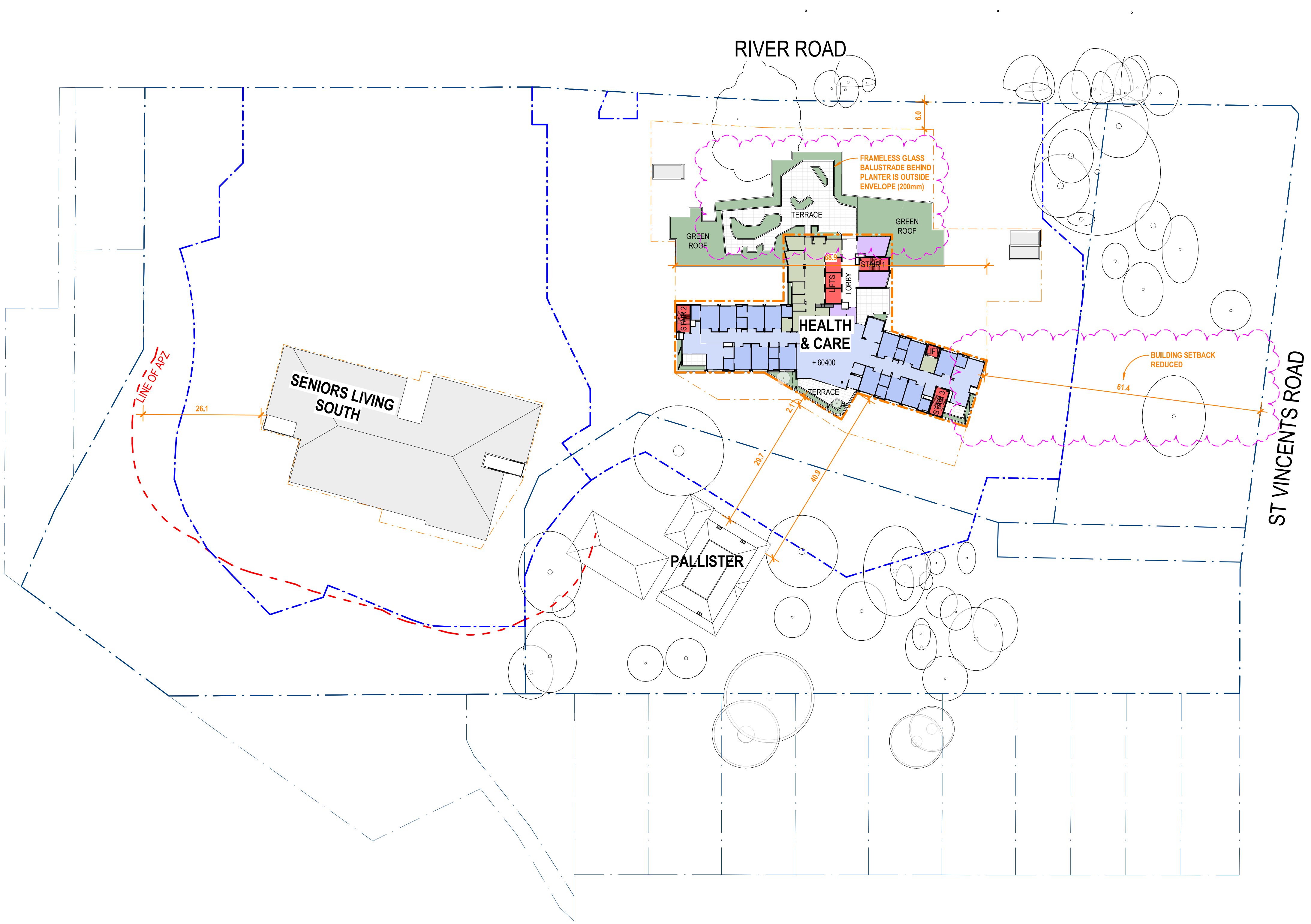

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P15	2022.03.18	ISSUE TO CONSULTANTS	AMac
P14	2022.03.16	SSD UPDATE	NAH

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REVISION: P19
DATE: 01/11/21

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C:_Revit Projects\SW-AR-GREENWICH_andrewmacNRYHN.rvt

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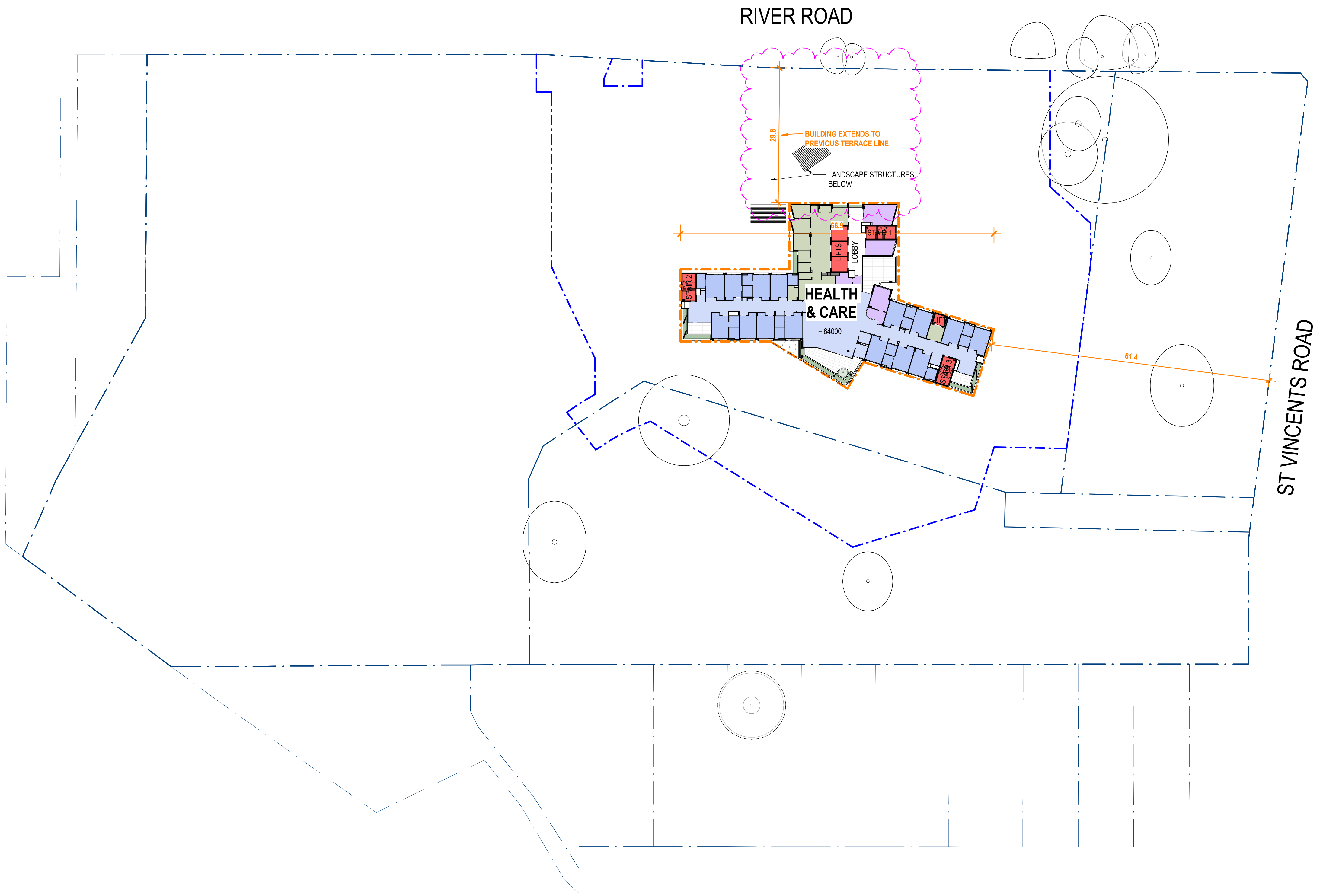

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P14	2022.03.16	SSD UPDATE	NAH

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REVISION: P19
DATE: 01/11/21

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CHECKED:
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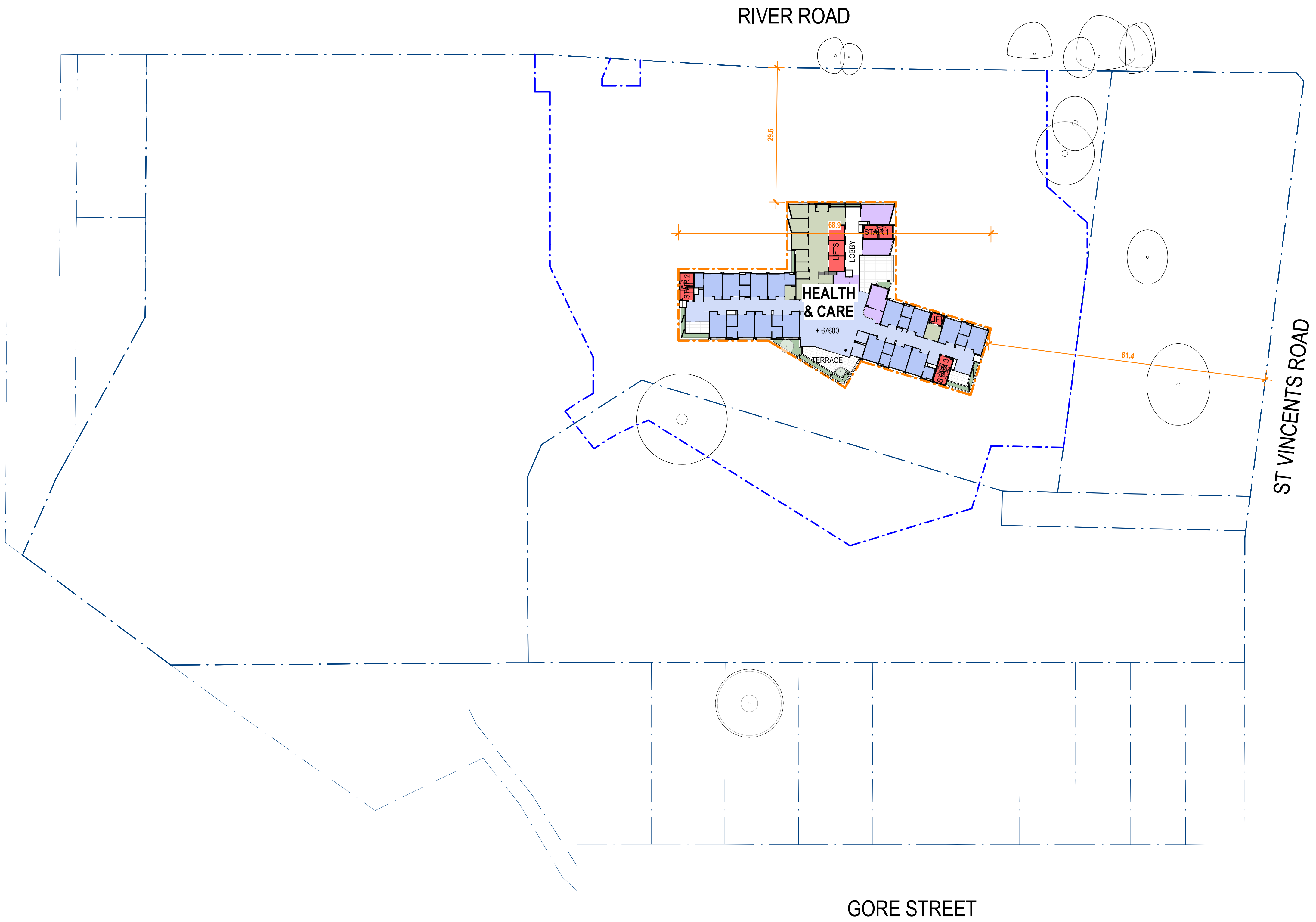
C:_Revit Projects\SW-AR-GREENWICH_andrewmacNRYHN.rvt



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P15	2022.03.18	ISSUE TO CONSULTANTS	AMac
P14	2022.03.16	SSD UPDATE	NAH

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DATE: 01/11/21

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DRAWING TITLE:
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DRAWN: NAH **CHECKED:** **SCALE:** 1 : 500 @A1

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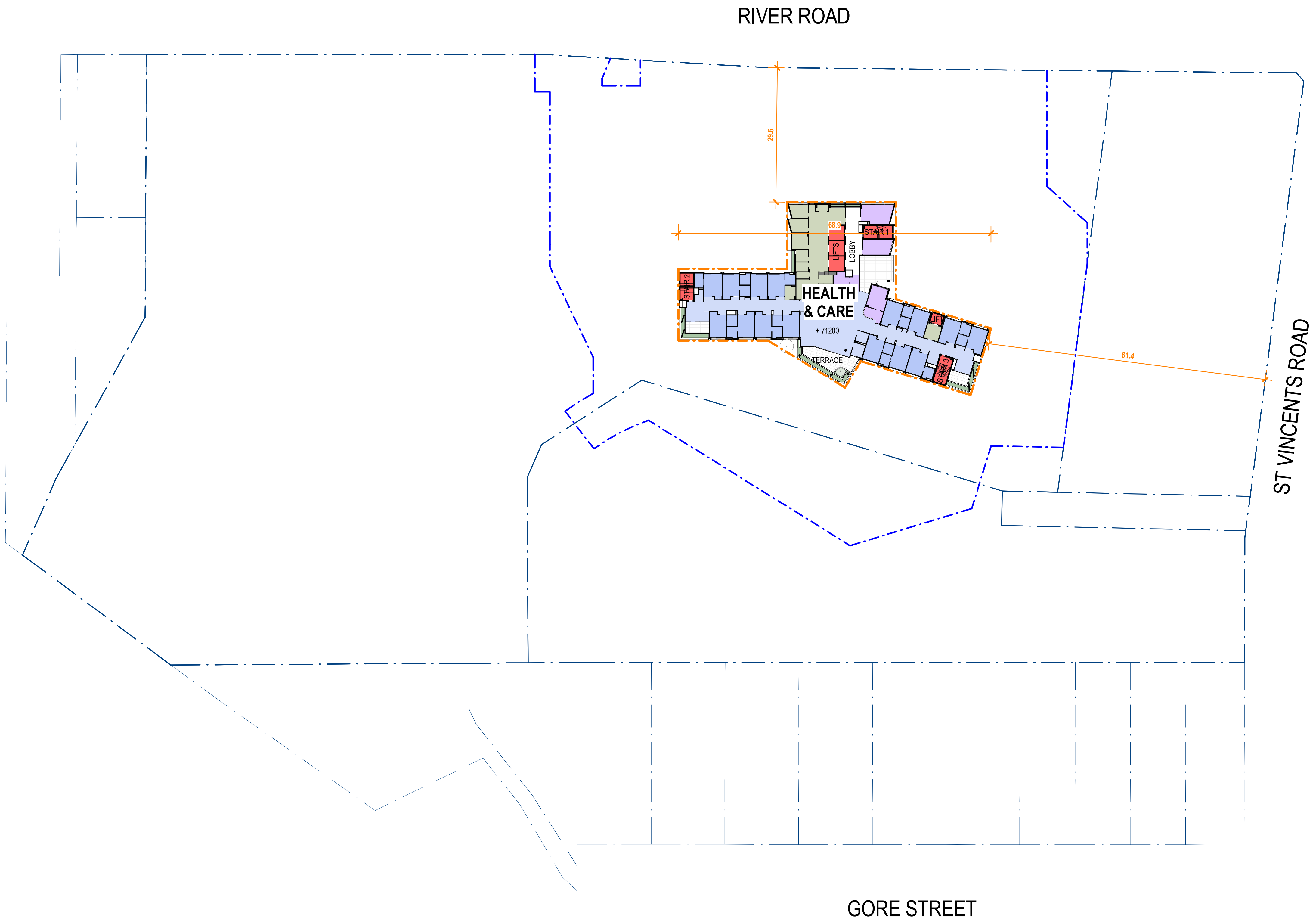
8/04/2022 5:31:02 PM

C:_Revit Projects\SW-AR-GREENWICH_andrewmacNRYHN.rvt



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P13	2022.03.18	ISSUE TO CONSULTANTS	AMac
P12	2022.03.16	SSD UPDATE	NAH

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REVISION: P17
DATE: 01/11/21
DRAWING No: DD-SW-0209
DRAWING TITLE: SITE LEVEL PLAN - LEVEL 10

DRAWN: NAH **CHECKED:** **SCALE:** 1 : 500 @A1

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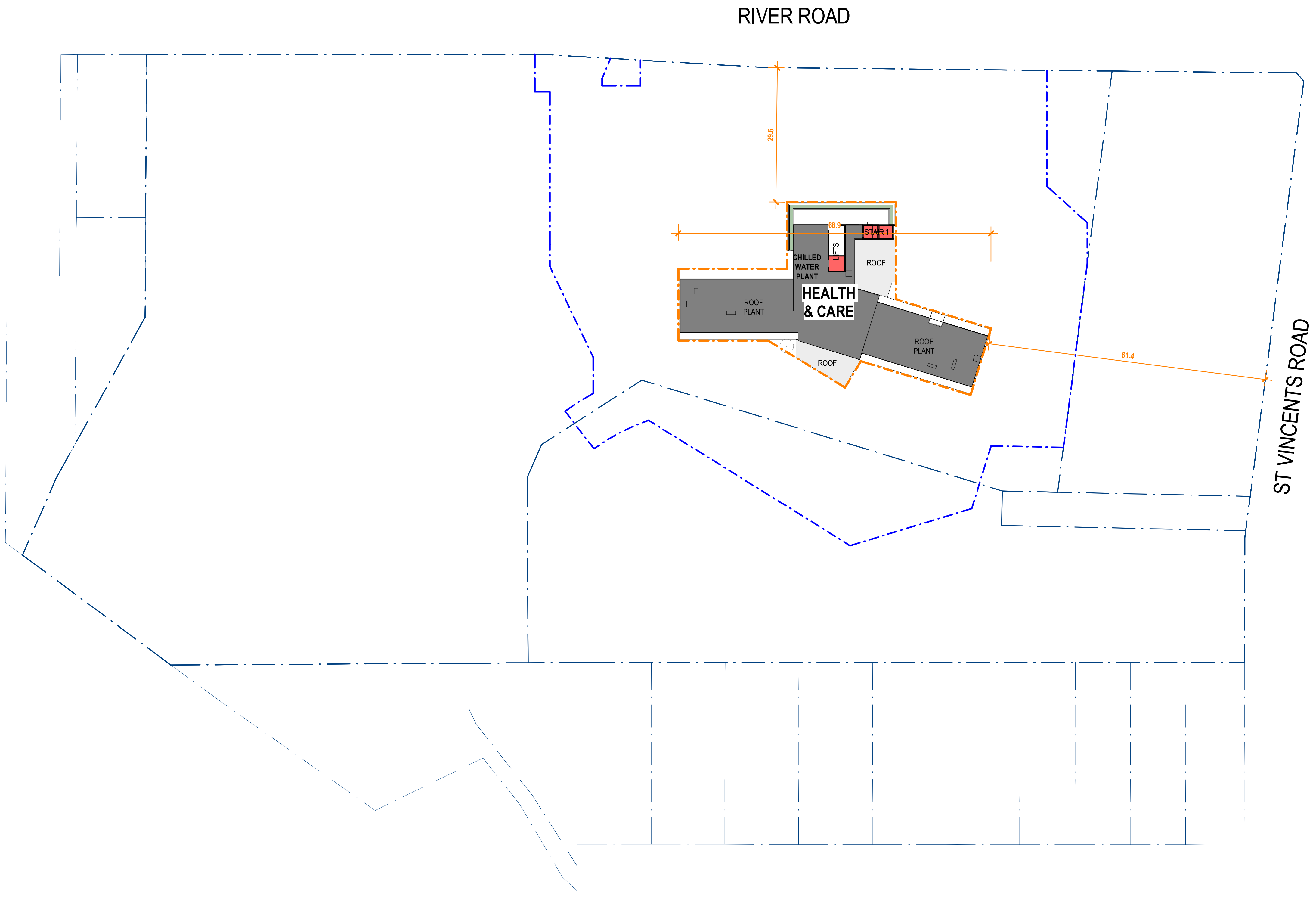

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P12	2022.03.16	SSD UPDATE	NAH

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REVISION: P17
DATE: 04/09/21
DRAWING No: DD-SW-0210
DRAWING TITLE: SITE LEVEL PLAN - LEVEL 11

DRAWN: NAH
CHECKED:
SCALE: 1 : 500 @A1

NSW NOMINATED ARCHITECT: ANDREW MASTERS (9037)
8/04/2022 5:31:27 PM

Appendix C: Data Summary Tables and Borehole Logs

ASI Data Summary Tables

JKEnvironments

ABBREVIATIONS AND EXPLANATIONS

Abbreviations used in the Tables:

ABC:	Ambient Background Concentration
ACM:	Asbestos Containing Material
ADWG:	Australian Drinking Water Guidelines
AF:	Asbestos Fines
ANZG	Australian and New Zealand Guidelines
B(a)P:	Benzo(a)pyrene
CEC:	Cation Exchange Capacity
CRC:	Cooperative Research Centre
CT:	Contaminant Threshold
EILs:	Ecological Investigation Levels
ESLs:	Ecological Screening Levels
FA:	Fibrous Asbestos
FTS:	Fluorotelomer sulfonic acid
GIL:	Groundwater Investigation Levels
GSW:	General Solid Waste
HILs:	Health Investigation Levels
HSLs:	Health Screening Levels
HSL-SSA:	Health Screening Level-SiteSpecific Assessment
kg/L	kilograms per litre
NA:	Not Analysed
NC:	Not Calculated
NEPM:	National Environmental Protection Measure
NHMRC:	National Health and Medical Research Council
NL:	Not Limiting
NSL:	No Set Limit
OCP:	Organochlorine Pesticides
OPP:	Organophosphorus Pesticides
PAHs:	Polycyclic Aromatic Hydrocarbons
%w/w:	weight per weight
ppm:	Parts per million
PCBs:	Polychlorinated Biphenyls
PCE:	Perchloroethylene (Tetrachloroethylene or Teterachloroethene)
PFAS	Per- and polyfluoroalkyl substances
PFHxS	Perfluorohexanesulfonic acid
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctanesulfonic acid
pH_{KCL} :	pH of filtered 1:20, 1M KCL extract, shaken overnight
pH_{ox} :	pH of filtered 1:20 1M KCl after peroxide digestion
PQL:	Practical Quantitation Limit
RS:	Rinsate Sample
RSL:	Regional Screening Levels
RSW:	Restricted Solid Waste
SAC:	Site Assessment Criteria
SCC:	Specific Contaminant Concentration
S_{Cr}:	Chromium reducible sulfur
S_{POS}:	Peroxide oxidisable Sulfur
SSA:	Site Specific Assessment
SSHSLs:	Site Specific Health Screening Levels
TAA:	Total Actual Acidity in 1M KCL extract titrated to pH6.5
TB:	Trip Blank
TCA:	1,1,1 Trichloroethane (methyl chloroform)
TCE:	Trichloroethylene (Trichloroethene)
TCLP:	Toxicity Characteristics Leaching Procedure
TPA:	Total Potential Acidity, 1M KCL peroxide digest
TS:	Trip Spike
TRH:	Total Recoverable Hydrocarbons
TSA:	Total Sulfide Acidity (TPA-TAA)
UCL:	Upper Level Confidence Limit on Mean Value
USEPA	United States Environmental Protection Agency
VOCC:	Volatile Organic Chlorinated Compounds
WHO:	World Health Organisation

Table Specific Explanations:

HIL Tables:

- The chromium results are for Total Chromium which includes Chromium III and VI. For initial screening purposes, we have assumed that the samples contain only Chromium VI unless demonstrated otherwise by additional analysis.
- Carcinogenic PAHs is a toxicity weighted sum of analyte concentrations for a specific list of PAH compounds relative to B(a)P. It is also refered to as the B(a)P Toxic Equivalence Quotient (TEQ).
- Statistical calculations are undertaken using ProUCL (USEPA). Statistical calculation is usually undertaken using data from fill samples.

EIL/ESL Table:

- ABC Values for selected metals have been adopted from the published background concentrations presented in Olszowy et. al., (1995), Trace Element Concentrations in Soils from Rural and Urban New South Wales (the 25th percentile values for old suburbs with high traffic have been quoted).
- Physiochemical parameters adopted from representative samples are displayed in blue font.

Waste Classification and TCLP Table:

- Data assessed using the NSW EPA Waste Classification Guidelines, Part 1: Classifying Waste (2014).
- The assessment of Total Moderately Harmful pesticides includes: Dichlorovos, Dimethoate, Fenitrothion, Ethion, Malathion and Parathion.
- Assessment of Total Scheduled pesticides include: HBC, alpha-BHC, gamma-BHC, beta-BHC, Heptachlor, Aldrin, Heptachlor Epoxide, gamma-Chlordane, alpha-chlordane, pp-DDE, Dieldrin, Endrin, pp-DDD, pp-DDT, Endrin Aldehyde.

Groundwater Ecology Tables:

- 95% refers to a concentration that has been derived to protect 95% of aquatic species

QA/QC Table:

- Field blank, Inter and Intra laboratory duplicate results are reported in mg/kg.
- Trip spike results are reported as percentage recovery.
- Field rinsate results are reported in µg/L.

JKEnvironments

TABLE S1
SOIL LABORATORY RESULTS COMPARED TO NEPM 2013.
HIL-B: 'Residential with minimal opportunities for soil access; including dwellings with fully/permanently paved yards like high-rise buildings'

All data in mg/kg unless stated otherwise			HEAVY METALS								PAHs		ORGANOCHLORINE PESTICIDES (OCPs)							OP PESTICIDES (OPPs)	TOTAL PCBs	ASBESTOS FIBRES
			Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	Total PAHs	Carcinogenic PAHs	HCB	Endosulfan	Methoxychlor	Aldrin & Dieldrin	Chlordane	DDT, DDD & DDE	Heptachlor	Chlorpyrifos		
PQL - Envirolab Services			4	0.4	1	1	1	0.1	1	1	-	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	100
Site Assessment Criteria (SAC)			500	150	500	30000	1200	120	1200	60000	400	4	15	400	500	10	90	600	10	340	1	Detected/Not Detected
Sample Reference	**Sample Depth**	**Sample Description**																				
BH101	0.02-0.4	Fill: Silty Gravelly Sand	<4	<0.4	62	59	14	<0.1	47	41	3.8	0.6	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH101 - [LAB_DUP]	0.02-0.4	Laboratory Duplicate	<4	<0.4	73	57	14	<0.1	55	46	4	0.6	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH101	0.5-0.85	Fill: Silty Sand	<4	<0.4	17	12	51	<0.1	15	44	0.3	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected
BH101	1.7-1.95	XW Sandstone	<4	<0.4	9	1	13	<0.1	<1	9	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH102	0.05-0.1	Fill: Silty Gravelly Sand	<4	<0.4	44	74	7	<0.1	73	37	0.68	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH102	0.5-0.95	Fill: Silty Clay	6	<0.4	43	29	110	<0.1	10	110	10	2.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH102	1.4-1.6	Sandstone	<4	<0.4	11	6	8	<0.1	4	18	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH103	0.03-0.4	Fill: Silty Gravelly Sand	<4	<0.4	34	26	42	<0.1	39	73	11	2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH103	0.5-0.7	Sandy Clay	<4	<0.4	15	<1	4	<0.1	<1	2	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH103	0.7-0.95	Silty Clay	<4	<0.4	11	<1	7	<0.1	<1	<1	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH103	1.4-1.5	Sandy Clay	<4	<0.4	36	2	4	<0.1	<1	1	1.2	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH104	0.04-0.3	Fill: Sandy Gravel	<4	<0.4	73	24	5	<0.1	75	37	0.2	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH104 - [LAB_DUP]	0.04-0.3	Laboratory Duplicate	<4	<0.4	83	27	6	<0.1	83	43	0.2	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH104	0.5-0.95	Fill: Silty Gravelly Sand	<4	<0.4	76	34	6	<0.1	81	48	0.4	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected
BH104	1.5-1.95	Fill: Silty Gravelly Sand	<4	<0.4	19	8	83	0.1	5	52	0.4	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH104	3.0-3.2	Fill: Silty Gravelly Sand	<4	<0.4	34	12	57	<0.1	3	38	0.08	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH104	3.8-4.1	Fill: Silty Sand	<4	<0.4	30	17	43	<0.1	17	70	0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH105	0.25-0.4	Fill: Silty Gravelly Sand	<4	<0.4	74	27	13	<0.1	76	45	0.4	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH105 - [LAB_DUP]	0.25-0.4	Laboratory Duplicate	<4	<0.4	72	26	10	<0.1	72	42	0.3	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH105	0.5-0.95	Fill: Clayey Silty Sand	<4	<0.4	13	6	32	<0.1	9	30	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH105	1.2-1.4	Sandy Clay	<4	<0.4	9	2	12	<0.1	1	14	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH106	0.03-0.3	Fill: Clayey Gravelly Sand	<4	<0.4	30	49	2	<0.1	110	38	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH106	0.6-0.8	Silty Clay	<4	<0.4	12	<1	7	<0.1	<1	2	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH107	0-0.2	Fill: Silty Clay	<4	<0.4	12	18	14	<0.1	6	22	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH107	0.2-0.4	Fill: Sandy Clay	<4	<0.4	8	4	14	<0.1	2	21	0.3	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH108	0-0.1	Fill: Sandy Silty Clay	<4	<0.4	6	9	63	<0.1	2	31	2.1	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH109	0.01-0.4	Fill: Clayey Gravelly Sand	<4	<0.4	63	27	8	<0.1	63	37	0.3	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH109	0.5-0.8	Fill: Sandy Clay	<4	<0.4	22	7	10	<0.1	16	16	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH109	0.8-0.95	Sandy Clay	<4	<0.4	15	2	5	<0.1	4	6	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH110A	0-0.1	Fill: Silty Gravelly Sand	<4	<0.4	63	26	6	<0.1	69	52	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH110A	0.1-0.2	Fill: Sandy Gravel	<4	<0.4	71	24	6	<0.1	73	39	0.2	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH110A	0.5-0.8	Fill: Sandy Clay	7	<0.4	18	2	16	<0.1	1	10	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected
BH111	0-0.1	Fill: Silty Sand	<4	<0.4	9	12	54	<0.1	4	50	3.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH111 - [LAB_DUP]	0-0.1	Laboratory Duplicate	<4	<0.4	9	12	51	<0.1	4	49	2.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH111	0.3-0.6	Fill: Silty Clay	4	<0.4	9	52	49	0.1	6	79	2.5	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH111	0.6-0.8	Fill: Silty Clayey Sand	<4	<0.4	16	13	58	0.2	5	120	1.8	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH112	0.22-0.65	Fill: Silty Gravelly Sand	<4	<0.4	12	11	44	<0.1	4	57	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH112	0.65-0.8	Sandstone	<4	<0.4	8	9	6	<0.1	1	12	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH113	0-0.1	Fill: Silty Sand	<4	<0.4	10	9	25	<0.1	3	27	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH113	0.1-0.2	Fill: Silty Clayey Sand	<4	<0.4	11	4	22	<0.1	2	21	0.3	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH113	0.35-0.45	Sandy Clay	<4	<0.4	6	7	28	<0.1	1	29	3	0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH114	0.05-0.2	Fill: Silty Sandy Gravel	<4	<0.4	77	31	4	<0.1	85	36	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH114 - [LAB_DUP]	0.05-0.2	Laboratory Duplicate	<4	<0.4	93	34	5	<0.1	91	41	0.1	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH115	0-0.1	Fill: Silty Clayey Sand	4	<0.4	11	11	40	<0.1	3	42	0.64	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH115	0.6-0.8	Sandy Clay	4	<0.4	15	<1	6	<0.1	<1	1	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH116	0-0.1	Fill: Silty Sandy Gravel	<4	<0.4	59	22	15	<0.1	54	42	0.3	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH116	0.1-0.3	Silty Clayey Sand	<4	<0.4	10	7	29	<0.1	4	29	0.4	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH117	0-0.1	Fill: Silty Sand	<4	<0.4	19	17	28	<0.1	16	54	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH117	0.5-0.95	Fill: Silty Sand	<4	<0.4	8	3	15	<0.1	2	16	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected
BH117	0.5-1.5	Fill: Silty Sand (Spoil)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected
BH117	0.5-1.5	Fragment	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected
BH118	0-0.1	Fill: Silty Sandy Clay	17	<0.4	8	26	220	<0.1	5	45	1.3	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH118 - [LAB_DUP]	0-0.1	Laboratory Duplicate	<4	<0.4	6	23	390	<0.1	3	65	3.8	0.7	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH118	1.4-1.5	Fill: Silty Sandy Clay	11	<0.4	7	35	99	<0.1	3	62	8.5	1.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH118	1.6-1.8	Sandy Clay	<4	<0.4	11	1	6	<0.1	2	14	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH119	0.05-0.3	Fill: Silty Sand	<4	<0.4	14	29	28	<0.1	8	37	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH119	0.05-0.3	Laboratory Duplicate	<4	<0.4	14	23	28	<0.1	9	41	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH119	0.5-0.8	Sandstone	<4	<0.4	15	<1	4	<0.1	<1	2	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SDUP3	0-0.1	Duplicate of BH111	<4	<0.4	11	13	54	<0.1	4	51	2.6	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected
SDUP4	0-0.1	Duplicate of BH115	<4	<0.4	9	5	20	<0.1	2	25	0.3	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1	Not Detected
SDUP7	0-0.1	Duplicate of BH108	<4	<0.4	6	9	66	<0.1	2	32	1.7	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SDUP8	0.04-0.3	Duplicate of BH104	<4	<0.4	82	31	5	<0.1	79	45	0.4	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SDUP9	0.02-0.4	Duplicate of BH101	<4	<0.4	62	52	13	<0.1	48	40	2.3	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
SDUP10	0-0.1	Duplicate of BH117	<4	<0.4	11	17	27	<0.1	12	60	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Number of Samples			62	62	62	62	62	62	62	62	62	62	28	28	28	28	28	27	28	28	28	26
Maximum Value			17	<PQL	93	74	390	0.2	110	120	11	2.1	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	Not Detected

Concentration above the SAC — **VALUE**
Concentration above the PQL — **Bold**

TABLE S2
SOIL LABORATORY RESULTS COMPARED TO HSLs
All data in mg/kg unless stated otherwise

					C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene	Field PID Measurement
PQL - Envirolab Services					25	50	0.2	0.5	1	1	1	ppm
NEPM 2013 HSL Land Use Category					HSL-A/B: LOW/HIGH DENSITY RESIDENTIAL							
Sample Reference	**Sample Depth**	**Sample Description**	**Depth Category**	**Soil Category**								
BH101	0.02-0.4	Fill: Silty Gravelly Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	3.8
BH101 - [LAB_DUP]	0.02-0.4	Laboratory Duplicate	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	NA
BH101	0.5-0.85	Fill: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	1.8
BH101	1.7-1.95	XW Sandstone	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0.5
BH102	0.05-0.1	Fill: Silty Gravelly Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	1.4
BH102	0.5-0.95	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	3.3
BH102	1.4-1.6	Sandstone	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	1.6
BH103	0.03-0.4	Fill: Silty Gravelly Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	1.2
BH103	0.5-0.7	Sandy Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	7.5
BH103	0.7-0.95	Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	505
BH103	1.4-1.5	Sandy Clay	0m to <1m	Sand	**68**	<50	<0.2	<0.5	<1	<3	<1	579
BH103 - [Replicate]	1.4-1.5	Replicate Sample (re-test)	0m to <1m	Sand	NA	<50	NA	NA	NA	NA	NA	NA
BH103 - [LAB-DUP]	1.4-1.5	Laboratory Duplicate	0m to <1m	Sand	NA	<50	NA	NA	NA	NA	NA	NA
BH104	0.04-0.3	Fill: Sandy Gravel	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0.1
BH104 - [LAB_DUP]	0.04-0.3	Laboratory Duplicate	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	NA
BH104	0.5-0.95	Fill: Silty Gravelly Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH104 - [Silica Gel]	0.5-0.95	Fill: Silty Gravelly Sand	0m to <1m	Sand	NA	<50	NA	NA	NA	NA	NA	NA
BH104	1.5-1.95	Fill: Silty Gravelly Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0.2
BH104	3.0-3.2	Fill: Silty Gravelly Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	5.6
BH104	3.8-4.1	Fill: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	1.1
BH105	0.25-0.4	Fill: Silty Gravelly Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH105 - [LAB_DUP]	0.25-0.4	Laboratory Duplicate	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	NA
BH105	0.5-0.95	Fill: Clayey Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH105	1.2-1.4	Sandy Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH106	0.03-0.3	Fill: Clayey Gravelly Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH106	0.6-0.8	Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH107	0-0.2	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH107	0.2-0.4	Fill: Sandy Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH108	0-0.1	Fill: Sandy Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH109	0.01-0.4	Fill: Clayey Gravelly Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH109	0.5-0.8	Fill: Sandy Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	5
BH109	0.8-0.95	Sandy Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	1.5
BH110A	0-0.1	Fill: Silty Gravelly Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0.3
BH110A	0.1-0.2	Fill: Sandy Gravel	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH110A	0.5-0.8	Fill: Sandy Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH111	0-0.1	Fill: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH111 - [LAB_DUP]	0-0.1	Laboratory Duplicate	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	NA
BH111	0.3-0.6	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH111	0.6-0.8	Fill: Silty Clayey Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH112	0.22-0.65	Fill: Silty Gravelly Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH112	0.65-0.8	Sandstone	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH113	0-0.1	Fill: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH113	0.1-0.2	Fill: Silty Clayey Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH113	0.35-0.45	Sandy Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH114	0.05-0.2	Fill: Silty Sandy Gravel	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH114 - [LAB_DUP]	0.05-0.2	Laboratory Duplicate	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	NA
BH115	0-0.1	Fill: Silty Clayey Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH115	0.6-0.8	Sandy Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH116	0-0.1	Fill: Silty Sandy Gravel	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH116	0.1-0.3	Silty Clayey Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH117	0-0.1	Fill: Silty Sand	0m to <1m	Sand	<25	**93**	<0.2	<0.5	<1	<3	<1	9.4
BH117	0.5-0.95	Fill: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	2.4
BH118	0-0.1	Fill: Silty Sandy Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH118 - [LAB_DUP]	0-0.1	Laboratory Duplicate	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	NA
BH118	1.4-1.5	Fill: Silty Sandy Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH118	1.6-1.8	Sandy Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH119	0.05-0.3	Fill: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0.6
BH119	0.05-0.3	Laboratory Duplicate	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	NA
BH119	0.5-0.8	Sandstone	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0.6
SDUP3	0-0.1	Duplicate of BH111	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	NA
SDUP4	0-0.1	Duplicate of BH115	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	NA
SDUP7	0-0.1	Duplicate of BH108	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	NA
SDUP7 - [Silica Gel]	0-0.1	Duplicate of BH108	0m to <1m	Sand	NA	<50	NA	NA	NA	NA	NA	NA
SDUP8	0.04-0.3	Duplicate of BH104	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	NA
SDUP9	0.02-0.4	Duplicate of BH101	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	NA
SDUP10	0-0.1	Duplicate of BH117	0m to <1m	Sand	<25	**63**	<0.2	<0.5	<1	<1	<1	NA
Total Number of Samples					62	62	62	62	62	62	62	49
Maximum Value					68	93	<PQL	<PQL	<PQL	<PQL	<PQL	579

Concentration above the SAC	**VALUE**
Concentration above the PQL	**Bold**

The guideline corresponding to the concentration above the SAC is highlighted in grey in the Site Assessment Criteria Table below

HSL SOIL ASSESSMENT CRITERIA

Sample Reference	Sample Depth	Sample Description	Depth Category	Soil Category	C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene
BH101	0.02-0.4	Fill: Silty Gravelly Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH101 - [LAB_DUP]	0.02-0.4	Laboratory Duplicate	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH101	0.5-0.85	Fill: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH101	1.7-1.95	XW Sandstone	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH102	0.05-0.1	Fill: Silty Gravelly Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH102	0.5-0.95	Fill: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH102	1.4-1.6	Sandstone	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH103	0.03-0.4	Fill: Silty Gravelly Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH103	0.5-0.7	Sandy Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH103	0.7-0.95	Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH103	1.4-1.5	Sandy Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH103 - [Replicate]	1.4-1.5	Replicate Sample (re-test)	0m to <1m	Sand	--	110	--	--	--	--	--
BH103 - [LAB-DUP]	1.4-1.5	Laboratory Duplicate	0m to <1m	Sand	--	110	--	--	--	--	--
BH104	0.04-0.3	Fill: Sandy Gravel	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH104 - [LAB_DUP]	0.04-0.3	Laboratory Duplicate	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH104	0.5-0.95	Fill: Silty Gravelly Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH104 - [Silica Gel]	0.5-0.95	Fill: Silty Gravelly Sand	0m to <1m	Sand	--	110	--	--	--	--	--
BH104	1.5-1.95	Fill: Silty Gravelly Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH104	3.0-3.2	Fill: Silty Gravelly Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH104	3.8-4.1	Fill: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH105	0.25-0.4	Fill: Silty Gravelly Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH105 - [LAB_DUP]	0.25-0.4	Laboratory Duplicate	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH105	0.5-0.95	Fill: Clayey Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH105	1.2-1.4	Sandy Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH106	0.03-0.3	Fill: Clayey Gravelly Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH106	0.6-0.8	Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH107	0-0.2	Fill: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH107	0.2-0.4	Fill: Sandy Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH108	0-0.1	Fill: Sandy Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH109	0.01-0.4	Fill: Clayey Gravelly Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH109	0.5-0.8	Fill: Sandy Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH109	0.8-0.95	Sandy Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH110A	0-0.1	Fill: Silty Gravelly Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH110A	0.1-0.2	Fill: Sandy Gravel	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH110A	0.5-0.8	Fill: Sandy Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH111	0-0.1	Fill: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH111 - [LAB_DUP]	0-0.1	Laboratory Duplicate	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH111	0.3-0.6	Fill: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH111	0.6-0.8	Fill: Silty Clayey Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH112	0.22-0.65	Fill: Silty Gravelly Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH112	0.65-0.8	Sandstone	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH113	0-0.1	Fill: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH113	0.1-0.2	Fill: Silty Clayey Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH113	0.35-0.45	Sandy Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH114	0.05-0.2	Fill: Silty Sandy Gravel	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH114 - [LAB_DUP]	0.05-0.2	Laboratory Duplicate	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH115	0-0.1	Fill: Silty Clayey Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH115	0.6-0.8	Sandy Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH116	0-0.1	Fill: Silty Sandy Gravel	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH116	0.1-0.3	Silty Clayey Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH117	0-0.1	Fill: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH117	0.5-0.95	Fill: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH118	0-0.1	Fill: Silty Sandy Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH118 - [LAB_DUP]	0-0.1	Laboratory Duplicate	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH118	1.4-1.5	Fill: Silty Sandy Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH118	1.6-1.8	Sandy Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH119	0.05-0.3	Fill: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH119	0.05-0.3	Laboratory Duplicate	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH119	0.5-0.8	Sandstone	0m to <1m	Sand	45	110	0.5	160	55	40	3
SDUP3	0-0.1	Duplicate of BH111	0m to <1m	Sand	45	110	0.5	160	55	40	3
SDUP4	0-0.1	Duplicate of BH115	0m to <1m	Sand	45	110	0.5	160	55	40	3
SDUP7	0-0.1	Duplicate of BH108	0m to <1m	Sand	45	110	0.5	160	55	40	3
SDUP7 - [Silica Gel]	0-0.1	Duplicate of BH108	0m to <1m	Sand	--	110	--	--	--	--	--
SDUP8	0.04-0.3	Duplicate of BH104	0m to <1m	Sand	45	110	0.5	160	55	40	3
SDUP9	0.02-0.4	Duplicate of BH101	0m to <1m	Sand	45	110	0.5	160	55	40	3
SDUP10	0-0.1	Duplicate of BH117	0m to <1m	Sand	45	110	0.5	160	55	40	3

TABLE S3
SOIL LABORATORY RESULTS COMPARED TO MANAGEMENT LIMITS
All data in mg/kg unless stated otherwise

			C_6-C_{10} (F1) plus BTEX	>C_{10}-C_{16} (F2) plus napthalene	>C_{16}-C_{34} (F3)	>C_{34}-C_{40} (F4)
PQL - Envirolab Services			25	50	100	100
NEPM 2013 Land Use Category			**RESIDENTIAL, PARKLAND & PUBLIC OPEN SPACE**			
Sample Reference	**Sample Depth**	**Soil Texture**				
BH101	0.02-0.4	Coarse	<25	<50	**140**	**140**
BH101 - [LAB_DUP]	0.02-0.4	Coarse	<25	<50	<100	<100
BH101	0.5-0.85	Coarse	<25	<50	<100	<100
BH101	1.7-1.95	Coarse	<25	<50	<100	<100
BH102	0.05-0.1	Coarse	<25	<50	**190**	**150**
BH102	0.5-0.95	Coarse	<25	<50	<100	<100
BH102	1.4-1.6	Coarse	<25	<50	<100	<100
BH103	0.03-0.4	Coarse	<25	<50	<100	<100
BH103	0.5-0.7	Coarse	<25	<50	<100	<100
BH103	0.7-0.95	Coarse	<25	<50	<100	<100
BH103	1.4-1.5	Coarse	**68**	<50	<100	<100
BH104	0.04-0.3	Coarse	<25	<50	**160**	<100
BH104 - [LAB_DUP]	0.04-0.3	Coarse	<25	<50	**170**	<100
BH104	0.5-0.95	Coarse	<25	<50	**420**	**120**
BH104	1.5-1.95	Coarse	<25	<50	<100	<100
BH104	3.0-3.2	Coarse	<25	<50	<100	<100
BH104	3.8-4.1	Coarse	<25	<50	<100	<100
BH105	0.25-0.4	Coarse	<25	<50	<100	<100
BH105 - [LAB_DUP]	0.25-0.4	Coarse	<25	<50	<100	<100
BH105	0.5-0.95	Coarse	<25	<50	<100	<100
BH105	1.2-1.4	Coarse	<25	<50	<100	<100
BH106	0.03-0.3	Coarse	<25	<50	**160**	**290**
BH106	0.6-0.8	Coarse	<25	<50	<100	<100
BH107	0-0.2	Coarse	<25	<50	<100	<100
BH107	0.2-0.4	Coarse	<25	<50	<100	<100
BH108	0-0.1	Coarse	<25	<50	**160**	<100
BH109	0.01-0.4	Coarse	<25	<50	**110**	**370**
BH109	0.5-0.8	Coarse	<25	<50	<100	<100
BH109	0.8-0.95	Coarse	<25	<50	<100	<100
BH110A	0-0.1	Coarse	<25	<50	**290**	**280**
BH110A	0.1-0.2	Coarse	<25	<50	<100	<100
BH110A	0.5-0.8	Coarse	<25	<50	<100	<100
BH111	0-0.1	Coarse	<25	<50	<100	<100
BH111 - [LAB_DUP]	0-0.1	Coarse	<25	<50	<100	<100
BH111	0.3-0.6	Coarse	<25	<50	<100	<100
BH111	0.6-0.8	Coarse	<25	<50	<100	<100
BH112	0.22-0.65	Coarse	<25	<50	<100	<100
BH112	0.65-0.8	Coarse	<25	<50	**220**	<100
BH113	0-0.1	Coarse	<25	<50	<100	<100
BH113	0.1-0.2	Coarse	<25	<50	<100	<100
BH113	0.35-0.45	Coarse	<25	<50	**120**	<100
BH114	0.05-0.2	Coarse	<25	<50	<100	<100
BH114 - [LAB_DUP]	0.05-0.2	Coarse	<25	<50	<100	<100
BH115	0-0.1	Coarse	<25	<50	<100	<100
BH115	0.6-0.8	Coarse	<25	<50	<100	<100
BH116	0-0.1	Coarse	<25	<50	<100	<100
BH116	0.1-0.3	Coarse	<25	<50	<100	<100
BH117	0-0.1	Coarse	<25	**93**	**240**	**100**
BH117	0.5-0.95	Coarse	<25	<50	<100	<100
BH118	0-0.1	Coarse	<25	<50	<100	<100
BH118 - [LAB_DUP]	0-0.1	Coarse	<25	<50	<100	<100
BH118	1.4-1.5	Coarse	<25	<50	<100	<100
BH118	1.6-1.8	Coarse	<25	<50	<100	<100
BH119	0.05-0.3	Coarse	<25	<50	<100	<100
BH119	0.05-0.3	Coarse	<25	<50	<100	<100
BH119	0.5-0.8	Coarse	<25	<50	<100	<100
SDUP3	0-0.1	Coarse	<25	<50	**160**	<100
SDUP4	0-0.1	Coarse	<25	<50	**120**	<100
SDUP7	0-0.1	Coarse	<25	<50	**310**	**190**
SDUP8	0.04-0.3	Coarse	<25	<50	**450**	**210**
SDUP9	0.02-0.4	Coarse	<25	<50	**110**	**120**
SDUP10	0-0.1	Coarse	<25	**63**	**200**	**120**
Total Number of Samples			62	62	62	62
Maximum Value			68	93	450	370

Concentration above the SAC	**VALUE**
Concentration above the PQL	**Bold**

MANAGEMENT LIMIT ASSESSMENT CRITERIA

Sample Reference	Sample Depth	Soil Texture	C_6-C_{10} (F1) plus BTEX	>C_{10}-C_{16} (F2) plus napthalene	>C_{16}-C_{34} (F3)	>C_{34}-C_{40} (F4)
BH101	0.02-0.4	Coarse	700	1000	2500	10000
BH101 - [LAB_DUP]	0.02-0.4	Coarse	700	1000	2500	10000
BH101	0.5-0.85	Coarse	700	1000	2500	10000
BH101	1.7-1.95	Coarse	700	1000	2500	10000
BH102	0.05-0.1	Coarse	700	1000	2500	10000
BH102	0.5-0.95	Coarse	700	1000	2500	10000
BH102	1.4-1.6	Coarse	700	1000	2500	10000
BH103	0.03-0.4	Coarse	700	1000	2500	10000
BH103	0.5-0.7	Coarse	700	1000	2500	10000
BH103	0.7-0.95	Coarse	700	1000	2500	10000
BH103	1.4-1.5	Coarse	700	1000	2500	10000
BH104	0.04-0.3	Coarse	700	1000	2500	10000
BH104 - [LAB_DUP]	0.04-0.3	Coarse	700	1000	2500	10000
BH104	0.5-0.95	Coarse	700	1000	2500	10000
BH104	1.5-1.95	Coarse	700	1000	2500	10000
BH104	3.0-3.2	Coarse	700	1000	2500	10000
BH104	3.8-4.1	Coarse	700	1000	2500	10000
BH105	0.25-0.4	Coarse	700	1000	2500	10000
BH105 - [LAB_DUP]	0.25-0.4	Coarse	700	1000	2500	10000
BH105	0.5-0.95	Coarse	700	1000	2500	10000
BH105	1.2-1.4	Coarse	700	1000	2500	10000
BH106	0.03-0.3	Coarse	700	1000	2500	10000
BH106	0.6-0.8	Coarse	700	1000	2500	10000
BH107	0-0.2	Coarse	700	1000	2500	10000
BH107	0.2-0.4	Coarse	700	1000	2500	10000
BH108	0-0.1	Coarse	700	1000	2500	10000
BH109	0.01-0.4	Coarse	700	1000	2500	10000
BH109	0.5-0.8	Coarse	700	1000	2500	10000
BH109	0.8-0.95	Coarse	700	1000	2500	10000
BH110A	0-0.1	Coarse	700	1000	2500	10000
BH110A	0.1-0.2	Coarse	700	1000	2500	10000
BH110A	0.5-0.8	Coarse	700	1000	2500	10000
BH111	0-0.1	Coarse	700	1000	2500	10000
BH111 - [LAB_DUP]	0-0.1	Coarse	700	1000	2500	10000
BH111	0.3-0.6	Coarse	700	1000	2500	10000
BH111	0.6-0.8	Coarse	700	1000	2500	10000
BH112	0.22-0.65	Coarse	700	1000	2500	10000
BH112	0.65-0.8	Coarse	700	1000	2500	10000
BH113	0-0.1	Coarse	700	1000	2500	10000
BH113	0.1-0.2	Coarse	700	1000	2500	10000
BH113	0.35-0.45	Coarse	700	1000	2500	10000
BH114	0.05-0.2	Coarse	700	1000	2500	10000
BH114 - [LAB_DUP]	0.05-0.2	Coarse	700	1000	2500	10000
BH115	0-0.1	Coarse	700	1000	2500	10000
BH115	0.6-0.8	Coarse	700	1000	2500	10000
BH116	0-0.1	Coarse	700	1000	2500	10000
BH116	0.1-0.3	Coarse	700	1000	2500	10000
BH117	0-0.1	Coarse	700	1000	2500	10000
BH117	0.5-0.95	Coarse	700	1000	2500	10000
BH118	0-0.1	Coarse	700	1000	2500	10000
BH118 - [LAB_DUP]	0-0.1	Coarse	700	1000	2500	10000
BH118	1.4-1.5	Coarse	700	1000	2500	10000
BH118	1.6-1.8	Coarse	700	1000	2500	10000
BH119	0.05-0.3	Coarse	700	1000	2500	10000
BH119	0.05-0.3	Coarse	700	1000	2500	10000
BH119	0.5-0.8	Coarse	700	1000	2500	10000
SDUP3	0-0.1	Coarse	700	1000	2500	10000
SDUP4	0-0.1	Coarse	700	1000	2500	10000
SDUP7	0-0.1	Coarse	700	1000	2500	10000
SDUP8	0.04-0.3	Coarse	700	1000	2500	10000
SDUP9	0.02-0.4	Coarse	700	1000	2500	10000
SDUP10	0-0.1	Coarse	700	1000	2500	10000

TABLE S4
SOIL LABORATORY RESULTS COMPARED T0 DIRECT CONTACT CRITERIA
All data in mg/kg unless stated otherwise

Analyte		C_6-C_{10}	>C_{10}-C_{16}	>C_{16}-C_{34}	>C_{34}-C_{40}	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene	PID
PQL - Envirolab Services		25	50	100	100	0.2	0.5	1	1	1	
CRC 2011 -Direct contact Criteria		5,600	4,200	5,800	8,100	140	21,000	5,900	17,000	2,200	
Site Use		HIGH DENSITY RESIDENTIAL - DIRECT SOIL CONTACT									
Sample Reference	**Sample Depth**										
BH101	0.02-0.4	<25	<50	**140**	**140**	<0.2	<0.5	<1	<3	<1	**3.8**
BH101 - [LAB_DUP]	0.02-0.4	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	**NA**
BH101	0.5-0.85	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	**1.8**
BH101	1.7-1.95	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	**0.5**
BH102	0.05-0.1	<25	<50	**190**	**150**	<0.2	<0.5	<1	<3	<1	**1.4**
BH102	0.5-0.95	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	**3.3**
BH102	1.4-1.6	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	**1.6**
BH103	0.03-0.4	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	**1.2**
BH103	0.5-0.7	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	**7.5**
BH103	0.7-0.95	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	**505**
BH103	1.4-1.5	**68**	<50	<100	<100	<0.2	<0.5	<1	<3	<1	**579**
BH104	0.04-0.3	<25	<50	**160**	<100	<0.2	<0.5	<1	<3	<1	**0.1**
BH104 - [LAB_DUP]	0.04-0.3	<25	<50	**170**	<100	<0.2	<0.5	<1	<3	<1	**NA**
BH104	0.5-0.95	<25	<50	**420**	**120**	<0.2	<0.5	<1	<3	<1	**0**
BH104	1.5-1.95	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	**0.2**
BH104	3.0-3.2	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	**5.6**
BH104	3.8-4.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	**1.1**
BH105	0.25-0.4	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	**0**
BH105 - [LAB_DUP]	0.25-0.4	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	**NA**
BH105	0.5-0.95	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	**0**
BH105	1.2-1.4	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	**0**
BH106	0.03-0.3	<25	<50	**160**	**290**	<0.2	<0.5	<1	<3	<1	**0**
BH106	0.6-0.8	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	**0**
BH107	0-0.2	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	**0**
BH107	0.2-0.4	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	**0**
BH108	0-0.1	<25	<50	**160**	**<100**	<0.2	<0.5	<1	<3	<1	**0**
BH109	0.01-0.4	<25	<50	**110**	**370**	<0.2	<0.5	<1	<3	<1	**0**
BH109	0.5-0.8	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	**5**
BH109	0.8-0.95	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	**1.5**
BH110A	0-0.1	<25	<50	**290**	**280**	<0.2	<0.5	<1	<3	<1	**0.3**
BH110A	0.1-0.2	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	**0**
BH110A	0.5-0.8	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	**0**
BH111	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	**0**
BH111 - [LAB_DUP]	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	**NA**
BH111	0.3-0.6	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	**0**
BH111	0.6-0.8	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	**0**
BH112	0.22-0.65	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	**0**
BH112	0.65-0.8	<25	<50	**220**	<100	<0.2	<0.5	<1	<3	<1	**0**
BH113	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	**0**
BH113	0.1-0.2	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	**0**
BH113	0.35-0.45	<25	<50	**120**	<100	<0.2	<0.5	<1	<3	<1	**0**
BH114	0.05-0.2	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	**0**
BH114 - [LAB_DUP]	0.05-0.2	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	**NA**
BH115	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	**0**
BH115	0.6-0.8	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	**0**
BH116	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	**0**
BH116	0.1-0.3	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	**0**
BH117	0-0.1	<25	**93**	**240**	**100**	<0.2	<0.5	<1	<3	<1	**9.4**
BH117	0.5-0.95	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	**2.4**
BH118	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	**0**
BH118 - [LAB_DUP]	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	**NA**
BH118	1.4-1.5	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	**0**
BH118	1.6-1.8	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	**0**
BH119	0.05-0.3	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	**0.6**
BH119	0.05-0.3	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	**NA**
BH119	0.5-0.8	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	**0.6**
SDUP3	0-0.1	<25	<50	**160**	<100	<0.2	<0.5	<1	<3	<1	**NA**
SDUP4	0-0.1	<25	<50	**120**	<100	<0.2	<0.5	<1	<3	<1	**NA**
SDUP7	0-0.1	<25	<50	**310**	**190**	<0.2	<0.5	<1	<3	<1	**NA**
SDUP8	0.04-0.3	<25	<50	**450**	**210**	<0.2	<0.5	<1	<1	<1	**NA**
SDUP9	0.02-0.4	<25	<50	**110**	**120**	<0.2	<0.5	<1	<3	<1	**NA**
SDUP10	0-0.1	<25	**63**	**200**	**120**	<0.2	<0.5	<1	<1	<1	**NA**
Total Number of Samples		62	62	62	62	62	62	62	62	62	49
Maximum Value		68	93	450	370	<PQL	<PQL	<PQL	<PQL	<PQL	579

Concentration above the SAC	**VALUE**
Concentration above the PQL	**Bold**

TABLE S5
ASBESTOS QUANTIFICATION - FIELD OBSERVATIONS AND LABORATORY RESULTS
HSL-B: Residential with minimal opportunities for soil access

FIELD DATA															LABORATORY DATA											
Date Sampled	Sample reference	Sample Depth	Visible ACM in top 100mm	Approx. Volume of Soil (L)	Soil Mass (g)	Mass ACM (g)	Mass Asbestos in ACM (g)	[Asbestos from ACM in soil] (%w/w)	Mass ACM <7mm (g)	Mass Asbestos in ACM <7mm (g)	[Asbestos from ACM <7mm in soil] (%w/w)	Mass FA (g)	Mass Asbestos in FA (g)	[Asbestos from FA in soil] (%w/w)	Lab Report Number	Sample refeference	Sample Depth	Sample Mass (g)	Asbestos ID in soil (AS4964) >0.1g/kg	Trace Analysis	Total Asbestos (g/kg)	Asbestos ID in soil <0.1g/kg	ACM >7mm Estimation (g)	FA and AF Estimation (g)	ACM >7mm Estimation %(w/w)	FA and AF Estimation %(w/w)
SAC			**No**					**0.04**			**0.001**			**0.001**											**0.04**	**0.001**
6/10/2021	BH101	0.02-0.4	No	--	5,200	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	280027	BH101	0.02-0.4	848.45	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
6/10/2021	BH101	0.4-1.4	NA	--	6,700	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	280027	BH101	0.5-0.85	779.09	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
6/10/2021	BH101	1.4-1.7	NA	--	7,900	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	280027	BH102	0.05-0.1	1050.98	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
6/10/2021	BH102	0.05-0.5	No	--	7,600	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	280027	BH103	0.03-0.4	819.47	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
6/10/2021	BH102	0.5-1.2	NA	--	9,500	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	280027	BH104	0.04-0.3	1011.06	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
6/10/2021	BH103	0.03-0.5	No	--	7,400	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	280027	BH104	0.5-0.95	911.82	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
1/10/2021	BH104	0.04-0.2	No	--	4,450	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	279440	BH105	0.25-0.4	155.24	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
1/10/2021	BH104	0.3-1.3	NA	--	4,700	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	279440	BH106	0.03-0.3	876.86	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
1/10/2021	BH104	1.3-2.3	NA	--	4,800	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	279440	BH107	0-0.2	834.55	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
1/10/2021	BH104	2.3-3.2	NA	--	5,450	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	280027	BH108	0-0.1	918.63	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
1/10/2021	BH104	3.2-4.1	NA	--	4,700	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	279440	BH109	0.01-0.4	907.91	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
27/09/2021	BH105	0.25-0.4	NA	--	5,250	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	279440	BH110A	0-0.1	309.8	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
28/09/2021	BH106	0.03-0.3	No	--	3,800	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	279440	BH110A	0.5-0.8	546.92	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
27/09/2021	BH107	0-0.2	No	--	11,050	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	279440	BH111	0-0.1	714.5	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
27/09/2021	BH107	0.2-0.4	NA	--	4,550	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	279440	BH112	0.22-0.65	808.15	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
28/09/2021	BH109	0.01-0.4	No	--	4,700	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	279440	BH113	0-0.1	644.18	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
28/09/2021	BH109	0.4-0.8	NA	--	7,400	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	279440	BH114	0.05-0.2	869.03	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
29/09/2021	BH110A	0-0.1	No	--	10,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	279440	BH115	0-0.1	691.37	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
29/09/2021	BH110A	0.1-0.2	NA	--	4,200	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	279440	BH116	0-0.1	844.36	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
29/09/2021	BH110A	0.2-1.1	NA	--	5,800	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	280027	BH117	0-0.1	417.36	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
28/09/2021	BH111	0-0.1	No	--	10,800	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	280027	BH117	0.5-0.95	525.21	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
28/09/2021	BH111	0.1-0.3	NA	--	4,800	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	279440	BH118	0-0.1	691.91	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
28/09/2021	BH111	0.3-0.6	NA	--	5,200	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	280027	BH119	0.05-0.3	817.66	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
28/09/2021	BH111	0.6-0.8	NA	--	4,900	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	279440	SDUP3	0-0.1	737.45	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
29/09/2021	BH112	0.22-0.65	NA	--	6,900	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	279440	SDUP4	0-0.1	793	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
29/09/2021	BH113	0-0.1	No	--	10,100	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
29/09/2021	BH113	0.1-0.35	NA	--	9,600	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
29/09/2021	BH114	0.05-0.2	No	--	9,600	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
29/09/2021	BH115	0-0.1	No	--	11,800	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
29/09/2021	BH115	0.1-0.5	NA	--	5,900	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
29/09/2021	BH116	0-0.1	No	--	11,900	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
6/10/2021	BH117	0-0.1	No	--	10,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
29/09/2021	BH118	0-0.1	No	--	10,600	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
29/09/2021	BH118	0.1-1.1	NA	--	9,850	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
29/09/2021	BH118	1.1-1.6	NA	--	8,100	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Concentration above the SAC **VALUE**

TABLE S6
SUMMARY OF PFAS CONCENTRATIONS IN SOIL - HUMAN HEALTH
Units are µg/Kg unless stated otherwise.

	PQL Envirolab Services	NEMP 2020 Residential min. access	BH104 0.04-0.3 Fill: Sandy Gravel	BH104 - [LAB_DUP] 0.04-0.3 Laboratory Duplicate	BH105 0.25-0.4 Fill: Silty Gravelly Sand	BH105 0.5-0.95 Fill: Clayey Silty Sand	PFAS DUP1 0.25-0.4 Duplicate of BH105	PFAS DUP3 0.04-0.3 Duplicate of BH104
PFAS Compound								
Perfluorobutanesulfonic acid	0.1	NSL	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**
Perfluoropentanesulfonic acid	0.1	NSL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluorohexanesulfonic acid - PFHxS	0.1	NSL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoroheptanesulfonic acid	0.1	NSL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluorooctanesulfonic acid PFOS	0.1	NSL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluorodecanesulfonic acid	0.2	NSL	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Perfluorobutanoic acid	0.2	NSL	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Perfluoropentanoic acid	0.2	NSL	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Perfluorohexanoic acid	0.1	NSL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoroheptanoic acid	0.1	NSL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluorooctanoic acid PFOA	0.1	20,000	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluorononanoic acid	0.1	NSL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluorodecanoic acid	0.5	NSL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Perfluoroundecanoic acid	0.5	NSL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Perfluorododecanoic acid	0.5	NSL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Perfluorotridecanoic acid	0.5	NSL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Perfluorotetradecanoic acid	5	NSL	<5	<5	<5	<5	<5	<5
4:2 FTS	0.1	NSL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
6:2 FTS	0.1	NSL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
8:2 FTS	0.1	NSL	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
10:2 FTS	0.1	NSL	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Perfluorooctane sulfonamide	1	NSL	<1	<1	<1	<1	<1	<1
N-Methyl perfluorooctane sulfonamide	1	NSL	<1	<1	<1	<1	<1	<1
N-Ethyl perfluorooctanesulfon amide	1	NSL	<1	<1	<1	<1	<1	<1
N-Me perfluorooctanesulfonamid oethanol	1	NSL	<1	<1	<1	<1	<1	<1
N-Et perfluorooctanesulfonamid oethanol	5	NSL	<5	<5	<5	<5	<5	<5
MePer uorooctanesulf-amid oacetic acid	0.2	NSL	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
EtPer uorooctanesulf-amid oacetic acid	0.2	NSL	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Total Positive PFHxS & PFOS	0.1	2,000	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Positive PFOS & PFOA	0.1	NSL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Positive PFAS	0.1	NSL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Positive PFAS result	**Bold**
PFAS result above the SAC	**Bold**

JKEnvironments

TABLE S7
SOIL LABORATORY RESULTS COMPARED TO NEPM 2013 EILs AND ESLs
All data in mg/kg unless stated otherwise

Land Use Category				URBAN RESIDENTIAL AND PUBLIC OPEN SPACE																			
							AGED HEAVY METALS-EILs						EILs		ESLs								
				pH	CEC (cmolc/kg)	Clay Content (% clay)	Arsenic	Chromium	Copper	Lead	Nickel	Zinc	Naphthalene	DDT	C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	>C_{16}-C_{34} (F3)	>C_{34}-C_{40} (F4)	Benzene	Toluene	Ethylbenzene	Total Xylenes	B(a)P
PQL - Envirolab Services				-	1	-	4	1	1	1	1	1	1	0.1	25	50	100	100	0.2	0.5	1	1	0.05
Ambient Background Concentration (ABC)				-	-	-	NSL	13	28	163	5	122	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL
Sample Reference	**Sample Depth**	**Sample Description**	**Soil Texture**																				
BH101	0.02-0.4	Fill: Silty Gravelly Sand	Coarse	9.8	12	NA	<4	62	59	14	47	41	<1	<0.1	<25	<50	140	140	<0.2	<0.5	<1	<3	0.4
BH101	0.02-0.4	Laboratory Duplicate	Coarse	9.8	12	NA	<4	73	57	14	55	46	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	0.4
BH101	0.5-0.85	Fill: Silty Sand	Coarse	9.1	NA	NA	<4	17	12	51	15	44	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	0.1
BH101	1.7-1.95	XW Sandstone	Coarse	8.7	NA	NA	<4	9	1	13	<1	9	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH102	0.05-0.1	Fill: Silty Gravelly Sand	Coarse	9	12	NA	<4	44	74	7	73	37	<1	<0.1	<25	<50	190	150	<0.2	<0.5	<1	<3	0.2
BH102	0.5-0.95	Fill: Silty Clay	Coarse	7	11	NA	6	43	29	110	10	110	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	1.5
BH102	1.4-1.6	Sandstone	Coarse	7.8	NA	NA	<4	11	6	8	4	18	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH103	0.03-0.4	Fill: Silty Gravelly Sand	Coarse	8.8	12	NA	<4	34	26	42	39	73	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	1.5
BH103	0.5-0.7	Sandy Clay	Coarse	8	3.2	NA	<4	15	<1	4	<1	2	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH103	0.7-0.95	Silty Clay	Coarse	NA	NA	NA	<4	11	<1	7	<1	<1	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH103	1.4-1.5	Sandy Clay	Coarse	8	3.2	NA	<4	36	2	4	<1	1	<1	NA	68	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH103 - [Replicate]	1.4-1.5	Replicate Sample (re-test)	Coarse	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<50	<100	<100	NA	NA	NA	NA	NA
BH103 - [LAB-DUP]	1.4-1.5	Laboratory Duplicate	Coarse	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<50	<100	<100	NA	NA	NA	NA	NA
BH104	0.04-0.3	Fill: Sandy Gravel	Coarse	8.5	153	NA	<4	73	24	5	75	37	<1	<0.1	<25	<50	160	<100	<0.2	<0.5	<1	<3	<0.05
BH104	0.04-0.3	Laboratory Duplicate	Coarse	8.5	153	NA	<4	83	27	6	83	43	<1	<0.1	<25	<50	170	<100	<0.2	<0.5	<1	<3	<0.05
BH104	0.5-0.95	Fill: Silty Gravelly Sand	Coarse	9	48	NA	<4	76	34	6	81	48	<1	NA	<25	<50	420	120	<0.2	<0.5	<1	<3	<0.05
BH104 - [Silica Gel]	0.5-0.95	Fill: Silty Gravelly Sand	Coarse	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<50	340	100	NA	NA	NA	NA	NA
BH104	1.5-1.95	Fill: Silty Gravelly Sand	Coarse	9	48	NA	<4	19	8	83	5	52	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	0.1
BH104	3.0-3.2	Fill: Silty Gravelly Sand	Coarse	9	48	NA	<4	34	12	57	3	38	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	0.08
BH104	3.8-4.1	Fill: Silty Sand	Coarse	9.1	NA	NA	<4	30	17	43	17	70	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	0.05
BH105	0.25-0.4	Fill: Silty Gravelly Sand	Coarse	8.8	12	NA	<4	74	27	13	76	45	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH105 - [LAB_DUP]	0.25-0.4	Laboratory Duplicate	Coarse	8.8	14	NA	<4	72	26	10	72	42	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH105	0.5-0.95	Fill: Clayey Silty Sand	Coarse	8.7	15	NA	<4	13	6	32	9	30	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH105	1.2-1.4	Sandy Clay	Coarse	8	3.2	NA	<4	9	2	12	1	14	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH106	0.03-0.3	Fill: Clayey Gravelly Sand	Coarse	9.6	25	NA	<4	30	49	2	110	38	<1	<0.1	<25	<50	160	290	<0.2	<0.5	<1	<3	<0.05
BH106	0.6-0.8	Silty Clay	Coarse	NA	NA	NA	<4	12	<1	7	<1	2	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH107	0-0.2	Fill: Silty Clay	Coarse	6.8	11	NA	<4	12	18	14	6	22	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH107	0.2-0.4	Fill: Sandy Clay	Coarse	7.7	4.5	NA	<4	8	4	14	2	21	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	0.06
BH108	0-0.1	Fill: Sandy Silty Clay	Coarse	4.9	5.2	NA	<4	6	9	63	2	31	<1	<0.1	<25	<50	160	<100	<0.2	<0.5	<1	<3	0.3
BH109	0.01-0.4	Fill: Clayey Gravelly Sand	Coarse	9	18	NA	<4	63	27	8	63	37	<1	<0.1	<25	<50	110	370	<0.2	<0.5	<1	<3	<0.05
BH109	0.5-0.8	Fill: Sandy Clay	Coarse	7.7	4.5	NA	<4	22	7	10	16	16	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH109	0.8-0.95	Sandy Clay	Coarse	8	3.2	NA	<4	15	2	5	4	6	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH110A	0-0.1	Fill: Silty Gravelly Sand	Coarse	8.8	12	NA	<4	63	26	6	69	52	<1	<0.1	<25	<50	290	280	<0.2	<0.5	<1	<3	<0.05
BH110A	0.1-0.2	Fill: Sandy Gravel	Coarse	8.7	18	NA	<4	71	24	6	73	39	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH110A	0.5-0.8	Fill: Sandy Clay	Coarse	7.7	4.5	NA	7	18	2	16	1	10	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH111	0-0.1	Fill: Silty Sand	Coarse	9.1	NA	NA	<4	9	12	54	4	50	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	0.3
BH111 - [LAB_DUP]	0-0.1	Laboratory Duplicate	Coarse	9.1	NA	NA	<4	9	12	51	4	49	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	0.2
BH111	0.3-0.6	Fill: Silty Clay	Coarse	6.8	11	NA	4	9	52	49	6	79	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	0.3
BH111	0.6-0.8	Fill: Silty Clayey Sand	Coarse	NA	NA	NA	<4	16	13	58	5	120	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	0.2
BH112	0.22-0.65	Fill: Silty Gravelly Sand	Coarse	8.8	12	NA	<4	12	11	44	4	57	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH112	0.65-0.8	Sandstone	Coarse	NA	NA	NA	<4	8	9	6	1	12	<1	NA	<25	<50	220	<100	<0.2	<0.5	<1	<3	<0.05
BH113	0-0.1	Fill: Silty Sand	Coarse	9.1	NA	NA	<4	10	9	25	3	27	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH113	0.1-0.2	Fill: Silty Clayey Sand	Coarse	NA	NA	NA	<4	11	4	22	2	21	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	0.06
BH113	0.35-0.45	Sandy Clay	Coarse	8	3.2	NA	<4	6	7	28	1	29	<1	NA	<25	<50	120	<100	<0.2	<0.5	<1	<3	0.3
BH114	0.05-0.2	Fill: Silty Sandy Gravel	Coarse	10.1	36	NA	<4	77	31	4	85	36	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH114 - [LAB_DUP]	0.05-0.2	Laboratory Duplicate	Coarse	10.1	36	NA	<4	93	34	5	91	41	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH115	0-0.1	Fill: Silty Clayey Sand	Coarse	NA	NA	NA	4	11	11	40	3	42	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	0.1
BH115	0.6-0.8	Sandy Clay	Coarse	8	3.2	NA	4	15	<1	6	<1	1	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH116	0-0.1	Fill: Silty Sandy Gravel	Coarse	10.1	36	NA	<4	59	22	15	54	42	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH116	0.1-0.3	Silty Clayey Sand	Coarse	NA	NA	NA	<4	10	7	29	4	29	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	0.1
BH117	0-0.1	Fill: Silty Sand	Coarse	9.1	NA	NA	<4	19	17	28	16	54	<1	<0.1	<25	93	240	100	<0.2	<0.5	<1	<3	<0.05
BH117	0.5-0.95	Fill: Silty Sand	Coarse	9.1	NA	NA	<4	8	3	15	2	16	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH118	0-0.1	Fill: Silty Sandy Clay	Coarse	NA	NA	NA	17	8	26	220	5	45	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	0.2
BH118 - [LAB_DUP]	0-0.1	Laboratory Duplicate	Coarse	NA	NA	NA	<4	6	23	390	3	65	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	0.4
BH118	1.4-1.5	Fill: Silty Sandy Clay	Coarse	NA	NA	NA	11	7	35	99	3	62	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	0.89
BH118	1.6-1.8	Sandy Clay	Coarse	8	3.2	NA	<4	11	1	6	2	14	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH119	0.05-0.3	Fill: Silty Sand	Coarse	9.1	NA	NA	<4	14	29	28	8	37	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH119	0.05-0.3	Laboratory Duplicate	Coarse	9.1	NA	NA	<4	14	23	28	9	41	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH119	0.5-0.8	Sandstone	Coarse	NA	NA	NA	<4	15	<1	4	<1	2	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
SDUP3	0-0.1	Duplicate of BH111	Coarse	9.1	NA	NA	<4	11	13	54	4	51	<1	NA	<25	<50	160	<100	<0.2	<0.5	<1	<3	0.2
SDUP4	0-0.1	Duplicate of BH115	Coarse	NA	NA	NA	<4	9	5	20	2	25	<1	<0.1	<25	<50	120	<100	<0.2	<0.5	<1	<3	0.06
SDUP7	0-0.1	Duplicate of BH108	Coarse	4.9	5.2	NA	<4	6	9	66	2	32	<1	NA	<25	<50	310	190	<0.2	<0.5	<1	<3	0.2
SDUP7 - [Silica Gel]	0-0.1	Duplicate of BH108	Coarse	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<50	<100	<100	NA	NA	NA	NA	NA
SDUP8	0.04-0.3	Duplicate of BH104	Coarse	8.5	153	NA	<4	82	31	5	79	45	<1	NA	<25	<50	450	210	<0.2	<0.5	<1	<1	<0.05
SDUP9	0.02-0.4	Duplicate of BH101	Coarse	9.8	12	NA	<4	62	52	13	48	40	<1	<0.1	<25	<50	110	120	<0.2	<0.5	<1	<3	0.3
SDUP10	0-0.1	Duplicate of BH117	Coarse	9.1	NA	NA	<4	11	17	27	12	60	<1	NA	<25	63	200	120	<0.2	<0.5	<1	<1	<0.05
Total Number of Samples				50	37	0	62	62	62	62	62	62	62	28	62	62	62	62	62	62	62	62	62
Maximum Value				10.1	153	NA	17	93	74	390	110	120	<PQL	<PQL	68	93	450	370	<PQL	<PQL	<PQL	<PQL	1.5

Concentration above the SAC VALUE
Concentration above the PQL **Bold**
The guideline corresponding to the elevated value is highlighted in grey in the EIL and ESL Assessment Criteria Table below

EIL AND ESL ASSESSMENT CRITERIA

Sample Reference	Sample Depth	Sample Description	Soil Texture	pH	CEC (cmolc/kg)	Clay Content (% clay)	Arsenic	Chromium	Copper	Lead	Nickel	Zinc	Naphthalene	DDT	C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	>C_{16}-C_{34} (F3)	>C_{34}-C_{40} (F4)	Benzene	Toluene	Ethylbenzene	Total Xylenes	B(a)P
BH101	0.02-0.4	Fill: Silty Gravelly Sand	Coarse	9.8	12	NA	100	200	240	1300	280	820	170	180	180	120	300	2800	50	85	70	105	20
BH101	0.02-0.4	Laboratory Duplicate	Coarse	9.8	12	NA	100	200	240	1300	280	820	170	180	180	120	300	2800	50	85	70	105	20
BH101	0.5-0.85	Fill: Silty Sand	Coarse	9.1	NA	NA	100	200	90	1300	35	190	170	--	180	120	300	2800	50	85	70	105	20
BH101	1.7-1.95	XW Sandstone	Coarse	8.7	NA	NA	100	200	90	1300	35	190	170	--	180	120	300	2800	50	85	70	105	20
BH102	0.05-0.1	Fill: Silty Gravelly Sand	Coarse	9	12	NA	100	200	240	1300	280	820	170	180	180	120	300	2800	50	85	70	105	20
BH102	0.5-0.95	Fill: Silty Clay	Coarse	7	11	NA	100	200	240	1300	280	820	170	--	180	120	300	2800	50	85	70	105	20
BH102	1.4-1.6	Sandstone	Coarse	7.8	NA	NA	100	200	90	1300	35	190	170	--	180	120	300	2800	50	85	70	105	20
BH103	0.03-0.4	Fill: Silty Gravelly Sand	Coarse	8.8	12	NA	100	200	240	1300	280	820	170	180	180	120	300	2800	50	85	70	105	20
BH103	0.5-0.7	Sandy Clay	Coarse	8	3.2	NA	100	200	120	1300	35	350	170	--	180	120	300	2800	50	85	70	105	20
BH103	0.7-0.95	Silty Clay	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	--	180	120	300	2800	50	85	70	105	20
BH103	1.4-1.5	Sandy Clay	Coarse	8	3.2	NA	100	200	120	1300	35	350	170	--	180	120	300	2800	50	85	70	105	20
BH103 - [Replicate]	1.4-1.5	Replicate Sample (re-test)	Coarse	NA	NA	NA	--	--	--	--	--	--	--	--	--	120	300	2800	--	--	--	--	--
BH103 - [LAB-DUP]	1.4-1.5	Laboratory Duplicate	Coarse	NA	NA	NA	--	--	--	--	--	--	--	--	--	120	300	2800	--	--	--	--	--
BH104	0.04-0.3	Fill: Sandy Gravel	Coarse	8.5	153	NA	100	200	260	1300	560	1400	170	180	180	120	300	2800	50	85	70	105	20
BH104	0.04-0.3	Laboratory Duplicate	Coarse	8.5	153	NA	100	200	260	1300	560	1400	170	180	180	120	300	2800	50	85	70	105	20
BH104	0.5-0.95	Fill: Silty Gravelly Sand	Coarse	9	48	NA	100	200	260	1300	560	1400	170	--	180	120	300	2800	50	85	70	105	20
BH104 - [Silica Gel]	0.5-0.95	Fill: Silty Gravelly Sand	Coarse	NA	NA	NA	--	--	--	--	--	--	--	--	--	120	300	2800	--	--	--	--	--
BH104	1.5-1.95	Fill: Silty Gravelly Sand	Coarse	9	48	NA	100	200	260	1300	560	1400	170	--	180	120	300	2800	50	85	70	105	20
BH104	3.0-3.2	Fill: Silty Gravelly Sand	Coarse	9	48	NA	100	200	260	1300	560	1400	170	--	180	120	300	2800	50	85	70	105	20
BH104	3.8-4.1	Fill: Silty Sand	Coarse	9.1	NA	NA	100	200	90	1300	35	190	170	--	180	120	300	2800	50	85	70	105	20
BH105	0.25-0.4	Fill: Silty Gravelly Sand	Coarse	8.8	12	NA	100	200	240	1300	280	820	170	180	180	120	300	2800	50	85	70	105	20
BH105 - [LAB_DUP]	0.25-0.4	Laboratory Duplicate	Coarse	8.8	14	NA	100	200	240	1300	280	820	170	180	180	120	300	2800	50	85	70	105	20
BH105	0.5-0.95	Fill: Clayey Silty Sand	Coarse	8.7	15	NA	100	200	240	1300	280	820	170	--	180	120	300	2800	50	85	70	105	20
BH105	1.2-1.4	Sandy Clay	Coarse	8	3.2	NA	100	200	120	1300	35	350	170	--	180	120	300	2800	50	85	70	105	20
BH106	0.03-0.3	Fill: Clayey Gravelly Sand	Coarse	9.6	25	NA	100	200	250	1300	360	1100	170	180	180	120	300	2800	50	85	70	105	20
BH106	0.6-0.8	Silty Clay	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	--	180	120	300	2800	50	85	70	105	20
BH107	0-0.2	Fill: Silty Clay	Coarse	6.8	11	NA	100	200	240	1300	280	820	170	180	180	120	300	2800	50	85	70	105	20
BH107	0.2-0.4	Fill: Sandy Clay	Coarse	7.7	4.5	NA	100	200	120	1300	35	350	170	--	180	120	300	2800	50	85	70	105	20
BH108	0-0.1	Fill: Sandy Silty Clay	Coarse	4.9	5.2	NA	100	200	160	1300	180	300	170	180	180	120	300	2800	50	85	70	105	20
BH109	0.01-0.4	Fill: Clayey Gravelly Sand	Coarse	9	18	NA	100	200	240	1300	280	820	170	180	180	120	300	2800	50	85	70	105	20
BH109	0.5-0.8	Fill: Sandy Clay	Coarse	7.7	4.5	NA	100	200	120	1300	35	350	170	--	180	120	300	2800	50	85	70	105	20
BH109	0.8-0.95	Sandy Clay	Coarse	8	3.2	NA	100	200	120	1300	35	350	170	--	180	120	300	2800	50	85	70	105	20
BH110A	0-0.1	Fill: Silty Gravelly Sand	Coarse	8.8	12	NA	100	200	240	1300	280	820	170	180	180	120	300	2800	50	85	70	105	20
BH110A	0.1-0.2	Fill: Sandy Gravel	Coarse	8.7	18	NA	100	200	240	1300	280	820	170	--	180	120	300	2800	50	85	70	105	20
BH110A	0.5-0.8	Fill: Sandy Clay	Coarse	7.7	4.5	NA	100	200	120	1300	35	350	170	--	180	120	300	2800	50	85	70	105	20
BH111	0-0.1	Fill: Silty Sand	Coarse	9.1	NA	NA	100	200	90	1300	35	190	170	180	180	120	300	2800	50	85	70	105	20
BH111 - [LAB_DUP]	0-0.1	Laboratory Duplicate	Coarse	9.1	NA	NA	100	200	90	1300	35	190	170	180	180	120	300	2800	50	85	70	105	20
BH111	0.3-0.6	Fill: Silty Clay	Coarse	6.8	11	NA	100	200	240	1300	280	820	170	--	180	120	300	2800	50	85	70	105	20
BH111	0.6-0.8	Fill: Silty Clayey Sand	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	--	180	120	300	2800	50	85	70	105	20
BH112	0.22-0.65	Fill: Silty Gravelly Sand	Coarse	8.8	12	NA	100	200	240	1300	280	820	170	180	180	120	300	2800	50	85	70	105	20
BH112	0.65-0.8	Sandstone	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	--	180	120	300	2800	50	85	70	105	20
BH113	0-0.1	Fill: Silty Sand	Coarse	9.1	NA	NA	100	200	90	1300	35	190	170	180	180	120	300	2800	50	85	70	105	20
BH113	0.1-0.2	Fill: Silty Clayey Sand	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	--	180	120	300	2800	50	85	70	105	20
BH113	0.35-0.45	Sandy Clay	Coarse	8	3.2	NA	100	200	120	1300	35	350	170	--	180	120	300	2800	50	85	70	105	20
BH114	0.05-0.2	Fill: Silty Sandy Gravel	Coarse	10.1	36	NA	100	200	250	1300	420	1300	170	180	180	120	300	2800	50	85	70	105	20
BH114 - [LAB_DUP]	0.05-0.2	Laboratory Duplicate	Coarse	10.1	36	NA	100	200	250	1300	420	1300	170	180	180	120	300	2800	50	85	70	105	20
BH115	0-0.1	Fill: Silty Clayey Sand	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	300	2800	50	85	70	105	20
BH115	0.6-0.8	Sandy Clay	Coarse	8	3.2	NA	100	200	120	1300	35	350	170	--	180	120	300	2800	50	85	70	105	20
BH116	0-0.1	Fill: Silty Sandy Gravel	Coarse	10.1	36	NA	100	200	250	1300	420	1300	170	180	180	120	300	2800	50	85	70	105	20
BH116	0.1-0.3	Silty Clayey Sand	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	--	180	120	300	2800	50	85	70	105	20
BH117	0-0.1	Fill: Silty Sand	Coarse	9.1	NA	NA	100	200	90	1300	35	190	170	180	180	120	300	2800	50	85	70	105	20
BH117	0.5-0.95	Fill: Silty Sand	Coarse	9.1	NA	NA	100	200	90	1300	35	190	170	--	180	120	300	2800	50	85	70	105	20
BH118	0-0.1	Fill: Silty Sandy Clay	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	300	2800	50	85	70	105	20
BH118 - [LAB_DUP]	0-0.1	Laboratory Duplicate	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	300	2800	50	85	70	105	20
BH118	1.4-1.5	Fill: Silty Sandy Clay	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	--	180	120	300	2800	50	85	70	105	20
BH118	1.6-1.8	Sandy Clay	Coarse	8	3.2	NA	100	200	120	1300	35	350	170	--	180	120	300	2800	50	85	70	105	20
BH119	0.05-0.3	Fill: Silty Sand	Coarse	9.1	NA	NA	100	200	90	1300	35	190	170	180	180	120	300	2800	50	85	70	105	20
BH119	0.05-0.3	Laboratory Duplicate	Coarse	9.1	NA	NA	100	200	90	1300	35	190	170	180	180	120	300	2800	50	85	70	105	20
BH119	0.5-0.8	Sandstone	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	--	180	120	300	2800	50	85	70	105	20
SDUP3	0-0.1	Duplicate of BH111	Coarse	9.1	NA	NA	100	200	90	1300	35	190	170	--	180	120	300	2800	50	85	70	105	20
SDUP4	0-0.1	Duplicate of BH115	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	300	2800	50	85	70	105	20
SDUP7	0-0.1	Duplicate of BH108	Coarse	4.9	5.2	NA	100	200	160	1300	180	300	170	--	180	120	300	2800	50	85	70	105	20
SDUP7 - [Silica Gel]	0-0.1	Duplicate of BH108	Coarse	NA	NA	NA	--	--	--	--	--	--	--	--	--	120	300	2800	--	--	--	--	--
SDUP8	0.04-0.3	Duplicate of BH104	Coarse	8.5	153	NA	100	200	260	1300	560	1400	170	--	180	120	300	2800	50	85	70	105	20
SDUP9	0.02-0.4	Duplicate of BH101	Coarse	9.8	12	NA	100	200	240	1300	280	820	170	180	180	120	300	2800	50	85	70	105	20
SDUP10	0-0.1	Duplicate of BH117	Coarse	9.1	NA	NA	100	200	90	1300	35	190	170	--	180	120	300	2800	50	85	70	105	20

TABLE S8
SUMMARY OF PFAS CONCENTRATIONS IN SOIL - ECOLOGY
Units are µg/Kg unless stated otherwise.

	PQL Envirolab Services	NEMP 2020 Direct exposure All land use	NEMP 2020 Indirect exposure All land use	BH104 0.04-0.3 Fill: Sandy Gravel	BH104 - [LAB_DUP] 0.04-0.3 Laboratory Duplicate	BH105 0.25-0.4 Fill: Silty Gravelly Sand	BH105 0.5-0.95 Fill: Clayey Silty Sand	PFAS DUP1 0.25-0.4 Duplicate of BH105	PFAS DUP3 0.04-0.3 Duplicate of BH104
PFAS Compound									
Perfluorobutanesulfonic acid	0.1	NSL	NSL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanesulfonic acid	0.1	NSL	NSL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluorohexanesulfonic acid - PFHxS	0.1	NSL	NSL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoroheptanesulfonic acid	0.1	NSL	NSL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluorooctanesulfonic acid PFOS	0.1	1000	140	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluorodecanesulfonic acid	0.2	NSL	NSL	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Perfluorobutanoic acid	0.2	NSL	NSL	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Perfluoropentanoic acid	0.2	NSL	NSL	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Perfluorohexanoic acid	0.1	NSL	NSL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoroheptanoic acid	0.1	NSL	NSL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluorooctanoic acid PFOA	0.1	10,000	NSL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluorononanoic acid	0.1	NSL	NSL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluorodecanoic acid	0.5	NSL	NSL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Perfluoroundecanoic acid	0.5	NSL	NSL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Perfluorododecanoic acid	0.5	NSL	NSL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Perfluorotridecanoic acid	0.5	NSL	NSL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Perfluorotetradecanoic acid	5	NSL	NSL	<5	<5	<5	<5	<5	<5
4:2 FTS	0.1	NSL	NSL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
6:2 FTS	0.1	NSL	NSL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
8:2 FTS	0.1	NSL	NSL	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
10:2 FTS	0.1	NSL	NSL	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Perfluorooctane sulfonamide	1	NSL	NSL	<1	<1	<1	<1	<1	<1
N-Methyl perfluorooctane sulfonamide	1	NSL	NSL	<1	<1	<1	<1	<1	<1
N-Ethyl perfluorooctanesulfon amide	1	NSL	NSL	<1	<1	<1	<1	<1	<1
N-Me perfluorooctanesulfonamid oethanol	1	NSL	NSL	<1	<1	<1	<1	<1	<1
N-Et perfluorooctanesulfonamid oethanol	5	NSL	NSL	<5	<5	<5	<5	<5	<5
MePer uorooctanesulf-amid oacetic acid	0.2	NSL	NSL	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
EtPer uorooctanesulf-amid oacetic acid	0.2	NSL	NSL	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Total Positive PFHxS & PFOS	0.1	NSL	NSL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Positive PFOS & PFOA	0.1	NSL	NSL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Positive PFAS	0.1	NSL	NSL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Positive PFAS result	**Bold**
PFAS result above the SAC	**Bold**

JKEnvironments

TABLE S9
SOIL LABORATORY RESULTS COMPARED TO WASTE CLASSIFICATION GUIDELINES
All data in mg/kg unless stated otherwise

			HEAVY METALS								PAHs		OC/OP PESTICIDES				Total PCBs	TRH					BTEX COMPOUNDS				ASBESTOS FIBRES
			Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	Total PAHs	B(a)P	Total Endosulfans	Chlorpyrifos	Total Moderately Harmful	Total Scheduled		C_6-C_9	C_{10}-C_{14}	C_{15}-C_{28}	C_{29}-C_{36}	Total C_{10}-C_{36}	Benzene	Toluene	Ethyl benzene	Total Xylenes	
PQL - Envirolab Services			4	0.4	1	1	1	0.1	1	1	-	0.05	0.1	0.1	0.1	0.1	0.1	25	50	100	100	50	0.2	0.5	1	1	100
General Solid Waste CT1			100	20	100	NSL	100	4	40	NSL	200	0.8	60	4	250	50	50	650		NSL		10,000	10	288	600	1,000	-
General Solid Waste SCC1			500	100	1900	NSL	1500	50	1050	NSL	200	10	108	7.5	250	50	50	650		NSL		10,000	18	518	1,080	1,800	-
Restricted Solid Waste CT2			400	80	400	NSL	400	16	160	NSL	800	3.2	240	16	1000	50	50	2600		NSL		40,000	40	1,152	2,400	4,000	-
Restricted Solid Waste SCC2			2000	400	7600	NSL	6000	200	4200	NSL	800	23	432	30	1000	50	50	2600		NSL		40,000	72	2,073	4,320	7,200	-
Sample Reference	**Sample Depth**	**Sample Description**																									
BH101	0.02-0.4	Fill: Silty Gravelly Sand	<4	<0.4	62	59	14	<0.1	47	41	3.8	0.4	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	130	130	<0.2	<0.5	<1	<3	Not Detected
BH101 - [LAB_DUP]	0.02-0.4	Laboratory Duplicate	<4	<0.4	73	57	14	<0.1	55	46	4	0.4	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
BH101	0.5-0.85	Fill: Silty Sand	<4	<0.4	17	12	51	<0.1	15	44	0.3	0.1	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	Not Detected
BH101	1.7-1.95	XW Sandstone	<4	<0.4	9	1	13	<0.1	<1	9	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
BH102	0.05-0.1	Fill: Silty Gravelly Sand	<4	<0.4	44	74	7	<0.1	73	37	0.68	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	160	160	<0.2	<0.5	<1	<3	Not Detected
BH102	0.5-0.95	Fill: Silty Clay	6	<0.4	43	29	110	<0.1	10	110	10	1.5	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
BH102	1.4-1.6	Sandstone	<4	<0.4	11	6	8	<0.1	4	18	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
BH103	0.03-0.4	Fill: Silty Gravelly Sand	<4	<0.4	34	26	42	<0.1	39	73	11	1.5	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	Not Detected
BH103	0.5-0.7	Sandy Clay	<4	<0.4	15	<1	4	<0.1	<1	2	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
BH103	0.7-0.95	Silty Clay	<4	<0.4	11	<1	7	<0.1	<1	<1	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
BH103	1.4-1.5	Sandy Clay	<4	<0.4	36	2	4	<0.1	<1	1	1.2	<0.05	NA	NA	NA	NA	NA	34	62	<100	<100	62	<0.2	<0.5	<1	<3	NA
BH104	0.04-0.3	Fill: Sandy Gravel	<4	<0.4	73	24	5	<0.1	75	37	0.2	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	130	130	<0.2	<0.5	<1	<3	Not Detected
BH104 - [LAB_DUP]	0.04-0.3	Laboratory Duplicate	<4	<0.4	83	27	6	<0.1	83	43	0.2	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	140	140	<0.2	<0.5	<1	<3	NA
BH104	0.5-0.95	Fill: Silty Gravelly Sand	<4	<0.4	76	34	6	<0.1	81	48	0.4	<0.05	NA	NA	NA	NA	NA	<25	<50	130	340	470	<0.2	<0.5	<1	<3	Not Detected
BH104	1.5-1.95	Fill: Silty Gravelly Sand	<4	<0.4	19	8	83	0.1	5	52	0.4	0.1	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
BH104	3.0-3.2	Fill: Silty Gravelly Sand	<4	<0.4	34	12	57	<0.1	3	38	0.08	0.08	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
BH104	3.8-4.1	Fill: Silty Sand	<4	<0.4	30	17	43	<0.1	17	70	0.05	0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
BH105	0.25-0.4	Fill: Silty Gravelly Sand	<4	<0.4	74	27	13	<0.1	76	45	0.4	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	Not Detected
BH105 - [LAB_DUP]	0.25-0.4	Laboratory Duplicate	<4	<0.4	72	26	10	<0.1	72	42	0.3	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
BH105	0.5-0.95	Fill: Clayey Silty Sand	<4	<0.4	13	6	32	<0.1	9	30	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
BH105	1.2-1.4	Sandy Clay	<4	<0.4	9	2	12	<0.1	1	14	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
BH106	0.03-0.3	Fill: Clayey Gravelly Sand	<4	<0.4	30	49	2	<0.1	110	38	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	220	220	<0.2	<0.5	<1	<3	Not Detected
BH106	0.6-0.8	Silty Clay	<4	<0.4	12	<1	7	<0.1	<1	2	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
BH107	0-0.2	Fill: Silty Clay	<4	<0.4	12	18	14	<0.1	6	22	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	Not Detected
BH107	0.2-0.4	Fill: Sandy Clay	<4	<0.4	8	4	14	<0.1	2	21	0.3	0.06	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
BH108	0-0.1	Fill: Sandy Silty Clay	<4	<0.4	6	9	63	<0.1	2	31	2.1	0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	130	130	<0.2	<0.5	<1	<3	Not Detected
BH109	0.01-0.4	Fill: Clayey Gravelly Sand	<4	<0.4	63	27	8	<0.1	63	37	0.3	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	190	190	<0.2	<0.5	<1	<3	Not Detected
BH109	0.5-0.8	Fill: Sandy Clay	<4	<0.4	22	7	10	<0.1	16	16	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
BH109	0.8-0.95	Sandy Clay	<4	<0.4	15	2	5	<0.1	4	6	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
BH110A	0-0.1	Fill: Silty Gravelly Sand	<4	<0.4	63	26	6	<0.1	69	52	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	110	290	400	<0.2	<0.5	<1	<3	Not Detected
BH110A	0.1-0.2	Fill: Sandy Gravel	<4	<0.4	71	24	6	<0.1	73	39	0.2	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
BH110A	0.5-0.8	Fill: Sandy Clay	7	<0.4	18	2	16	<0.1	1	10	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	Not Detected
BH111	0-0.1	Fill: Silty Sand	<4	<0.4	9	12	54	<0.1	4	50	3.5	0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	Not Detected
BH111 - [LAB_DUP]	0-0.1	Laboratory Duplicate	<4	<0.4	9	12	51	<0.1	4	49	2.5	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
BH111	0.3-0.6	Fill: Silty Clay	4	<0.4	9	52	49	0.1	6	79	2.5	0.3	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
BH111	0.6-0.8	Fill: Silty Clayey Sand	<4	<0.4	16	13	58	0.2	5	120	1.8	0.2	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
BH112	0.22-0.65	Fill: Silty Gravelly Sand	<4	<0.4	12	11	44	<0.1	4	57	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	Not Detected
BH112	0.65-0.8	Sandstone	<4	<0.4	8	9	6	<0.1	1	12	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	160	160	<0.2	<0.5	<1	<3	NA
BH113	0-0.1	Fill: Silty Sand	<4	<0.4	10	9	25	<0.1	3	27	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	Not Detected
BH113	0.1-0.2	Fill: Silty Clayey Sand	<4	<0.4	11	4	22	<0.1	2	21	0.3	0.06	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
BH113	0.35-0.45	Sandy Clay	<4	<0.4	6	7	28	<0.1	1	29	3	0.3	NA	NA	NA	NA	NA	<25	<50	<100	120	120	<0.2	<0.5	<1	<3	NA
BH114	0.05-0.2	Fill: Silty Sandy Gravel	<4	<0.4	77	31	4	<0.1	85	36	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	Not Detected
BH114 - [LAB_DUP]	0.05-0.2	Laboratory Duplicate	<4	<0.4	93	34	5	<0.1	91	41	0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
BH115	0-0.1	Fill: Silty Clayey Sand	4	<0.4	11	11	40	<0.1	3	42	0.64	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	Not Detected
BH115	0.6-0.8	Sandy Clay	4	<0.4	15	<1	6	<0.1	<1	1	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
BH116	0-0.1	Fill: Silty Sandy Gravel	<4	<0.4	59	22	15	<0.1	54	42	0.3	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	Not Detected
BH116	0.1-0.3	Silty Clayey Sand	<4	<0.4	10	7	29	<0.1	4	29	0.4	0.1	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
BH117	0-0.1	Fill: Silty Sand	<4	<0.4	19	17	28	<0.1	16	54	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	81	120	180	381	<0.2	<0.5	<1	<3	Not Detected
BH117	0.5-0.95	Fill: Silty Sand	<4	<0.4	8	3	15	<0.1	2	16	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	Not Detected
BH117	0.5-1.5	Fill: Silty Sand (Spoil)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected
BH118	0-0.1	Fill: Silty Sandy Clay	17	<0.4	8	26	220	<0.1	5	45	1.3	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	Not Detected
BH118 - [LAB_DUP]	0-0.1	Laboratory Duplicate	<4	<0.4	6	23	390	<0.1	3	65	3.8	0.4	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
BH118	1.4-1.5	Fill: Silty Sandy Clay	11	<0.4	7	35	99	<0.1	3	62	8.5	0.89	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
BH118	1.6-1.8	Sandy Clay	<4	<0.4	11	1	6	<0.1	2	14	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
BH119	0.05-0.3	Fill: Silty Sand	<4	<0.4	14	29	28	<0.1	8	37	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	Not Detected
BH119	0.05-0.3	Laboratory Duplicate	<4	<0.4	14	23	28	<0.1	9	41	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
BH119	0.5-0.8	Sandstone	<4	<0.4	15	<1	4	<0.1	<1	2	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
SDUP3	0-0.1	Duplicate of BH111	<4	<0.4	11	13	54	<0.1	4	51	2.6	0.2	NA	NA	NA	NA	NA	<25	<50	<100	160	160	<0.2	<0.5	<1	<3	Not Detected
SDUP4	0-0.1	Duplicate of BH115	<4	<0.4	9	5	20	<0.1	2	25	0.3	0.06	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	110	110	<0.2	<0.5	<1	<3	Not Detected
SDUP7	0-0.1	Duplicate of BH108	<4	<0.4	6	9	66	<0.1	2	32	1.7	0.2	NA	NA	NA	NA	NA	<25	<50	160	270	430	<0.2	<0.5	<1	<3	NA
SDUP8	0.04-0.3	Duplicate of BH104	<4	<0.4	82	31	5	<0.1	79	45	0.4	<0.05	NA	NA	NA	NA	NA	<25	<50	150	390	540	<0.2	<0.5	<1	<1	NA
SDUP9	0.02-0.4	Duplicate of BH101	<4	<0.4	62	52	13	<0.1	48	40	2.3	0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
SDUP10	0-0.1	Duplicate of BH117	<4	<0.4	11	17	27	<0.1	12	60	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	100	190	290	<0.2	<0.5	<1	<1	NA
Total Number of Samples			62	62	62	62	62	62	62	62	62	62	28	28	28	28	28	62	62	62	62	62	62	62	62	62	26
Maximum Value			17	<PQL	93	74	390	0.2	110	120	11	1.5	<PQL	<PQL	<PQL	<PQL	<PQL	34	81	160	390	540	<PQL	<PQL	<PQL	<PQL	Not Detected

Concentration above the CT1	VALUE
Concentration above SCC1	VALUE
Concentration above the SCC2	VALUE
Concentration above PQL	**Bold**

TABLE S10
SUMMARY OF PFAS CONCENTRATIONS IN SOIL - WASTE CLASSIFICATION
Units are µg/Kg unless stated otherwise.

	PQL Envirolab Services	SCC1	SCC2	BH104 0.04-0.3 Fill: Sandy Gravel	BH104 - [LAB_DUP] 0.04-0.3 Laboratory Duplicate	BH105 0.25-0.4 Fill: Silty Gravelly Sand	BH105 0.5-0.95 Fill: Clayey Silty Sand	PFAS DUP1 0.25-0.4 Duplicate of BH105	PFAS DUP3 0.04-0.3 Duplicate of BH104
PFAS Compound									
Perfluorobutanesulfonic acid	0.1	NSL	NSL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanesulfonic acid	0.1	NSL	NSL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluorohexanesulfonic acid - PFHxS	0.1	NSL	NSL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoroheptanesulfonic acid	0.1	NSL	NSL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluorooctanesulfonic acid PFOS	0.1	NSL	NSL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluorodecanesulfonic acid	0.2	NSL	NSL	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Perfluorobutanoic acid	0.2	NSL	NSL	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Perfluoropentanoic acid	0.2	NSL	NSL	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Perfluorohexanoic acid	0.1	NSL	NSL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoroheptanoic acid	0.1	NSL	NSL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluorooctanoic acid PFOA	0.1	18,000	72,000	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluorononanoic acid	0.1	NSL	NSL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluorodecanoic acid	0.5	NSL	NSL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Perfluoroundecanoic acid	0.5	NSL	NSL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Perfluorododecanoic acid	0.5	NSL	NSL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Perfluorotridecanoic acid	0.5	NSL	NSL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Perfluorotetradecanoic acid	5	NSL	NSL	<5	<5	<5	<5	<5	<5
4:2 FTS	0.1	NSL	NSL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
6:2 FTS	0.1	NSL	NSL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
8:2 FTS	0.1	NSL	NSL	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
10:2 FTS	0.1	NSL	NSL	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Perfluorooctane sulfonamide	1	NSL	NSL	<1	<1	<1	<1	<1	<1
N-Methyl perfluorooctane sulfonamide	1	NSL	NSL	<1	<1	<1	<1	<1	<1
N-Ethyl perfluorooctanesulfon amide	1	NSL	NSL	<1	<1	<1	<1	<1	<1
N-Me perfluorooctanesulfonamid oethanol	1	NSL	NSL	<1	<1	<1	<1	<1	<1
N-Et perfluorooctanesulfonamid oethanol	5	NSL	NSL	<5	<5	<5	<5	<5	<5
MePer uorooctanesulf-amid oacetic acid	0.2	NSL	NSL	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
EtPer uorooctanesulf-amid oacetic acid	0.2	NSL	NSL	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Total Positive PFHxS & PFOS	0.1	1800	7,200	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Positive PFOS & PFOA	0.1	NSL	NSL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Positive PFAS	0.1	NSL	NSL	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Result above SCC1 Criteria	**Bold**
Result above SCC2 Criteria	**Bold**

TABLE S11
SOIL LABORATORY TCLP RESULTS
All data in mg/L unless stated otherwise

			Lead	Nickel	B(a)P
PQL - Envirolab Services			0.03	0.02	0.001
TCLP1 - General Solid Waste			5	2	0.04
TCLP2 - Restricted Solid Waste			20	8	0.16
TCLP3 - Hazardous Waste			>20	>8	>0.16
Sample Reference	**Sample Depth**	**Sample Description**			
BH101	0.02-0.4	Fill: Silty Gravelly Sand	NA	**0.02**	NA
BH101 - [LAB_DUP]	0.02-0.4	Laboratory Duplicate	NA	**0.02**	NA
BH102	0.05-0.1	Fill: Silty Gravelly Sand	NA	**0.09**	NA
BH102	0.5-0.95	Fill: Silty Clay	**0.2**	NA	<0.001
BH103	0.03-0.4	Fill: Silty Gravelly Sand	NA	NA	<0.001
BH104	0.04-0.3	Fill: Sandy Gravel	NA	**0.07**	NA
BH104	0.5-0.95	Fill: Silty Gravelly Sand	NA	**0.06**	NA
BH105	0.25-0.4	Fill: Silty Gravelly Sand	NA	**0.08**	NA
BH105 - [LAB_DUP]	0.25-0.4	Laboratory Duplicate	NA	**0.08**	NA
BH106	0.03-0.3	Fill: Clayey Gravelly Sand	NA	**0.1**	NA
BH109	0.01-0.4	Fill: Clayey Gravelly Sand	NA	**0.09**	NA
BH110A	0-0.1	Fill: Silty Gravelly Sand	NA	<0.02	NA
BH110A	0.1-0.2	Fill: Sandy Gravel	NA	**0.03**	NA
BH114	0.05-0.2	Fill: Silty Sandy Gravel	NA	**0.05**	NA
BH116	0-0.1	Fill: Silty Sandy Gravel	NA	<0.02	NA
BH118	0-0.1	Fill: Silty Sandy Clay	**0.72**	NA	NA
BH118	1.4-1.5	Fill: Silty Sandy Clay	NA	NA	<0.001
Total Number of samples			2	13	3
Maximum Value			0.72	0.1	<PQL

General Solid Waste	**VALUE**
Restricted Solid Waste	**VALUE**
Hazardous Waste	**VALUE**
Concentration above PQL	**Bold**

TABLE G1
SUMMARY OF GROUNDWATER LABORATORY RESULTS COMPARED TO ECOLOGICAL GILs SAC
All results in µg/L unless stated otherwise.

	PQL Envirolab Services	ANZG 2018 Fresh Waters	SAMPLES								
			MW101	MW101 - [LAB_DUP]	MW102	MW105	MW106	MW107	MW109	WDUP1	WDUP2
Inorganic Compounds and Parameters											
pH		6.5 - 8.5	**6.2**	**6.2**	**7**	**5.4**	**4.5**	**4.9**	**5.3**	NA	NA
Electrical Conductivity (µS/cm)	1	NSL	**300**	**300**	**69**	**590**	**350**	**250**	**240**	NA	NA
Turbidity (NTU)		NSL	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals and Metalloids											
Arsenic (As III)	1	24	**2**	**1**	**1**	<1	**3**	**2**	**1**	**2**	**3**
Cadmium	0.1	0.2	<0.1	<0.1	<0.1	**0.2**	**0.2**	<0.1	<0.1	**0.1**	**0.3**
Chromium (SAC for Cr III adopted)	1	3.3	<1	<1	<1	<1	<1	<1	<1	<1	**1**
Copper	1	1.4	<1	<1	**6**	**5**	**7**	**5**	**4**	**4**	**9**
Lead	1	3.4	<1	**1**	<1	<1	**17**	**3**	<1	**3**	**19**
Total Mercury (inorganic)	0.05	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Nickel	1	11	**3**	**3**	<1	**18**	**10**	**5**	**3**	**5**	**11**
Zinc	1	8	**40**	**40**	**6**	**81**	**73**	**47**	**18**	**38**	**76**
Monocyclic Aromatic Hydrocarbons (BTEX Compounds)											
Benzene	1	950	<1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	1	180	<1	<1	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene	1	80	<1	<1	<1	<1	<1	<1	<1	<1	<1
m+p-xylene	2	75	<2	<2	<2	<2	<2	<2	<2	<2	<2
o-xylene	1	350	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total xylenes	2	NSL	<2	<2	<2	<2	<2	<2	<2	<2	<2
Total Recoverable Hydrocarbons (TRHs)											
TRH F1	10	NSL	**44**	**45**	<10	**23**	<10	<10	<10	<10	<10
TRH F2	50	NSL	<50	<50	<50	<50	<50	<50	<50	<50	<50
TRH F3	100	NSL	<100	<100	<100	<100	<100	<100	<100	<100	<100
TRH F4	100	NSL	<100	<100	<100	<100	<100	<100	<100	<100	<100
Volatile Organic Compounds (VOCs), including chlorinated VOCs											
Dichlorodifluoromethane	10	NSL	<10	<10	<10	<10	<10	<10	<10	<10	<10
Chloromethane	10	NSL	<10	<10	<10	<10	<10	<10	<10	<10	<10
Vinyl Chloride	10	100	<10	<10	<10	<10	<10	<10	<10	<10	<10
Bromomethane	10	NSL	<10	<10	<10	<10	<10	<10	<10	<10	<10
Chloroethane	10	NSL	<10	<10	<10	<10	<10	<10	<10	<10	<10
Trichlorofluoromethane	10	NSL	<10	<10	<10	<10	<10	<10	<10	<10	<10
1,1-Dichloroethene	1	700	<1	<1	<1	<1	<1	<1	<1	<1	<1
Trans-1,2-dichloroethene	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-dichloroethane	1	90	<1	<1	<1	<1	<1	<1	<1	<1	<1
Cis-1,2-dichloroethene	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromochloromethane	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
Dibromochloromethane	1	NSL	**1**	<1	<1	<1	<1	<1	<1	<1	<1
Bromodichloromethane	1	NSL	**7**	**5**	<1	**2**	<1	<1	<1	<1	<1
Bromoform	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chloroform	1	370	**42**	**36**	<1	**16**	<1	<1	<1	<1	<1
2,2-dichloropropane	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-dichloroethane	1	1900	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,1-trichloroethane	1	270	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-dichloropropene	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
Cyclohexane	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
Carbon tetrachloride	1	240	<1	<1	<1	<1	<1	<1	<1	<1	<1
Benzene	1	950	<1	<1	<1	<1	<1	<1	<1	<1	<1
Dibromomethane	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-dichloropropane	1	900	<1	<1	<1	<1	<1	<1	<1	<1	<1
Trichloroethene	1	330	<1	<1	<1	<1	<1	<1	<1	<1	<1
trans-1,3-dichloropropene	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
cis-1,3-dichloropropene	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,2-trichloroethane	1	6500	<1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	1	180	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,3-dichloropropane	1	1100	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-dibromoethane	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	1	70	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,1,2-tetrachloroethane	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chlorobenzene	1	55	<1	<1	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene	1	80	<1	<1	<1	<1	<1	<1	<1	<1	<1
m+p-xylene	2	75	<2	<2	<2	<2	<2	<2	<2	<2	<2
Styrene	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,2,2-tetrachloroethane	1	400	<1	<1	<1	<1	<1	<1	<1	<1	<1
o-xylene	1	350	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2,3-trichloropropane	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
Isopropylbenzene	1	30	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromobenzene	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
n-propyl benzene	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
2-chlorotoluene	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
4-chlorotoluene	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,3,5-trimethyl benzene	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tert-butyl benzene	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2,4-trimethyl benzene	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,3-dichlorobenzene	1	260	<1	<1	<1	<1	<1	<1	<1	<1	<1
Sec-butyl benzene	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,4-dichlorobenzene	1	60	<1	<1	<1	<1	<1	<1	<1	<1	<1
4-isopropyl toluene	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-dichlorobenzene	1	160	<1	<1	<1	<1	<1	<1	<1	<1	<1
n-butyl benzene	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-dibromo-3-chloropropane	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2,4-trichlorobenzene	1	85	<1	<1	<1	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2,3-trichlorobenzene	1	3	<1	<1	<1	<1	<1	<1	<1	<1	<1
Polycyclic Aromatic Hydrocarbons (PAHs)											
Naphthalene	0.2	16	<0.2	NA	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.1
Acenaphthylene	0.1	NSL	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	0.1	NSL	<0.1	NA	<0.1	<0.1	<0.1	**0.3**	**5.1**	<0.1	<0.1
Fluorene	0.1	NSL	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	0.1	0.6	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	0.1	0.01	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	0.1	1	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	0.1	NSL	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	0.1	NSL	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	0.1	NSL	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	0.2	NSL	<0.2	NA	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	0.1	0.1	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene	0.1	NSL	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	0.1	NSL	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	0.1	NSL	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Concentration above the SAC	**VALUE**
Concentration above the PQL	**Bold**
GIL >PQL	Red

TABLE G2
SUMMARY OF PFAS CONCENTRATIONS IN GROUNDWATER - ECOLOGY
All results in µg/L unless stated otherwise.

	PQL Envirolab Services	NEMP 2020 95% Freshwater	SAMPLES	
			MW105	WPFASDUP1
PFAS Compound				
Perfluorobutanesulfonic acid	0.01	NSL	<0.01	<0.01
Perfluoropentanesulfonic acid	0.01	NSL	<0.01	<0.01
Perfluorohexanesulfonic acid - PFHxS	0.01	NSL	<0.01	<0.01
Perfluoroheptanesulfonic acid	0.01	NSL	<0.01	<0.01
Perfluorooctanesulfonic acid PFOS	0.01	0.13	<0.01	<0.01
Perfluorodecanesulfonic acid	0.02	NSL	<0.02	<0.02
Perfluorobutanoic acid	0.02	NSL	<0.02	<0.02
Perfluoropentanoic acid	0.02	NSL	<0.02	<0.02
Perfluorohexanoic acid	0.01	NSL	<0.01	<0.01
Perfluoroheptanoic acid	0.01	NSL	<0.01	<0.01
Perfluorooctanoic acid PFOA	0.01	220	<0.01	<0.01
Perfluorononanoic acid	0.01	NSL	<0.01	<0.01
Perfluorodecanoic acid	0.02	NSL	<0.02	<0.02
Perfluoroundecanoic acid	0.02	NSL	<0.02	<0.02
Perfluorododecanoic acid	0.05	NSL	<0.05	<0.05
Perfluorotridecanoic acid	0.1	NSL	<0.1	<0.1
Perfluorotetradecanoic acid	0.5	NSL	<0.5	<0.5
4:2 FTS	0.01	NSL	<0.01	<0.01
6:2 FTS	0.01	NSL	<0.01	<0.01
8:2 FTS	0.02	NSL	<0.02	<0.02
10:2 FTS	0.02	NSL	<0.02	<0.02
Perfluorooctane sulfonamide	0.1	NSL	<0.1	<0.1
N-Methyl perfluorooctane sulfonamide	0.05	NSL	<0.05	<0.05
N-Ethyl perfluorooctanesulfon amide	0.1	NSL	<0.1	<0.1
N-Me perfluorooctanesulfonamid oethanol	0.05	NSL	<0.05	<0.05
N-Et perfluorooctanesulfonamid oethanol	0.5	NSL	<0.5	<0.5
MePer uorooctanesulf-amid oacetic acid	0.02	NSL	<0.02	<0.02
EtPer uorooctanesulf-amid oacetic acid	0.02	NSL	<0.02	<0.02
Total Positive PFHxS & PFOS	0.01	NSL	<0.01	<0.01
Total Positive PFOS & PFOA	0.01	NSL	<0.01	<0.01
Total Positive PFAS	0.01	NSL	<0.01	<0.01

Positive PFAS result	**Bold**
PFAS result above the SAC	**Bold**

TABLE G3
SUMMARY OF GROUNDWATER LABORATORY RESULTS COMPARED TO HUMAN CONTACT GILs
All results in µg/L unless stated otherwise.

	PQL Envirolab Services	Recreational (10 x NHMRC ADWG)	SAMPLES								
			MW101	MW101 - [LAB_DUP]	MW102	MW105	MW106	MW107	MW109	WDUP1	WDUP2
Inorganic Compounds and Parameters											
pH	-	Not Applicable	**6.2**	**6.2**	**7**	**5.4**	**4.5**	**4.9**	**5.3**	NA	NA
Electrical Conductivity (µS/cm)	1	NSL	**300**	**300**	**69**	**590**	**350**	**250**	**240**	NA	NA
Turbidity (NTU)	-	NSL	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals and Metalloids											
Arsenic (As III)	1	100	**2**	**1**	**1**	<1	**3**	**2**	**1**	**2**	**3**
Cadmium	0.1	20	<0.1	<0.1	<0.1	**0.2**	**0.2**	<0.1	<0.1	**0.1**	**0.3**
Chromium (total)	1	500	<1	<1	<1	<1	<1	<1	<1	<1	**1**
Copper	1	20000	<1	<1	**6**	**5**	**7**	**5**	**4**	**4**	**9**
Lead	1	100	<1	**1**	<1	<1	**17**	**3**	<1	**3**	**19**
Total Mercury (inorganic)	0.05	10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Nickel	1	200	**3**	**3**	<1	**18**	**10**	**5**	**3**	**5**	**11**
Zinc	1	30000	**40**	**40**	**6**	**81**	**73**	**47**	**18**	**38**	**76**
Monocyclic Aromatic Hydrocarbons (BTEX Compounds)											
Benzene	1	10	<1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	1	8000	<1	<1	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene	1	3000	<1	<1	<1	<1	<1	<1	<1	<1	<1
m+p-xylene	2	NSL	<2	<2	<2	<2	<2	<2	<2	<2	<2
o-xylene	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total xylenes	2	6000	<2	<2	<2	<2	<2	<2	<2	<2	<2
Total Recoverable Hydrocarbons (TRHs)											
TRH F1	10	NSL	**44**	**45**	<10	**23**	<10	<10	<10	<10	<10
TRH F2	50	NSL	<50	<50	<50	<50	<50	<50	<50	<50	<50
TRH F3	100	NSL	<100	<100	<100	<100	<100	<100	<100	<100	<100
TRH F4	100	NSL	<100	<100	<100	<100	<100	<100	<100	<100	<100
Volatile Organic Compounds (VOCs), including chlorinated VOCs											
Dichlorodifluoromethane	10	NSL	<10	<10	<10	<10	<10	<10	<10	<10	<10
Chloromethane	10	NSL	<10	<10	<10	<10	<10	<10	<10	<10	<10
Vinyl Chloride	10	3	<10	<10	<10	<10	<10	<10	<10	<10	<10
Bromomethane	10	NSL	<10	<10	<10	<10	<10	<10	<10	<10	<10
Chloroethane	10	NSL	<10	<10	<10	<10	<10	<10	<10	<10	<10
Trichlorofluoromethane	10	NSL	<10	<10	<10	<10	<10	<10	<10	<10	<10
1,1-Dichloroethene	1	300	<1	<1	<1	<1	<1	<1	<1	<1	<1
Trans-1,2-dichloroethene	1	600	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-dichloroethane	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
Cis-1,2-dichloroethene	1	600	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromochloromethane	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
Dibromochloromethane	1	2500	**1**	<1	<1	<1	<1	<1	<1	<1	<1
Bromodichloromethane	1		**7**	**5**	<1	**2**	<1	<1	<1	<1	<1
Bromoform	1		<1	<1	<1	<1	<1	<1	<1	<1	<1
Chloroform	1		**42**	**36**	**<1**	**16**	<1	<1	<1	<1	<1
2,2-dichloropropane	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-dichloroethane	1	30	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,1-trichloroethane	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-dichloropropene	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
Cyclohexane	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
Carbon tetrachloride	1	30	<1	<1	<1	<1	<1	<1	<1	<1	<1
Benzene	1	10	<1	<1	<1	<1	<1	<1	<1	<1	<1
Dibromomethane	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-dichloropropane	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
Trichloroethene	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
trans-1,3-dichloropropene	1	1000	<1	<1	<1	<1	<1	<1	<1	<1	<1
cis-1,3-dichloropropene	1	1000	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,2-trichloroethane	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	1	8000	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,3-dichloropropane	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-dibromoethane	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	1	500	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,1,2-tetrachloroethane	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chlorobenzene	1	3000	<1	<1	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene	1	3000	<1	<1	<1	<1	<1	<1	<1	<1	<1
m+p-xylene	2	NSL	<2	<2	<2	<2	<2	<2	<2	<2	<2
Styrene	1	300	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,2,2-tetrachloroethane	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
o-xylene	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2,3-trichloropropane	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
Isopropylbenzene	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromobenzene	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
n-propyl benzene	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
2-chlorotoluene	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
4-chlorotoluene	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,3,5-trimethyl benzene	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tert-butyl benzene	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2,4-trimethyl benzene	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,3-dichlorobenzene	1	200	<1	<1	<1	<1	<1	<1	<1	<1	<1
Sec-butyl benzene	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,4-dichlorobenzene	1	400	<1	<1	<1	<1	<1	<1	<1	<1	<1
4-isopropyl toluene	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-dichlorobenzene	1	15000	<1	<1	<1	<1	<1	<1	<1	<1	<1
n-butyl benzene	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-dibromo-3-chloropropane	1	NSL	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2,4-trichlorobenzene	1	300	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2,3-trichlorobenzene	1		<1	<1	<1	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene	1	7	<1	<1	<1	<1	<1	<1	<1	<1	<1
Polycyclic Aromatic Hydrocarbons (PAHs)											
Naphthalene	0.2	NSL	<0.2	NA	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.1
Acenaphthylene	0.1	NSL	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	0.1	NSL	<0.1	NA	<0.1	<0.1	<0.1	**0.3**	**5.1**	<0.1	<0.1
Fluorene	0.1	NSL	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	0.1	NSL	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	0.1	NSL	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	0.1	NSL	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	0.1	NSL	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	0.1	NSL	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	0.1	NSL	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	0.2	NSL	<0.2	NA	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	0.1	0.1	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene	0.1	NSL	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	0.1	NSL	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	0.1	NSL	<0.1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Concentration above the SAC	**VALUE**
Concentration above the PQL	**Bold**
GIL >PQL	Red

JKEnvironments

TABLE G4
GROUNDWATER LABORATORY RESULTS COMPARED TO HSLs
All data in µg/L unless stated otherwise

				C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene	PID
PQL - Envirolab Services				10	50	1	1	1	2	1	
NEPM 2013 - Land Use Category				HSL-A/B: LOW/HIGH DENSITY RESIDENTIAL							
Sample Reference	**Water Depth**	**Depth Category**	**Soil Category**								
MW101	3.58	0m to <2m	Sand	**44**	<50	<1	<1	<1	<2	<1	29.7
MW101 - [LAB_DUP]	3.58	0m to <2m	Sand	**45**	<50	<1	<1	<1	<2	<1	29.7
MW102	3.67	2m to <4m	Sand	<10	<50	<1	<1	<1	<2	<1	40.3
MW105	6.03	0m to <2m	Sand	**23**	<50	<1	<1	<1	<2	<1	2.8
MW106	9.17	0m to <2m	Sand	<10	<50	<1	<1	<1	<2	<1	11.2
MW107	9.9	0m to <2m	Sand	<10	<50	<1	<1	<1	<2	<1	2.4
MW109	7.07	4m to <8m	Sand	<10	<50	<1	<1	<1	<2	<1	27.2
WDUP1	9.9	0m to <2m	Sand	<10	<50	<1	<1	<1	<2	<1	NA
WDUP2	9.17	0m to <2m	Sand	<10	<50	<1	<1	<1	<2	<1	NA
Total Number of Samples				9	9	9	9	9	9	9	7
Maximum Value				45	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	40.3

Concentration above the SAC — **VALUE**
Site specific assesment (SSA) required — **VALUE**
Concentration above the PQL — **Bold**
The guideline corresponding to the elevated value is highlighted in grey in the Groundwater Assessment Criteria Table below

HSL GROUNDWATER ASSESSMENT CRITERIA

Sample Reference	**Water Depth**	**Depth Category**	**Soil Category**	C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene
MW101	3.58	0m to <2m	Sand	SSA	SSA	SSA	SSA	SSA	SSA	SSA
MW101 - [LAB_DUP]	3.58	0m to <2m	Sand	SSA	SSA	SSA	SSA	SSA	SSA	SSA
MW102	3.67	2m to <4m	Sand	1000	1000	800	NL	NL	NL	NL
MW105	6.03	0m to <2m	Sand	SSA	SSA	SSA	SSA	SSA	SSA	SSA
MW106	9.17	0m to <2m	Sand	SSA	SSA	SSA	SSA	SSA	SSA	SSA
MW107	9.9	0m to <2m	Sand	SSA	SSA	SSA	SSA	SSA	SSA	SSA
MW109	7.07	4m to <8m	Sand	1000	1000	800	NL	NL	NL	NL
WDUP1	9.9	0m to <2m	Sand	SSA	SSA	SSA	SSA	SSA	SSA	SSA
WDUP2	9.17	0m to <2m	Sand	SSA	SSA	SSA	SSA	SSA	SSA	SSA

TABLE G5
GROUNDWATER LABORATORY RESULTS COMPARED TO SITE SPECIFIC HSLs - RISK ASSESSMENT
All results in µg/L unless stated otherwise.

	PQL Envirolab Services	NHMRC ADWG 2011 (v3.6 2021)	WHO 2008	USEPA RSL Tapwater 2021	SAMPLES MW101	MW101 - [LAB_DUP]	MW102	MW105	MW106	MW107	MW109	WDUP1	WDUP2
Total Recoverable Hydrocarbons (TRH)													
C_6-C_9 Aliphatics (assessed using F1)	10	-	15000	-	**44**	**45**	<10	**23**	<10	<10	<10	<10	<10
>C_9-C_{14} Aliphatics (assessed using F2)	50	-	100	-	<50	<50	<50	<50	<50	<50	<50	<50	<50
Monocyclic Aromatic Hydrocarbons (BTEX Compounds)													
Benzene	1	1	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	1	800	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene	1	300	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total xylenes	2	600	-	-	<2	<2	<2	<2	<2	<2	<2	<2	<2
Polycyclic Aromatic Hydrocarbons (PAHs)													
Naphthalene	1	-	-	0.12	<1	<1	<1	<1	<1	<1	<1	<1	<1
Acenaphthene	0.1	-	-	530	<0.1	NA	<0.1	<0.1	<0.1	**0.3**	**5.1**	<0.1	<0.1
Volatile Organic Compounds (VOCs), including chlorinated VOCs													
Dichlorodifluoromethane	10	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10
Chloromethane	10	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10
Vinyl Chloride	10	0.3	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10
Bromomethane	10	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10
Chloroethane	10	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10
Trichlorofluoromethane	10	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10
1,1-Dichloroethene	1	30	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Trans-1,2-dichloroethene	1	60	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-dichloroethane	1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Cis-1,2-dichloroethene	1	60	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromochloromethane	1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Dibromochloromethane	1		-	-	**1**	<1	<1	<1	<1	<1	<1	<1	<1
Bromodichloromethane	1	250	-	-	**7**	**5**	<1	**2**	<1	<1	<1	<1	<1
Bromoform	1		-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chloroform	1		-	-	**42**	**36**	<1	**16**	<1	<1	<1	<1	<1
2,2-dichloropropane	1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-dichloroethane	1	3	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,1-trichloroethane	1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-dichloropropene	1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Cyclohexane	1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Carbon tetrachloride	1	3	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Benzene	1	1	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Dibromomethane	1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-dichloropropane	1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Trichloroethene	1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
trans-1,3-dichloropropene	1	100	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
cis-1,3-dichloropropene	1	100	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,2-trichloroethane	1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	1	800	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,3-dichloropropane	1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-dibromoethane	1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	1	50	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,1,2-tetrachloroethane	1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chlorobenzene	1	300	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene	1	300	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
m+p-xylene	2	-	-	-	<2	<2	<2	<2	<2	<2	<2	<2	<2
Styrene	1	30	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,2,2-tetrachloroethane	1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
o-xylene	1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2,3-trichloropropane	1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Isopropylbenzene	1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromobenzene	1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
n-propyl benzene	1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
2-chlorotoluene	1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
4-chlorotoluene	1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,3,5-trimethyl benzene	1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tert-butyl benzene	1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2,4-trimethyl benzene	1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,3-dichlorobenzene	1	20	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Sec-butyl benzene	1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,4-dichlorobenzene	1	40	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
4-isopropyl toluene	1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-dichlorobenzene	1	1500	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
n-butyl benzene	1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-dibromo-3-chloropropane	1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2,4-trichlorobenzene	1	30	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2,3-trichlorobenzene	1		-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene	1	0.7	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1

Concentration above the SAC	VALUE
Concentration above the PQL	**Bold**
GIL >PQL	Red

JKEnvironments

TABLE G6
SUMMARY OF PFAS CONCENTRATIONS IN GROUNDWATER - HUMAN HEALTH
All results in µg/L unless stated otherwise.

	PQL Envirolab Services	NEMP 2020 Recreational	SAMPLES	
			MW105	WPFASDUP1
PFAS Compound				
Perfluorobutanesulfonic acid	0.01	NSL	<0.01	<0.01
Perfluoropentanesulfonic acid	0.01	NSL	<0.01	<0.01
Perfluorohexanesulfonic acid - PFHxS	0.01	NSL	<0.01	<0.01
Perfluoroheptanesulfonic acid	0.01	NSL	<0.01	<0.01
Perfluorooctanesulfonic acid PFOS	0.01	NSL	<0.01	<0.01
Perfluorodecanesulfonic acid	0.02	NSL	<0.02	<0.02
Perfluorobutanoic acid	0.02	NSL	<0.02	<0.02
Perfluoropentanoic acid	0.02	NSL	<0.02	<0.02
Perfluorohexanoic acid	0.01	NSL	<0.01	<0.01
Perfluoroheptanoic acid	0.01	NSL	<0.01	<0.01
Perfluorooctanoic acid PFOA	0.01	5.6	<0.01	<0.01
Perfluorononanoic acid	0.01	NSL	<0.01	<0.01
Perfluorodecanoic acid	0.02	NSL	<0.02	<0.02
Perfluoroundecanoic acid	0.02	NSL	<0.02	<0.02
Perfluorododecanoic acid	0.05	NSL	<0.05	<0.05
Perfluorotridecanoic acid	0.1	NSL	<0.1	<0.1
Perfluorotetradecanoic acid	0.5	NSL	<0.5	<0.5
4:2 FTS	0.01	NSL	<0.01	<0.01
6:2 FTS	0.01	NSL	<0.01	<0.01
8:2 FTS	0.02	NSL	<0.02	<0.02
10:2 FTS	0.02	NSL	<0.02	<0.02
Perfluorooctane sulfonamide	0.1	NSL	<0.1	<0.1
N-Methyl perfluorooctane sulfonamide	0.05	NSL	<0.05	<0.05
N-Ethyl perfluorooctanesulfon amide	0.1	NSL	<0.1	<0.1
N-Me perfluorooctanesulfonamid oethanol	0.05	NSL	<0.05	<0.05
N-Et perfluorooctanesulfonamid oethanol	0.5	NSL	<0.5	<0.5
MePer uorooctanesulf-amid oacetic acid	0.02	NSL	<0.02	<0.02
EtPer uorooctanesulf-amid oacetic acid	0.02	NSL	<0.02	<0.02
Total Positive PFHxS & PFOS	0.01	0.7	<0.01	<0.01
Total Positive PFOS & PFOA	0.01	NSL	<0.01	<0.01
Total Positive PFAS	0.01	NSL	<0.01	<0.01

Positive PFAS result	**Bold**
PFAS result above the SAC	**Bold**

TABLE Q1
SOIL QA/QC SUMMARY

			TRH C6 - C10	TRH >C10-C16	TRH >C16-C34	TRH >C34-C40	Benzene	Toluene	Ethylbenzene	m+p-xylene	o-Xylene
	PQL Envirolab SYD		*25*	*50*	*100*	*100*	*0.2*	*0.5*	*1*	*2*	*1*
	PQL Envirolab VIC		*25*	*50*	*100*	*100*	*0.2*	*0.5*	*1.0*	*2.0*	*1.0*
Intra	SDUP3	0-0.1	<25	<50	160	<100	<0.2	<0.5	<1	<2	<1
laboratory	BH111	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1
duplicate	MEAN		nc	nc	105	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	105%	nc	nc	nc	nc	nc	nc
Intra	SDUP4	0-0.1	<25	<50	120	<100	<0.2	<0.5	<1	<2	<1
laboratory	BH115	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1
duplicate	MEAN		nc	nc	85	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	82%	nc	nc	nc	nc	nc	nc
Intra	SDUP7	0-0.1	<25	<50	310	190	<0.2	<0.5	<1	<2	<1
laboratory	BH108	0-0.1	<25	<50	160	<100	<0.2	<0.5	<1	<2	<1
duplicate	MEAN		nc	nc	235	120	nc	nc	nc	nc	nc
	RPD %		nc	nc	64%	117%	nc	nc	nc	nc	nc
Intra	SDUP9	0.02-0.4	<25	<50	110	120	<0.2	<0.5	<1	<2	<1
laboratory	BH101	0.02-0.4	<25	<50	140	140	<0.2	<0.5	<1	<2	<1
duplicate	MEAN		nc	nc	125	130	nc	nc	nc	nc	nc
	RPD %		nc	nc	24%	15%	nc	nc	nc	nc	nc
Inter	SDUP8	0.04-0.3	<25	<50	450	210	<0.2	<0.5	<1	<2	<1
laboratory	BH104	0.04-0.3	<25	<50	160	<100	<0.2	<0.5	<1	<2	<1
duplicate	MEAN		nc	nc	305	130	nc	nc	nc	nc	nc
	RPD %		nc	nc	95%	123%	nc	nc	nc	nc	nc
Inter	SDUP10	0-0.1	<25	63	200	120	<0.2	<0.5	<1	<2	<1
laboratory	BH117	0-0.1	<25	93	240	100	<0.2	<0.5	<1	<2	<1
duplicate	MEAN		nc	78	220	110	nc	nc	nc	nc	nc
	RPD %		nc	38%	18%	18%	nc	nc	nc	nc	nc
Field	TB-S1	-	NA	NA	NA	NA	<0.2	<0.5	<1	<2	<1
Blank	27/09/21										
Field	FRI-SPT	µg/L	NA	NA	NA	NA	<1	<1	<1	<2	<1
Rinsate	6/10/21										
Trip	TS-S1		-	-	-	-	105%	104%	103%	97%	106%
Spike	27/09/21										

			Naphthalene	Acenaphthylene	Acenaph-thene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)anthracene	Chrysene	Benzo(b,j+k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-c,d)pyrene	Dibenzo(a,h)anthra-cene	Benzo(g,h,i)perylene
	PQL Envirolab SYD		*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.2*	*0.05*	*0.1*	*0.1*	*0.1*
	PQL Envirolab VIC		*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.2*	*0.1*	*0.1*	*0.1*	*0.1*
Intra	SDUP3	0-0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	0.4	0.4	0.3	0.2	0.4	0.2	0.1	<0.1	0.2
laboratory	BH111	0-0.1	<0.1	<0.1	<0.1	<0.1	0.5	0.1	0.6	0.6	0.4	0.2	0.4	0.3	0.1	<0.1	0.2
duplicate	MEAN		nc	nc	nc	nc	0.35	0.075	0.5	0.5	0.35	0.2	0.4	0.25	0.1	nc	0.2
	RPD %		nc	nc	nc	nc	86%	67%	40%	40%	29%	0%	0%	40%	0%	nc	0%
Intra	SDUP4	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	0.1	<0.1	<0.1	<0.2	0.06	<0.1	<0.1	<0.1
laboratory	BH115	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	0.2	<0.1	0.1	<0.2	0.1	<0.1	<0.1	<0.1
duplicate	MEAN		nc	nc	nc	nc	nc	nc	0.15	0.15	nc	0.075	nc	0.08	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	67%	67%	nc	67%	nc	50%	nc	nc	nc
Intra	SDUP7	0-0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.3	0.2	0.2	0.1	0.3	0.2	0.1	<0.1	0.1
laboratory	BH108	0-0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.4	0.3	0.2	0.1	0.4	0.3	0.1	<0.1	0.2
duplicate	MEAN		nc	nc	nc	nc	0.1	nc	0.35	0.25	0.2	0.1	0.35	0.25	0.1	nc	0.15
	RPD %		nc	nc	nc	nc	0%	nc	29%	40%	0%	0%	29%	40%	0%	nc	67%
Intra	SDUP9	0.02-0.4	<0.1	<0.1	<0.1	<0.1	0.3	0.1	0.3	0.3	0.3	0.1	0.3	0.3	0.1	<0.1	0.1
laboratory	BH101	0.02-0.4	<0.1	<0.1	<0.1	<0.1	0.6	0.2	0.6	0.6	0.4	0.2	0.5	0.4	0.2	<0.1	0.2
duplicate	MEAN		nc	nc	nc	nc	0.45	0.15	0.45	0.45	0.35	0.15	0.4	0.35	0.15	nc	0.15
	RPD %		nc	nc	nc	nc	67%	67%	67%	67%	29%	67%	50%	29%	67%	nc	67%
Inter	SDUP8	0.04-0.3	0.1	<0.1	<0.1	<0.1	0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
laboratory	BH104	0.04-0.3	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
duplicate	MEAN		0.075	nc	nc	nc	0.25	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		67%	nc	nc	nc	40%	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Inter	SDUP10	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
laboratory	BH117	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Field	TB-S1	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Blank	27/09/21																
Field	FRI-SPT	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Rinsate	6/10/21																
Trip	TS-S1		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spike	27/09/21																

			HCB	alpha- BHC	gamma- BHC	beta- BHC	Heptachlor	delta- BHC	Aldrin	Heptachlor Epoxide	Gamma- Chlordane	alpha- chlordane	Endosulfan I	pp- DDE	Dieldrin	Endrin	pp- DDD	Endosulfan II	pp- DDT	Endrin Aldehyde	Endosulfan Sulphate	Methoxychlor
	PQL Envirolab SYD		*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*
	PQL Envirolab VIC		*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*
Intra	SDUP3	0-0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
laboratory	BH111	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Intra	SDUP4	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
laboratory	BH115	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Intra	SDUP7	0-0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
laboratory	BH108	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Intra	SDUP9	0.02-0.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
laboratory	BH101	0.02-0.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Inter	SDUP8	0.04-0.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
laboratory	BH104	0.04-0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Inter	SDUP10	0-0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
laboratory	BH117	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Field	TB-S1	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Blank	27/09/21																					
Field	FRI-SPT	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Rinsate	6/10/21																					
Trip	TS-S1		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spike	27/09/21																					

			Azinphos-methyl (Guthion)	Bromophos-ethyl	Chlorpyriphos	Chlorpyriphos-methyl	Diazinon	Dichlorvos	Dimethoate	Ethion	Fenitrothion	Malathion	Parathion	Ronnel	Total PCBS
	PQL Envirolab SYD		*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*
	PQL Envirolab VIC		*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*
Intra	SDUP3	0-0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
laboratory	BH111	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Intra	SDUP4	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
laboratory	BH115	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Intra	SDUP7	0-0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
laboratory	BH108	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Intra	SDUP9	0.02-0.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
laboratory	BH101	0.02-0.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Inter	SDUP8	0.04-0.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
laboratory	BH104	0.04-0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Inter	SDUP10	0-0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
laboratory	BH117	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Field	TB-S1	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Blank	27/09/21														
Field	FRI-SPT	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Rinsate	6/10/21														
Trip	TS-S1		-	-	-	-	-	-	-	-	-	-	-	-	-
Spike	27/09/21														

			Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	ACM >7mm Estimation	FA and AF Estimation
	PQL Envirolab SYD		*4*	*0.4*	*1*	*1*	*1*	*0.1*	*1*	*1*	*0.01*	*0.001*
	PQL Envirolab VIC		*4.0*	*0.4*	*1.0*	*1.0*	*1.0*	*0.1*	*1.0*	*1.0*	*-*	*-*
Intra	SDUP3	0-0.1	<4	<0.4	11	13	54	<0.1	4	51	<0.01	<0.001
laboratory	BH111	0-0.1	<4	<0.4	9	12	54	<0.1	4	50	<0.01	<0.001
duplicate	MEAN		nc	nc	10	12.5	54	nc	4	50.5	nc	nc
	RPD %		nc	nc	20%	8%	0%	nc	0%	2%	nc	nc
Intra	SDUP4	0-0.1	<4	<0.4	9	5	20	<0.1	2	25	<0.01	<0.001
laboratory	BH115	0-0.1	4	<0.4	11	11	40	<0.1	3	42	<0.01	<0.001
duplicate	MEAN		3	nc	10	8	30	nc	2.5	33.5	nc	nc
	RPD %		67%	nc	20%	75%	67%	nc	40%	51%	nc	nc
Intra	SDUP7	0-0.1	<4	<0.4	6	9	66	<0.1	2	32	NA	NA
laboratory	BH108	0-0.1	<4	<0.4	6	9	63	<0.1	2	31	NA	NA
duplicate	MEAN		nc	nc	6	9	64.5	nc	2	31.5	NA	NA
	RPD %		nc	nc	0%	0%	5%	nc	0%	3%	NA	NA
Intra	SDUP9	0.02-0.4	<4	<0.4	62	52	13	<0.1	48	40	NA	NA
laboratory	BH101	0.02-0.4	<4	<0.4	62	59	14	<0.1	47	41	NA	NA
duplicate	MEAN		nc	nc	62	55.5	13.5	nc	47.5	40.5	NA	NA
	RPD %		nc	nc	0%	13%	7%	nc	2%	2%	NA	NA
Inter	SDUP8	0.04-0.3	<4	<0.4	82	31	5	<0.1	79	45	NA	NA
laboratory	BH104	0.04-0.3	<4	<0.4	73	24	5	<0.1	75	37	NA	NA
duplicate	MEAN		nc	nc	77.5	27.5	5	nc	77	41	NA	NA
	RPD %		nc	nc	12%	25%	0%	nc	5%	20%	NA	NA
Inter	SDUP10	0-0.1	<4	<0.4	11	17	27	<0.1	12	60	NA	NA
laboratory	BH117	0-0.1	<4	<0.4	19	17	28	<0.1	16	54	NA	NA
duplicate	MEAN		nc	nc	15	17	27.5	nc	14	57	NA	NA
	RPD %		nc	nc	53%	0%	4%	nc	29%	11%	NA	NA
Field	TB-S1	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Blank	27/09/21											
Field	FRI-SPT	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Rinsate	6/10/21											
Trip	TS-S1		-	-	-	-	-	-	-	-	-	-
Spike	27/09/21											

Result outside of QA/QC acceptance criteria

TABLE Q2
SUMMARY OF PFAS FIELD QA/QC IN SOIL
Units are µg/Kg unless stated otherwise.

			Perfluorobutanesulfonic acid	Perfluoropentanesulfonic acid	Perfluorohexanesulfonic acid - PFHxS	Perfluoroheptanesulfonic acid	Perfluorooctanesulfonic acid PFOS	Perfluorodecanesulfonic acid	Perfluorobutanoic acid	Perfluoropentanoic acid	Perfluorohexanoic acid	Perfluoroheptanoic acid	Perfluorooctanoic acid PFOA	Perfluorononanoic acid	Perfluorodecanoic acid	Perfluoroundecanoic acid	Perfluorododecanoic acid	Perfluorotridecanoic acid	Perfluorotetradecanoic acid	4:2 FTS	6:2 FTS	8:2 FTS	10:2 FTS	Perfluorooctane sulfonamide	N-Methyl perfluorooctane sulfonamide	N-Ethyl perfluorooctanesulfon amide	N-Me perfluorooctanesulfonamid oethanol	N-Et perfluorooctanesulfonamid oethanol	MePer uorooctanesulf-amid oacetic acid	EtPer uorooctanesulf-amid oacetic acid	Total Positive PFHxS & PFOS	Total Positive PFOS & PFOA	Total Positive PFAS
PQL Envirolab			*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.2*	*0.2*	*0.2*	*0.1*	*0.1*	*0.1*	*0.1*	*0.5*	*0.5*	*0.5*	*0.5*	*5*	*0.1*	*0.1*	*0.1*	*0.1*	*1*	*1*	*1*	*1*	*5*	*0.2*	*0.2*	*0.1*	*0.1*	*0.1*
PQL Envirolab VIC			*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.2*	*0.2*	*0.2*	*0.1*	*0.1*	*0.1*	*0.1*	*0.5*	*0.5*	*0.5*	*0.5*	*5*	*0.1*	*0.1*	*0.1*	*0.1*	*1*	*1*	*1*	*1*	*5*	*0.2*	*0.2*	*0.1*	*0.1*	*0.1*
Intra laboratory duplicate	BH105	0.25-0.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.5	<5	<0.1	<0.1	<0.2	<0.2	<1	<1	<1	<1	<5	<0.2	<0.2	<0.1	<0.1	<0.1
	PFAS DUP1	0.25-0.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.5	<5	<0.1	<0.1	<0.2	<0.2	<1	<1	<1	<1	<5	<0.2	<0.2	<0.1	<0.1	<0.1
	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Inter laboratory duplicate	BH104	0.04-0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.5	<5	<0.1	<0.1	<0.2	<0.2	<1	<1	<1	<1	<5	<0.2	<0.2	<0.1	<0.1	<0.1
	PFAS DUP3	0.04-0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.5	<5	<0.1	<0.1	<0.2	<0.2	<1	<1	<1	<1	<5	<0.2	<0.2	<0.1	<0.1	<0.1
	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc

Result outside of QA/QC acceptance criteria Value

JKEnvironments

TABLE Q3
GROUNDWATER QA/QC SUMMARY

		Dichlorodifluoromethane	Chloromethane	Vinyl Chloride	Bromomethane	Chloroethane	Trichlorofluoromethane	1,1-Dichloroethene	Trans-1,2-dichloroethene	1,1-dichloroethane	Cis-1,2-dichloroethene	Bromochloromethane	Chloroform	2,2-dichloropropane	1,2-dichloroethane	1,1,1-trichloroethane	1,1-dichloropropene	Cyclohexane	Carbon tetrachloride	Benzene	Dibromomethane	1,2-dichloropropane	Trichloroethene	Bromodichloromethane	trans-1,3-dichloropropene	cis-1,3-dichloropropene	1,1,2-trichloroethane	Toluene	1,3-dichloropropane	Dibromochloromethane
	PQL Envirolab SYD	10	10	10	10	10	10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	PQL Envirolab VIC	10	10	10	10	10	10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Intra	MW107	<10	<10	<10	<10	<10	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
laboratory	WDUP1	<10	<10	<10	<10	<10	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
duplicate	MEAN	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Inter	MW106	<10	<10	<10	<10	<10	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
laboratory	WDUP2	<10	<10	<10	<10	<10	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
duplicate	MEAN	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Field	TB-W1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Blank	13/10/2021																													

		1,2-dibromoethane	Tetrachloroethene	1,1,1,2-tetrachloroethane	Chlorobenzene	Ethylbenzene	Bromoform	m+p-xylene	Styrene	1,1,2,2-tetrachloroethane	o-xylene	1,2,3-trichloropropane	Isopropylbenzene	Bromobenzene	n-propyl benzene	2-chlorotoluene	4-chlorotoluene	1,3,5-trimethyl benzene	Tert-butyl benzene	1,2,4-trimethyl benzene	1,3-dichlorobenzene	Sec-butyl benzene	1,4-dichlorobenzene	4-isopropyl toluene	1,2-dichlorobenzene	n-butyl benzene	1,2-dibromo-3-chloropropane	1,2,4-trichlorobenzene	Hexachlorobutadiene	1,2,3-trichlorobenzene
	PQL Envirolab SYD	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	PQL Envirolab VIC	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Intra	MW107	<1	<1	<1	<1	<1	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
laboratory	WDUP1	<1	<1	<1	<1	<1	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
duplicate	MEAN	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Inter	MW106	<1	<1	<1	<1	<1	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
laboratory	WDUP2	<1	<1	<1	<1	<1	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
duplicate	MEAN	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Field	TB-W1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Blank	13/10/2021																													

		TRH C6 - C10	TRH >C10-C16	TRH >C16-C34	TRH >C34-C40	Benzene	Toluene	Ethylbenzene	m+p-xylene	o-Xylene	Naphthalene	Acenaphthylene	Acenaph-thene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)anthracene	Chrysene	Benzo(b,j+k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-c,d)pyrene	Dibenzo(a,h)anthra-cene	Benzo(g,h,i)perylene	Arsenic	Cadmium	Chromium VI	Copper	Lead	Mercury	Nickel	Zinc
	PQL Envirolab SYD	10	50	100	100	1	1	1	2	1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	1	0.1	1	1	1	0.05	1	1
	PQL Envirolab VIC	10	50	100	100	1.0	1.0	1.0	2.0	1.0	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	1	0.1	1	1	1	0.05	1	1
Intra	MW107	<10	<50	<100	<100	<1	<1	<1	<2	<1	<0.2	<0.1	0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	2	<0.1	<1	5	3	<0.05	5	47
laboratory	WDUP1	<10	<50	<100	<100	<1	<1	<1	<2	<1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	2	0.1	<1	4	3	<0.05	5	38
duplicate	MEAN	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	0.175	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	2	0.075	nc	4.5	3	nc	5	42.5
	RPD %	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	143%	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	0%	67%	nc	22%	0%	nc	0%	21%
Inter	MW106	<10	<50	<100	<100	<1	<1	<1	<2	<1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	3	0.2	<1	7	17	<0.05	10	73
laboratory	WDUP2	<10	<50	<100	<100	<1	<1	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	3	0.3	1	9	19	<0.05	11	76
duplicate	MEAN	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	3	0.25	0.75	8	18	nc	10.5	74.5
	RPD %	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	0%	40%	67%	25%	11%	nc	10%	4%
Field	TB-W1	NA	0	0	0	<1	<1	<1	<2	<1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Blank	13/10/2021																																
Trip	TS-W1	-	-	-	-	96%	103%	115%	110%	110%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Spike	13/10/2021																																

Result outside of QA/QC acceptance criteria | Value

TABLE Q4
SUMMARY OF PFAS FIELD QA/QC IN GROUNDWATER
Units are µg/L unless stated otherwise.

		Perfluorobutanesulfonic acid	Perfluoropentanesulfonic acid	Perfluorohexanesulfonic acid - PFHxS	Perfluoroheptanesulfonic acid	Perfluorooctanesulfonic acid PFOS	Perfluorodecanesulfonic acid	Perfluorobutanoic acid	Perfluoropentanoic acid	Perfluorohexanoic acid	Perfluoroheptanoic acid	Perfluorooctanoic acid PFOA	Perfluorononanoic acid	Perfluorodecanoic acid	Perfluoroundecanoic acid	Perfluorododecanoic acid	Perfluorotridecanoic acid	Perfluorotetradecanoic acid	4:2 FTS	6:2 FTS	8:2 FTS	10:2 FTS	Perfluorooctane sulfonamide	N-Methyl perfluorooctane sulfonamide	N-Ethyl perfluorooctanesulfon amide	N-Me perfluorooctanesulfonamid oethanol	N-Et perfluorooctanesulfonamid oethanol	MePer uorooctanesulf-amid oacetic acid	EtPer uorooctanesulf-amid oacetic acid	Total Positive PFHxS & PFOS	Total Positive PFOS & PFOA	Total Positive PFAS
PQL Envirolab		*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.2*	*0.2*	*0.2*	*0.1*	*0.1*	*0.1*	*0.1*	*0.5*	*0.5*	*0.5*	*0.5*	*5*	*0.1*	*0.1*	*0.1*	*0.1*	*1*	*1*	*1*	*1*	*5*	*0.2*	*0.2*	*0.1*	*0.1*	*0.1*
PQL Envirolab VIC		*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.2*	*0.2*	*0.2*	*0.1*	*0.1*	*0.1*	*0.1*	*0.5*	*0.5*	*0.5*	*0.5*	*5*	*0.1*	*0.1*	*0.1*	*0.1*	*1*	*1*	*1*	*1*	*5*	*0.2*	*0.2*	*0.1*	*0.1*	*0.1*
Intra	MW105	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.02	<0.02	<0.05	<0.1	<0.5	<0.01	<0.01	<0.02	<0.02	<0.1	<0.05	<0.1	<0.05	<0.5	<0.02	<0.02	<0.01	<0.01	<0.01
laboratory	WPFASDUP1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.02	<0.02	<0.05	<0.1	<0.5	<0.01	<0.01	<0.02	<0.02	<0.1	<0.05	<0.1	<0.05	<0.5	<0.02	<0.02	<0.01	<0.01	<0.01
duplicate	MEAN	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Field	PFASTB-W	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.02	<0.02	<0.05	<0.1	<0.5	<0.01	<0.01	<0.02	<0.02	<0.1	<0.05	<0.1	<0.05	<0.5	<0.02	<0.02	<0.01	<0.01	<0.01
Blank	13/10/2021																															

Result outside of QA/QC acceptance criteria Value

ABBREVIATIONS AND EXPLANATIONS

Abbreviations used in the Tables:

CS	Characteristic Situation
CH_4	Methane
CO	Carbon Monoxide
CO_2	Carbon Dioxide
GSV	Gas Screening Value
H_2S	Hydrogen Sulfide
LEL	Lower Explosive Limit
O_2	Oxygen
>>>	Measured LEL greater than 100%

Flow rates

- If the flow rate measured in the field was zero this has been adjusted to 0.1 L/hr (the minimum measurable flow rate of the instrument). The adjustment is indicated by a green font.
- If the measured flow rate was a negative value this has been converted to a positive value to account for potential flow rates. The adjustment is indicated by a green font.

GSV and CS Values

GSV and CS value calculated using the Modified Wilson Card Classification detailed in the *Assessment and Management* of *Hazardous Ground Gases, NSW EPA 2019* . Table 7 of the guidelines suggests the following adjustments:

- If methane >1% and/or carbon dioxide > 5% for CS1 then CS increased to 2 (adjustment indicated by blue italic font);
- If borehole flow rate > 70L/hr for CS2 then CS increased to 3 (adjustment indicated by blue italic font).

Gas Protection Values

Gas Protection Values derived from Table 8 of the *Assessment and Management of Hazardous Ground Gases, NSW EPA 2019.*

- For large commercial developments if Gas protection value equals 1 and methane concentration >20% then increase to CS3 (adjustment indicated by blue italic font).

GSV, CS and Gas Protection values for the entire Site

These values are calculated using the maximum values ecountered at the site and are not borehole specific.

JKEnvironments

TABLE HGG1
SUMMARY OF FIELD GAS MEASUREMENTS

Site Use: **Medium/High Density Residential**		Peak HGG (Hazardous Ground Gas) Measurements														
		CH_4 (max)	CO_2 (max)	O_2 (min)	CH_4 LEL (max)	H_2S (max)	CO (max)	Flow (max)	Standing Water Level (SWL)	Atmospheric pressure	Calculated Methane Gas Screening Value (GSV)	Calculated Carbon Dioxide Gas Screening Value (GSV)	Methane Characteristic Gas Situtation (CS)	Carbon Dioxide Characteristic Gas Situtation (CS)	Maximum CS value	Gas Protection Guidance Value
Well Reference	**Sampling Round & Date**	% v/v	% v/v	% v/v	%LEL	ppm	ppm	L/hr	m	mBar	-	-	-	-	-	-
MW101	6/10/2021 (Round 1)	0	0	21.1	0	0	6	0.1	2.29	1004	0.00	0.00	1	1	1	0
MW102	7/10/2021 (Round 1)	0	0	20.3	0	0	6	0.3	3.7	1003	0.00	0.00	1	1	1	0
MW104	5/10/2021 (Round 1)	0	2.1	18.2	0	0	6	0.2	-	998	0.00	0.00	1	1	1	0
MW105	5/10/2021 (Round 1)	0	5.1	12.3	0	0	31	0.2	5.8	1001	0.00	0.01	1	*2*	2	3
MW106	5/10/2021 (Round 1)	0	4	17.5	0	0	11	0.7	8.26	1001	0.00	0.03	1	1	1	0
MW107	5/10/2021 (Round 1)	0	0	20.6	0	0	4	0.4	8.75	999	0.00	0.00	1	1	1	0
MW109	5/10/2021 (Round 1)	0	10.6	5.1	0	0	61	0.4	7.27	1000	0.00	0.04	1	*2*	2	3
MW119	5/10/2021 (Round 1)	0	1	20.4	0	0	6	0.4	-	998	0.00	0.00	1	1	1	0
MW101	13/10/2021 (Round 2)	0	4.2	15.2	0	0	6	0.5	3.68	1006	0.00	0.02	1	1	1	0
MW102	13/10/2021 (Round 2)	0	0.1	20.6	0	0	3	0.6	1.35	1007	0.00	0.00	1	1	1	0
MW104	13/10/2021 (Round 2)	0	0.5	20.2	0	0	6	0.5	-	1007	0.00	0.00	1	1	1	0
MW105	13/10/2021 (Round 2)	0	5.5	15.9	0	0	6	0.3	6.24	1007	0.00	0.02	1	*2*	2	3
MW106	13/10/2021 (Round 2)	0	5.2	16.6	0	0	4	0.3	-	1007	0.00	0.02	1	*2*	2	3
MW107	13/10/2021 (Round 2)	0	6.4	10.5	0	0	8	0.3	9.9	1008	0.00	0.02	1	*2*	2	3
MW109	14/10/2021 (Round 2)	0	13.7	2.7	0	0	9	0.5	7.07	1001	0.00	0.07	1	*2*	2	3
MW119	13/10/2021 (Round 2)	0	3.8	16.6	0	0	6	0.5	-	1006	0.00	0.02	1	1	1	0
MW101	20/10/2021 (Round 3)	0	8.1	12.8	0	0	0	0.1	3.64	1018	0.00	0.01	1	*2*	2	3
MW102	20/10/2021 (Round 3)	0	0.3	20.9	0	0	0	0.1	4.37	1015	0.00	0.00	1	1	1	0
MW104	20/10/2021 (Round 3)	0	0	21.4	0	0	0	0.1	-	1013	0.00	0.00	1	1	1	0
MW105	20/10/2021 (Round 3)	0	0	20.9	0	0	0	0.7	5.95	1014	0.00	0.00	1	1	1	0
MW106	20/10/2021 (Round 3)	0	5.9	16.4	0	0	10	1.2	9.35	1015	0.00	0.07	1	2	2	3
MW107	20/10/2021 (Round 3)	0	0	20.6	0	0	0	1.6	9.96	1015	0.00	0.00	1	1	1	0
MW109	20/10/2021 (Round 3)	0	13.3	3.2	0	0	0	0.1	8.57	1015	0.00	0.01	1	*2*	2	3
MW119	20/10/2021 (Round 3)	0	0	20.9	0	0	0	0.4	-	1015	0.00	0.00	1	1	1	0
Total Number of Measurements		24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
Minimum Value		0	0	2.7	0	0	0	0.1	1.35	998	0	0	1	1	1	0
Maximum Value		0	13.7	21.4	0	0	61	1.6	9.96	1018	0.0	0.1	1	2	2	3
					GSV, CS and Gas Protection values for the entire Site						0.00	0.22	1	2	2	3

Residential not recomended without high level intervention and management	
Level 3 Risk Assessment	Level 3 RA
Consider evacuation and social risks	

DSI Data Summary Tables

ABBREVIATIONS AND EXPLANATIONS

Abbreviations used in the Tables:

ABC:	Ambient Background Concentration
ACM:	Asbestos Containing Material
ADWG:	AustralianDrinking Water Guidelines
AF:	Asbestos Fines
ANZG	Australian and New Zealand Guidelines
B(a)P:	Benzo(a)pyrene
CEC:	Cation Exchange Capacity
CRC:	Cooperative Research Centre
CT:	Contaminant Threshold
EILs:	Ecological Investigation Levels
ESLs:	Ecological Screening Levels
FA:	Fibrous Asbestos
GIL:	Groundwater Investigation Levels
HILs:	Health Investigation Levels
HSLs:	Health Screening Levels
HSL-SSA:	Health Screening Level-SiteSpecific Assessment
NA:	Not Analysed
NC:	Not Calculated
NEPM:	National Environmental Protection Measure
NHMRC:	National Health and Medical Research Council
NL:	Not Limiting
NSL:	No Set Limit
OCP:	Organochlorine Pesticides
OPP:	Organophosphorus Pesticides
PAHs:	Polycyclic Aromatic Hydrocarbons
ppm:	Parts per million
PCBs:	Polychlorinated Biphenyls
PCE:	Perchloroethylene (Tetrachloroethylene or Teterachloroethene)
pH_{KCL} :	pH of filtered 1:20, 1M KCL extract, shaken overnight
pH_{ox} :	pH of filtered 1:20 1M KCl after peroxide digestion
PQL:	Practical Quantitation Limit
RS:	Rinsate Sample
RSL:	Regional Screening Levels
SAC:	Site Assessment Criteria
SCC:	Specific Contaminant Concentration
S_{Cr}:	Chromium reducible sulfur
S_{POS}:	Peroxide oxidisable Sulfur
SSA:	Site Specific Assessment
SSHSLs:	Site Specific Health Screening Levels
TAA:	Total Actual Acidity in 1M KCL extract titrated to pH6.5
TB:	Trip Blank
TCA:	1,1,1 Trichloroethane (methyl chloroform)
TCE:	Trichloroethylene (Trichloroethene)
TCLP:	Toxicity Characteristics Leaching Procedure
TPA:	Total Potential Acidity, 1M KCL peroxide digest
TS:	Trip Spike
TRH:	Total Recoverable Hydrocarbons
TSA:	Total Sulfide Acidity (TPA-TAA)
UCL:	Upper Level Confidence Limit on Mean Value
USEPA	United States Environmental Protection Agency
VOCs:	Volatile Organic Compounds
VOCC:	Volatile Organic Chlorinated Compounds
WHO:	World Health Organisation

Table Specific Explanations:

HIL Tables:

- The chromium results are for Total Chromium which includes Chromium III and VI. For initial screening purposes, we have assumed that the samples contain only Chromium VI unless demonstrated otherwise by additional analysis.
- Carcinogenic PAHs is a toxicity weighted sum of analyte concentrations for a specific list of PAH compounds relative to B(a)P. It is also refered to as the B(a)P Toxic Equivalence Quotient (TEQ).
- Statistical calculations are undertaken using ProUCL (USEPA). Statistical calculation is usually undertaken using data from fill samples.

EIL/ESL Table:

- ABC Values for selected metals have been adopted from the published background concentrations presented in Olszowy et. al., (1995), Trace Element Concentrations in Soils from Rural and Urban New South Wales (the 25th percentile values for old suburbs with high traffic have been quoted).

Waste Classification and TCLP Table:

- Data assessed using the NSW EPA Waste Classification Guidelines, Part 1: Classifying Waste (2014).
- The assessment of Total Moderately Harmful pesticides includes: Dichlorovos, Dimethoate, Fenitrothion, Ethion, Malathion and Parathion.
- Assessment of Total Scheduled pesticides include: HBC, alpha-BHC, gamma-BHC, beta-BHC, Heptachlor, Aldrin, Heptachlor Epoxide, gamma-Chlordane, alpha-chlordane, pp-DDE, Dieldrin, Endrin, pp-DDD, pp-DDT, Endrin Aldehyde.

TABLE A
SOIL LABORATORY RESULTS COMPARED TO NEPM 2013.
HIL-A: 'Residential with garden/accessible soils; children's day care centers; preschools; and primary schools'

All data in mg/kg unless stated otherwise			HEAVY METALS								PAHs		ORGANOCHLORINE PESTICIDES (OCPs)							OP PESTICIDES (OPPs)	TOTAL VOCs	TOTAL PCBs	ASBESTOS FIBRES
			Arsenic	Cadmium	Chromium VI	Copper	Lead	Mercury	Nickel	Zinc	Total PAHs	Carcinogenic PAHs	HCB	Endosulfan	Methoxychlor	Aldrin & Dieldrin	Chlordane	DDT, DDD & DDE	Heptachlor	Chlorpyrifos			
PQL - Envirolab Services			4	0.4	1	1	1	0.1	1	1	-	0.05	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	100
Site Assessment Criteria (SAC)			100	20	100	6000	300	40	400	7400	300	3	10	270	300	6	50	240	6	160	0.2*	1	Detected/Not Detected
Sample Reference	**Sample Depth**	**Sample Description**																					
BH1	0.2-0.3	Fill: silty sandy gravel	<4	<0.4	14	17	22	<0.1	24	34	0.71	<0.5	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	NA	<0.1	Not Detected
BH1	0.2-0.3	Laboratory duplicate	<4	<0.4	13	22	8	<0.1	41	26	0.1	<0.5	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	NA	<0.1	NA
BH1	0.2-0.3	Laboratory triplicate	<4	<0.4	15	24	16	<0.1	40	29	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH2	0.0-0.1	Fill: silty sand	<4	<0.4	11	21	160	0	5	120	1.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	NA
BH2	2.5-2.7	Sandstone	<4	<0.4	45	10	30	<0.1	4	150	24	2.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH3	0.1-0.2	Fill: silty gravelly sand	<4	<0.4	45	46	4	<0.1	37	26	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	Not Detected
BH4	0.1-0.2	Fill: silty gravelly sand	<4	<0.4	92	30	4	<0.1	76	41	0.1	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	Not Detected
BH4	0.5-0.7	Fill: silty sand	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.1	NA	NA
BH4	0.5-0.7	Laboratory duplicate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.2	NA	NA
BH4	1.9-2.0	Fill: silty sand	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.2	NA	NA
BH4	2.4-2.5	Clayey sand	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.2	NA	NA
BH5	0.1-0.2	Fill: silty gravelly sand	<4	<0.4	59	19	6	<0.1	59	33	0.4	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	Not Detected
BH5	0.7-0.8	Clayey sand	<4	<0.4	7	<1	5	<0.1	<1	<1	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH6	0.1-0.2	Fill: silty gravelly sand	<4	<0.4	17	58	2	<0.1	110	36	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	Not Detected
BH6	0.6-0.7	Sandy clay	<4	<0.4	10	<1	4	<0.1	3	3	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH7	0.0-0.1	Fill: silty sand	5	<0.4	23	13	24	<0.1	13	43	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	NA
BH8	0.0-0.1	Fill: silty sand	<4	<0.4	11	17	95	0	3	89	4.1	0.6	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	NA
BH8	0.3-0.4	Sandstone	<4	<0.4	9	5	15	0	2	17	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH9	0.1-0.2	Fill: silty sandy gravel	<4	<0.4	37	15	8	<0.1	38	26	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	Not Detected
BH10	0.0-0.1	Fill: silty sand	<4	<0.4	7	7	26	<0.1	2	28	0.2	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	Not Detected
BH11	0.0-0.2	Fill: silty sand	<4	<0.4	5	11	30	<0.1	3	36	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	Not Detected
BH11	0.0-0.2	Laboratory duplicate	<4	<0.4	6	10	32	<0.1	3	37	1.6	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	NA
BH12	0.3-0.5	Fill: silty sand	<4	<0.4	15	18	34	<0.1	9	43	4	0.6	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	Not Detected
BH13	0.0-0.2	Fill: silty sand	<4	<0.4	24	47	84	<0.1	19	120	1.4	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	NA
BH14	0.05-0.25	Fill: silty sand	<4	<0.4	23	51	5	<0.1	47	37	1.2	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	Not Detected
BH14	1.0-1.2	Fill: clayey sand	6	<0.4	14	23	110	0	7	120	5.4	0.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH15	0.0-0.3	Fill: silty sand	<4	<0.4	5	6	54	<0.1	2	35	2.7	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	Not Detected
BH16	0.0-0.15	Fill: silty clayey sand	<4	<0.4	8	31	17	<0.1	18	55	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	Not Detected
BH16	0.15-0.3	Fill: silty clayey sand	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.2	NA	NA
BH17	0.05-0.25	Fill: sandy gravel	<4	<0.4	88	38	5	<0.1	55	34	0.1	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	Not Detected
BH17	0.7-0.75	Fill: silty sand	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.2	NA	NA
BH17	0.75-0.85	Fill: sandy clay	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.2	NA	NA
BH18	0.05-0.25	Fill: sandy gravel	<4	<0.4	76	50	5	<0.1	61	43	0.4	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	Not Detected
BH19	0.0-0.1	Fill: silty sand	17	<0.4	27	100	32	0	9	100	0.72	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	Not Detected
BH20	0.0-0.2	Fill: silty sand	<4	<0.4	10	16	47	<0.1	4	63	0.2	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	Not Detected
BH21	0.05-0.3	Fill: silty sand	<4	<0.4	7	27	9	<0.1	23	23	0.1	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	Not Detected
BH21	0.05-0.3	Laboratory duplicate	<4	<0.4	8	36	12	<0.1	27	25	0.1	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	NA
BH21	0.6-0.9	Fill: silty sand	<4	<0.4	6	12	75	<0.1	2	110	0.4	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	<0.2	NA	NA
BH21	0.9-1.1	Fill: clayey sand	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.2	NA	NA
BH22	0.05-0.2	Fill: sandy gravel	<4	<0.4	70	22	4	0	69	38	0.2	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	Not Detected
BH23	0.0-0.1	Fill: silty sand	<4	<0.4	12	25	120	<0.1	6	110	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	Not Detected
BH23	0.3-0.4	Fill: silty clay	<4	<0.4	17	5	28	<0.1	9	19	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH24	0.0-0.3	Fill: silty sand	<4	<0.4	15	25	54	<0.1	25	150	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	Not Detected
BH25	0.0-0.2	Fill: silty sand	<4	<0.4	11	14	37	<0.1	5	60	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	Not Detected
BH26	0.0-0.1	Fill: silty sand	4	<0.4	15	10	34	<0.1	5	34	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	Not Detected
BH27	0.0-0.2	Fill: silty sand	<4	<0.4	9	12	44	0	7	39	0.3	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	Not Detected
BH28	0.0-0.2	Fill: silty sand	4	<0.4	15	11	41	<0.1	3	40	0.84	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	Not Detected
BH29	0.0-0.2	Fill: silty sand	<4	<0.4	6	5	13	<0.1	3	21	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	Not Detected
BH30	0.05-0.15	Fill: sandy gravel	<4	<0.4	82	28	5	<0.1	78	44	0.2	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	Not Detected
BH30	0.05-0.15	Laboratory duplicate	<4	<0.4	70	22	4	<0.1	69	39	0.1	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	NA
Total Number of Samples			42	42	42	42	42	42	42	42	41	41	34	34	34	34	34	34	34	34	9	34	26
Maximum Value			17	<PQL	92	100	160	0.2	110	150	24	2.5	<PQL	<PQL	<PQL	0.2	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	NC

Concentration above the SAC	**VALUE**

TABLE B
SOIL LABORATORY RESULTS COMPARED TO HSLs
All data in mg/kg unless stated otherwise

					C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene	Field PID Measurement
PQL - Envirolab Services					25	50	0.2	0.5	1	1	1	ppm
NEPM 2013 HSL Land Use Category					HSL-A/B:LOW/HIGH DENSITY RESIDENTIAL							
Sample Reference	**Sample Depth**	**Sample Description**	**Depth Category**	**Soil Category**								
BH1	0.2-0.3	Fill: silty sandy gravel	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH1	0.2-0.3	Laboratory duplicate	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH1	0.2-0.3	Laboratory triplicate	0m to <1m	Sand	NA	NA	NA	NA	NA	NA	NA	0
BH2	0.0-0.1	Fill: silty sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH2	2.5-2.7	Sandstone	2m to <4m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH3	0.1-0.2	Fill: silty gravelly sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH4	0.1-0.2	Fill: silty gravelly sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH5	0.1-0.2	Fill: silty gravelly sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH5	0.7-0.8	Clayey sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH6	0.1-0.2	Fill: silty gravelly sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH6	0.6-0.7	Sandy clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH7	0.0-0.1	Fill: silty sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH8	0.0-0.1	Fill: silty sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH8	0.3-0.4	Sandstone	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH9	0.1-0.2	Fill: silty sandy gravel	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH10	0.0-0.1	Fill: silty sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH11	0.0-0.2	Fill: silty sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH11	0.0-0.2	Laboratory duplicate	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH12	0.3-0.5	Fill: silty sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH13	0.0-0.2	Fill: silty sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH14	0.05-0.25	Fill: silty sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH14	1.0-1.2	Fill: clayey sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH15	0.0-0.3	Fill: silty sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH16	0.0-0.15	Fill: silty clayey sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH17	0.05-0.25	Fill: sandy gravel	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH18	0.05-0.25	Fill: sandy gravel	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH19	0.0-0.1	Fill: silty sand	0m to <1m	Sand	<25	100	<0.2	<0.5	<1	<3	<1	0
BH20	0.0-0.2	Fill: silty sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH21	0.05-0.3	Fill: silty sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH21	0.05-0.3	Laboratory duplicate	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH21	0.6-0.9	Fill: silty sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH22	0.05-0.2	Fill: sandy gravel	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH23	0.0-0.1	Fill: silty sand	0m to <1m	Sand	<25	210	<0.2	<0.5	<1	<3	<1	0
BH23	0.3-0.4	Fill: silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH24	0.0-0.3	Fill: silty sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH25	0.0-0.2	Fill: silty sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH26	0.0-0.1	Fill: silty sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH27	0.0-0.2	Fill: silty sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH28	0.0-0.2	Fill: silty sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH29	0.0-0.2	Fill: silty sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH30	0.05-0.15	Fill: sandy gravel	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
BH30	0.05-0.15	Laboratory duplicate	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
Total Number of Samples					41	41	41	41	41	41	41	42
Maximum Value					<PQL	210	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL

Concentration above the SAC **VALUE**

The guideline corresponding to the elevated value is highlighted in grey in the Site Assessment Criteria Table below

SITE ASSESSMENT CRITERIA

					C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene
PQL - Envirolab Services					25	50	0.2	0.5	1	1	1
NEPM 2013 HSL Land Use Category					HSL-A/B:LOW/HIGH DENSITY RESIDENTIAL						
Sample Reference	**Sample Depth**	**Sample Description**	**Depth Category**	**Soil Category**							
BH1	0.2-0.3	Fill: silty sandy gravel	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH1	0.2-0.3	Laboratory duplicate	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH1	0.2-0.3	Laboratory triplicate	0m to <1m	Sand	NA	NA	NA	NA	NA	NA	NA
BH2	0.0-0.1	Fill: silty sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH2	2.5-2.7	Sandstone	2m to <4m	Sand	110	440	0.5	310	NL	95	NL
BH3	0.1-0.2	Fill: silty gravelly sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH4	0.1-0.2	Fill: silty gravelly sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH5	0.1-0.2	Fill: silty gravelly sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH5	0.7-0.8	Clayey sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH6	0.1-0.2	Fill: silty gravelly sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH6	0.6-0.7	Sandy clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH7	0.0-0.1	Fill: silty sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH8	0.0-0.1	Fill: silty sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH8	0.3-0.4	Sandstone	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH9	0.1-0.2	Fill: silty sandy gravel	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH10	0.0-0.1	Fill: silty sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH11	0.0-0.2	Fill: silty sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH11	0.0-0.2	Laboratory duplicate	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH12	0.3-0.5	Fill: silty sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH13	0.0-0.2	Fill: silty sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH14	0.05-0.25	Fill: silty sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH14	1.0-1.2	Fill: clayey sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH15	0.0-0.3	Fill: silty sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH16	0.0-0.15	Fill: silty clayey sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH17	0.05-0.25	Fill: sandy gravel	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH18	0.05-0.25	Fill: sandy gravel	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH19	0.0-0.1	Fill: silty sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH20	0.0-0.2	Fill: silty sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH21	0.05-0.3	Fill: silty sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH21	0.05-0.3	Laboratory duplicate	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH21	0.6-0.9	Fill: silty sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH22	0.05-0.2	Fill: sandy gravel	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH23	0.0-0.1	Fill: silty sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH23	0.3-0.4	Fill: silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH24	0.0-0.3	Fill: silty sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH25	0.0-0.2	Fill: silty sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH26	0.0-0.1	Fill: silty sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH27	0.0-0.2	Fill: silty sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH28	0.0-0.2	Fill: silty sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH29	0.0-0.2	Fill: silty sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH30	0.05-0.15	Fill: sandy gravel	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH30	0.05-0.15	Laboratory duplicate	0m to <1m	Sand	45	110	0.5	160	55	40	3

TABLE C
SOIL LABORATORY RESULTS COMPARED TO NEPM 2013 EILs AND ESLs
All data in mg/kg unless stated otherwise

Land Use Category				URBAN RESIDENTIAL AND PUBLIC OPEN SPACE																			
							AGED HEAVY METALS-EILs						EILs		ESLs								
				pH	CEC (cmol$_c$/kg)	Clay Content (% clay)	Arsenic	Chromium	Copper	Lead	Nickel	Zinc	Naphthalene	DDT	C_6-C_{10} (F1)	$>C_{10}$-C_{16} (F2)	$>C_{16}$-C_{34} (F3)	$>C_{34}$-C_{40} (F4)	Benzene	Toluene	Ethylbenzene	Total Xylenes	B(a)P
PQL - Envirolab Services				-	1	-	4	1	1	1	1	1	0.1	0.1	25	50	100	100	0.2	0.5	1	1	0.05
Ambient Background Concentration (ABC)				-	-	-	NSL	13	28	163	5	122	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL
Sample Reference	**Sample Depth**	**Sample Description**	**Soil Texture**																				
BH1	0.2-0.3	Fill: silty sandy gravel	Coarse	8.3	22.7	8.7	<4	14	17	22	24	34	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	0.1
BH1	0.2-0.3	Laboratory duplicate	Coarse	8.3	22.7	8.7	<4	13	22	8	41	26	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH1	0.2-0.3	Laboratory triplicate	Coarse	8.3	22.7	8.7	<4	15	24	16	40	29	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH2	0.0-0.1	Fill: silty sand	Coarse	8.3	22.7	8.7	<4	11	21	160	5	120	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	0.2
BH2	2.5-2.7	Sandstone	Coarse	8.3	22.7	8.7	<4	45	10	30	4	150	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	1.8
BH3	0.1-0.2	Fill: silty gravelly sand	Coarse	8.3	22.7	8.7	<4	45	46	4	37	26	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH4	0.1-0.2	Fill: silty gravelly sand	Coarse	8.3	22.7	8.7	<4	92	30	4	76	41	<1	<0.1	<25	<50	120	180	<0.2	<0.5	<1	<3	<0.05
BH5	0.1-0.2	Fill: silty gravelly sand	Coarse	8.3	22.7	8.7	<4	59	19	6	59	33	<1	<0.1	<25	<50	860	310	<0.2	<0.5	<1	<3	0.1
BH5	0.7-0.8	Clayey sand	Coarse	8.3	22.7	8.7	<4	7	<1	5	<1	<1	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH6	0.1-0.2	Fill: silty gravelly sand	Coarse	8.3	22.7	8.7	<4	17	58	2	110	36	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH6	0.6-0.7	Sandy clay	Coarse	8.3	22.7	8.7	<4	10	<1	4	3	3	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH7	0.0-0.1	Fill: silty sand	Coarse	8.3	22.7	8.7	5	23	13	24	13	43	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH8	0.0-0.1	Fill: silty sand	Coarse	8.3	22.7	8.7	<4	11	17	95	3	89	<1	<0.1	<25	<50	200	150	<0.2	<0.5	<1	<3	0.4
BH8	0.3-0.4	Sandstone	Coarse	8.3	22.7	8.7	<4	9	5	15	2	17	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH9	0.1-0.2	Fill: silty sandy gravel	Coarse	8.3	22.7	8.7	<4	37	15	8	38	26	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH10	0.0-0.1	Fill: silty sand	Coarse	8.3	22.7	8.7	<4	7	7	26	2	28	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH11	0.0-0.2	Fill: silty sand	Coarse	8.3	22.7	8.7	<4	5	11	30	3	36	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH11	0.0-0.2	Laboratory duplicate	Coarse	8.3	22.7	8.7	<4	6	10	32	3	37	<1	<0.1	<25	<50	110	<100	<0.2	<0.5	<1	<3	0.1
BH12	0.3-0.5	Fill: silty sand	Coarse	8.3	22.7	8.7	<4	15	18	34	9	43	<1	<0.1	<25	<50	270	270	<0.2	<0.5	<1	<3	0.4
BH13	0.0-0.2	Fill: silty sand	Coarse	8.3	22.7	8.7	<4	24	47	84	19	120	<1	<0.1	<25	<50	310	240	<0.2	<0.5	<1	<3	0.2
BH14	0.05-0.25	Fill: silty sand	Coarse	8.3	22.7	8.7	<4	23	51	5	47	37	<1	<0.1	<25	<50	480	370	<0.2	<0.5	<1	<3	0.2
BH14	1.0-1.2	Fill: clayey sand	Coarse	8.3	22.7	8.7	6	14	23	110	7	120	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	0.4
BH15	0.0-0.3	Fill: silty sand	Coarse	8.3	22.7	8.7	<4	5	6	54	2	35	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	0.2
BH16	0.0-0.15	Fill: silty clayey sand	Coarse	8.3	22.7	8.7	<4	8	31	17	18	55	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH17	0.05-0.25	Fill: sandy gravel	Coarse	8.3	22.7	8.7	<4	88	38	5	55	34	<1	<0.1	<25	<50	310	470	<0.2	<0.5	<1	<3	<0.05
BH18	0.05-0.25	Fill: sandy gravel	Coarse	8.3	22.7	8.7	<4	76	50	5	61	43	<1	<0.1	<25	<50	200	250	<0.2	<0.5	<1	<3	0.05
BH19	0.0-0.1	Fill: silty sand	Coarse	8.3	22.7	8.7	17	27	100	32	9	100	<1	<0.1	<25	100	340	240	<0.2	<0.5	<1	<3	0.09
BH20	0.0-0.2	Fill: silty sand	Coarse	8.3	22.7	8.7	<4	10	16	47	4	63	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	0.05
BH21	0.05-0.3	Fill: silty sand	Coarse	8.3	22.7	8.7	<4	7	27	9	23	23	<1	<0.1	<25	<50	610	850	<0.2	<0.5	<1	<3	<0.05
BH21	0.05-0.3	Laboratory duplicate	Coarse	8.3	22.7	8.7	<4	8	36	12	27	25	<1	<0.1	<25	<50	690	1000	<0.2	<0.5	<1	<3	<0.05
BH21	0.6-0.9	Fill: silty sand	Coarse	8.3	22.7	8.7	<4	6	12	75	2	110	<1	NA	<25	<50	150	<100	<0.2	<0.5	<1	<3	0.09
BH22	0.05-0.2	Fill: sandy gravel	Coarse	8.3	22.7	8.7	<4	70	22	4	69	38	<1	<0.1	<25	<50	130	<100	<0.2	<0.5	<1	<3	<0.05
BH23	0.0-0.1	Fill: silty sand	Coarse	8.3	22.7	8.7	<4	12	25	120	6	110	<1	<0.1	<25	210	1600	610	<0.2	<0.5	<1	<3	<0.05
BH23	0.3-0.4	Fill: silty clay	Coarse	8.3	22.7	8.7	<4	17	5	28	9	19	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH24	0.0-0.3	Fill: silty sand	Coarse	8.3	22.7	8.7	<4	15	25	54	25	150	<1	<0.1	<25	<50	180	150	<0.2	<0.5	<1	<3	<0.05
BH25	0.0-0.2	Fill: silty sand	Coarse	8.3	22.7	8.7	<4	11	14	37	5	60	<1	<0.1	<25	<50	170	180	<0.2	<0.5	<1	<3	<0.05
BH26	0.0-0.1	Fill: silty sand	Coarse	8.3	22.7	8.7	4	15	10	34	5	34	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH27	0.0-0.2	Fill: silty sand	Coarse	8.3	22.7	8.7	<4	9	12	44	7	39	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	0.07
BH28	0.0-0.2	Fill: silty sand	Coarse	8.3	22.7	8.7	4	15	11	41	3	40	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	0.1
BH29	0.0-0.2	Fill: silty sand	Coarse	8.3	22.7	8.7	<4	6	5	13	3	21	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
BH30	0.05-0.15	Fill: sandy gravel	Coarse	8.3	22.7	8.7	<4	82	28	5	78	44	<1	<0.1	<25	<50	<100	120	<0.2	<0.5	<1	<3	<0.05
BH30	0.05-0.15	Laboratory duplicate	Coarse	8.3	22.7	8.7	<4	70	22	4	69	39	<1	<0.1	<25	<50	110	140	<0.2	<0.5	<1	<3	<0.05
Total Number of Samples							42	42	42	42	42	42	41	34	41	41	41	41	41	41	41	41	41
Maximum Value							17	92	100	160	110	150	<PQL	<PQL	<PQL	210	1600	1000	<PQL	<PQL	<PQL	<PQL	1.8

Concentration above the SAC

The guideline corresponding to the elevated value is highlighted in grey in the EIL and ESL Assessment Criteria Table below

EIL AND ESL ASSESSMENT CRITERIA

							AGED HEAVY METALS-EILs						EILs		ESLs								
				pH	CEC (cmol$_c$/kg)	Clay Content (% clay)	Arsenic	Chromium	Copper	Lead	Nickel	Zinc	Naphthalene	DDT	C_6-C_{10} (F1)	$>C_{10}$-C_{16} (F2)	$>C_{16}$-C_{34} (F3)	$>C_{34}$-C_{40} (F4)	Benzene	Toluene	Ethylbenzene	Total Xylenes	B(a)P
PQL - Envirolab Services				-	1	-	4	1	1	1	1	1	0.1	0.1	25	50	100	100	0.2	0.5	1	1	0.05
Ambient Background Concentration (ABC)				-	-	-	NSL	13	28	163	5	122	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL
Sample Reference	**Sample Depth**	**Sample Description**	**Soil Texture**																				
BH1	0.2-0.3	Fill: silty sandy gravel	Coarse	8.3	22.7	8.7	100	413	248	1263	355	1082	170	180	180	120	300	2800	50	85	70	105	20
BH1	0.2-0.3	Laboratory duplicate	Coarse	8.3	22.7	8.7	100	413	248	1263	355	1082	170	180	180	120	300	2800	50	85	70	105	20
BH1	0.2-0.3	Laboratory triplicate	Coarse	8.3	22.7	8.7	100	413	248	1263	355	1082	--	--	--	--	--	--	--	--	--	--	--
BH2	0.0-0.1	Fill: silty sand	Coarse	8.3	22.7	8.7	100	413	248	1263	355	1082	170	180	180	120	300	2800	50	85	70	105	20
BH2	2.5-2.7	Sandstone	Coarse	8.3	22.7	8.7	100	413	248	1263	355	1082	170	--	180	120	300	2800	50	85	70	105	20
BH3	0.1-0.2	Fill: silty gravelly sand	Coarse	8.3	22.7	8.7	100	413	248	1263	355	1082	170	180	180	120	300	2800	50	85	70	105	20
BH4	0.1-0.2	Fill: silty gravelly sand	Coarse	8.3	22.7	8.7	100	413	248	1263	355	1082	170	180	180	120	300	2800	50	85	70	105	20
BH5	0.1-0.2	Fill: silty gravelly sand	Coarse	8.3	22.7	8.7	100	413	248	1263	355	1082	170	180	180	120	300	2800	50	85	70	105	20
BH5	0.7-0.8	Clayey sand	Coarse	8.3	22.7	8.7	100	413	248	1263	355	1082	170	--	180	120	300	2800	50	85	70	105	20
BH6	0.1-0.2	Fill: silty gravelly sand	Coarse	8.3	22.7	8.7	100	413	248	1263	355	1082	170	180	180	120	300	2800	50	85	70	105	20
BH6	0.6-0.7	Sandy clay	Coarse	8.3	22.7	8.7	100	413	248	1263	355	1082	170	--	180	120	300	2800	50	85	70	105	20
BH7	0.0-0.1	Fill: silty sand	Coarse	8.3	22.7	8.7	100	413	248	1263	355	1082	170	180	180	120	300	2800	50	85	70	105	20
BH8	0.0-0.1	Fill: silty sand	Coarse	8.3	22.7	8.7	100	413	248	1263	355	1082	170	180	180	120	300	2800	50	85	70	105	20
BH8	0.3-0.4	Sandstone	Coarse	8.3	22.7	8.7	100	413	248	1263	355	1082	170	--	180	120	300	2800	50	85	70	105	20
BH9	0.1-0.2	Fill: silty sandy gravel	Coarse	8.3	22.7	8.7	100	413	248	1263	355	1082	170	180	180	120	300	2800	50	85	70	105	20
BH10	0.0-0.1	Fill: silty sand	Coarse	8.3	22.7	8.7	100	413	248	1263	355	1082	170	180	180	120	300	2800	50	85	70	105	20
BH11	0.0-0.2	Fill: silty sand	Coarse	8.3	22.7	8.7	100	413	248	1263	355	1082	170	180	180	120	300	2800	50	85	70	105	20
BH11	0.0-0.2	Laboratory duplicate	Coarse	8.3	22.7	8.7	100	413	248	1263	355	1082	170	180	180	120	300	2800	50	85	70	105	20
BH12	0.3-0.5	Fill: silty sand	Coarse	8.3	22.7	8.7	100	413	248	1263	355	1082	170	180	180	120	300	2800	50	85	70	105	20
BH13	0.0-0.2	Fill: silty sand	Coarse	8.3	22.7	8.7	100	413	248	1263	355	1082	170	180	180	120	300	2800	50	85	70	105	20
BH14	0.05-0.25	Fill: silty sand	Coarse	8.3	22.7	8.7	100	413	248	1263	355	1082	170	180	180	120	300	2800	50	85	70	105	20
BH14	1.0-1.2	Fill: clayey sand	Coarse	8.3	22.7	8.7	100	413	248	1263	355	1082	170	--	180	120	300	2800	50	85	70	105	20
BH15	0.0-0.3	Fill: silty sand	Coarse	8.3	22.7	8.7	100	413	248	1263	355	1082	170	180	180	120	300	2800	50	85	70	105	20
BH16	0.0-0.15	Fill: silty clayey sand	Coarse	8.3	22.7	8.7	100	413	248	1263	355	1082	170	180	180	120	300	2800	50	85	70	105	20
BH17	0.05-0.25	Fill: sandy gravel	Coarse	8.3	22.7	8.7	100	413	248	1263	355	1082	170	180	180	120	300	2800	50	85	70	105	20
BH18	0.05-0.25	Fill: sandy gravel	Coarse	8.3	22.7	8.7	100	413	248	1263	355	1082	170	180	180	120	300	2800	50	85	70	105	20
BH19	0.0-0.1	Fill: silty sand	Coarse	8.3	22.7	8.7	100	413	248	1263	355	1082	170	180	180	120	300	2800	50	85	70	105	20
BH20	0.0-0.2	Fill: silty sand	Coarse	8.3	22.7	8.7	100	413	248	1263	355	1082	170	180	180	120	300	2800	50	85	70	105	20
BH21	0.05-0.3	Fill: silty sand	Coarse	8.3	22.7	8.7	100	413	248	1263	355	1082	170	180	180	120	300	2800	50	85	70	105	20
BH21	0.05-0.3	Laboratory duplicate	Coarse	8.3	22.7	8.7	100	413	248	1263	355	1082	170	180	180	120	300	2800	50	85	70	105	20
BH21	0.6-0.9	Fill: silty sand	Coarse	8.3	22.7	8.7	100	413	248	1263	355	1082	170	--	180	120	300	2800	50	85	70	105	20
BH22	0.05-0.2	Fill: sandy gravel	Coarse	8.3	22.7	8.7	100	413	248	1263	355	1082	170	180	180	120	300	2800	50	85	70	105	20
BH23	0.0-0.1	Fill: silty sand	Coarse	8.3	22.7	8.7	100	413	248	1263	355	1082	170	180	180	120	300	2800	50	85	70	105	20
BH23	0.3-0.4	Fill: silty clay	Coarse	8.3	22.7	8.7	100	413	248	1263	355	1082	170	--	180	120	300	2800	50	85	70	105	20
BH24	0.0-0.3	Fill: silty sand	Coarse	8.3	22.7	8.7	100	413	248	1263	355	1082	170	180	180	120	300	2800	50	85	70	105	20
BH25	0.0-0.2	Fill: silty sand	Coarse	8.3	22.7	8.7	100	413	248	1263	355	1082	170	180	180	120	300	2800	50	85	70	105	20
BH26	0.0-0.1	Fill: silty sand	Coarse	8.3	22.7	8.7	100	413	248	1263	355	1082	170	180	180	120	300	2800	50	85	70	105	20
BH27	0.0-0.2	Fill: silty sand	Coarse	8.3	22.7	8.7	100	413	248	1263	355	1082	170	180	180	120	300	2800	50	85	70	105	20
BH28	0.0-0.2	Fill: silty sand	Coarse	8.3	22.7	8.7	100	413	248	1263	355	1082	170	180	180	120	300	2800	50	85	70	105	20
BH29	0.0-0.2	Fill: silty sand	Coarse	8.3	22.7	8.7	100	413	248	1263	355	1082	170	180	180	120	300	2800	50	85	70	105	20
BH30	0.05-0.15	Fill: sandy gravel	Coarse	8.3	22.7	8.7	100	413	248	1263	355	1082	170	180	180	120	300	2800	50	85	70	105	20
BH30	0.05-0.15	Laboratory duplicate	Coarse	8.3	22.7	8.7	100	413	248	1263	355	1082	170	180	180	120	300	2800	50	85	70	105	20

JKEnvironments

TABLE D
SOIL LABORATORY RESULTS COMPARED TO WASTE CLASSIFICATION GUIDELINES
All data in mg/kg unless stated otherwise

			HEAVY METALS								PAHs		OC/OP PESTICIDES				Total PCBs	Total VOCs*	TRH					BTEX COMPOUNDS				ASBESTOS FIBRES
			Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	Total PAHs	B(a)P	Total Endosulfans	Chloropyrifos	Total Moderately Harmful	Total Scheduled			C_6-C_9	C_{10}-C_{14}	C_{15}-C_{28}	C_{29}-C_{36}	Total C_{10}-C_{36}	Benzene	Toluene	Ethyl benzene	Total Xylenes	
PQL - Envirolab Services			4	0.4	1	1	1	0.1	1	1	-	0.05	0.1	0.1	0.1	0.1	0.1	0.2	25	50	100	100	50	0.2	0.5	1	1	100
General Solid Waste CT1			100	20	100	NSL	100	4	40	NSL	200	0.8	60	4	250	<50	<50	4	650		NSL		10,000	10	288	600	1,000	-
General Solid Waste SCC1			500	100	1900	NSL	1500	50	1050	NSL	200	10	108	7.5	250	<50	<50	7.2	650		NSL		10,000	18	518	1,080	1,800	-
Restricted Solid Waste CT2			400	80	400	NSL	400	16	160	NSL	800	3.2	240	16	1000	<50	<50	16	2600		NSL		40,000	40	1,152	2,400	4,000	-
Restricted Solid Waste SCC2			2000	400	7600	NSL	6000	200	4200	NSL	800	23	432	30	1000	<50	<50	28.8	2600		NSL		40,000	72	2,073	4,320	7,200	-
Sample Reference	**Sample Depth**	**Sample Description**																										
BH1	0.2-0.3	Fill: silty sandy gravel	<4	<0.4	14	17	22	<0.1	24	34	0.71	0.1	<0.1	<0.1	<0.1	0.2	<0.1	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	Not Detected
BH1	0.2-0.3	Laboratory duplicate	<4	<0.4	13	22	8	<0.1	**41**	26	0.1	<0.05	<0.1	<0.1	<0.1	0.2	<0.1	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
BH1	0.2-0.3	Laboratory triplicate	<4	<0.4	15	24	16	<0.1	40	29	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH2	0.0-0.1	Fill: silty sand	<4	<0.4	11	21	**160**	0.1	5	120	1.5	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
BH2	2.5-2.7	Sandstone	<4	<0.4	45	10	30	<0.1	4	150	24	**1.8**	NA	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
BH3	0.1-0.2	Fill: silty gravelly sand	<4	<0.4	45	46	4	<0.1	37	26	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	Not Detected
BH4	0.1-0.2	Fill: silty gravelly sand	<4	<0.4	92	30	4	<0.1	**76**	41	0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<25	<50	<100	140	140	<0.2	<0.5	<1	<3	Not Detected
BH4	0.5-0.7	Fill: silty sand	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH4	0.5-0.7	Laboratory duplicate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH4	1.9-2.0	Fill: silty sand	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH4	2.4-2.5	Clayey sand	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH5	0.1-0.2	Fill: silty gravelly sand	<4	<0.4	59	19	6	<0.1	**59**	33	0.4	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<25	<50	310	670	980	<0.2	<0.5	<1	<3	Not Detected
BH5	0.7-0.8	Clayey sand	<4	<0.4	7	<1	5	<0.1	<1	<1	<0.05	<0.05	NA	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
BH6	0.1-0.2	Fill: silty gravelly sand	<4	<0.4	17	58	2	<0.1	**110**	36	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	Not Detected
BH6	0.6-0.7	Sandy clay	<4	<0.4	10	<1	4	<0.1	3	3	<0.05	<0.05	NA	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
BH7	0.0-0.1	Fill: silty sand	5	<0.4	23	13	24	<0.1	13	43	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
BH8	0.0-0.1	Fill: silty sand	<4	<0.4	11	17	95	0.2	3	89	4.1	0.4	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<25	<50	<100	180	180	<0.2	<0.5	<1	<3	NA
BH8	0.3-0.4	Sandstone	<4	<0.4	9	5	15	0.1	2	17	<0.05	<0.05	NA	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
BH9	0.1-0.2	Fill: silty sandy gravel	<4	<0.4	37	15	8	<0.1	38	26	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	Not Detected
BH10	0.0-0.1	Fill: silty sand	<4	<0.4	7	7	26	<0.1	2	28	0.2	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	Not Detected
BH11	0.0-0.2	Fill: silty sand	<4	<0.4	5	11	30	<0.1	3	36	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	Not Detected
BH11	0.0-0.2	Laboratory duplicate	<4	<0.4	6	10	32	<0.1	3	37	1.6	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
BH12	0.3-0.5	Fill: silty sand	<4	<0.4	15	18	34	<0.1	9	43	4	0.4	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<25	<50	120	240	360	<0.2	<0.5	<1	<3	Not Detected
BH13	0.0-0.2	Fill: silty sand	<4	<0.4	24	47	84	<0.1	19	120	1.4	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<25	<50	140	260	400	<0.2	<0.5	<1	<3	NA
BH14	0.05-0.25	Fill: silty sand	<4	<0.4	23	51	5	<0.1	**47**	37	1.2	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<25	<50	210	390	600	<0.2	<0.5	<1	<3	Not Detected
BH14	1.0-1.2	Fill: clayey sand	6	<0.4	14	23	**110**	0.2	7	120	5.4	0.4	NA	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
BH15	0.0-0.3	Fill: silty sand	<4	<0.4	5	6	54	<0.1	2	35	2.7	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	Not Detected
BH16	0.0-0.15	Fill: silty clayey sand	<4	<0.4	8	31	17	<0.1	18	55	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	Not Detected
BH16	0.15-0.3	Fill: silty clayey sand	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH17	0.05-0.25	Fill: sandy gravel	<4	<0.4	88	38	5	<0.1	**55**	34	0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<25	<50	<100	380	380	<0.2	<0.5	<1	<3	Not Detected
BH17	0.7-0.75	Fill: silty sand	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH17	0.75-0.85	Fill: sandy clay	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH18	0.05-0.25	Fill: sandy gravel	<4	<0.4	76	50	5	<0.1	**61**	43	0.4	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<25	<50	<100	200	200	<0.2	<0.5	<1	<3	Not Detected
BH19	0.0-0.1	Fill: silty sand	17	<0.4	27	100	32	0.2	9	100	0.72	0.09	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<25	98	170	270	538	<0.2	<0.5	<1	<3	Not Detected
BH20	0.0-0.2	Fill: silty sand	<4	<0.4	10	16	47	<0.1	4	63	0.2	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	Not Detected
BH21	0.05-0.3	Fill: silty sand	<4	<0.4	7	27	9	<0.1	23	23	0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<25	<50	220	650	870	<0.2	<0.5	<1	<3	Not Detected
BH21	0.05-0.3	Laboratory duplicate	<4	<0.4	8	36	12	<0.1	27	25	0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<25	<50	250	710	960	<0.2	<0.5	<1	<3	NA
BH21	0.6-0.9	Fill: silty sand	<4	<0.4	6	12	75	<0.1	2	110	0.4	0.09	NA	NA	NA	NA	NA	<0.2	<25	<50	<100	170	170	<0.2	<0.5	<1	<3	NA
BH21	0.9-1.1	Fill: clayey sand	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH22	0.05-0.2	Fill: sandy gravel	<4	<0.4	70	22	4	0.1	**69**	38	0.2	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	Not Detected
BH23	0.0-0.1	Fill: silty sand	<4	<0.4	12	25	**120**	<0.1	6	110	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<25	180	1000	900	2080	<0.2	<0.5	<1	<3	Not Detected
BH23	0.3-0.4	Fill: silty clay	<4	<0.4	17	5	28	<0.1	9	19	<0.05	<0.05	NA	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
BH24	0.0-0.3	Fill: silty sand	<4	<0.4	15	25	54	<0.1	25	150	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<25	<50	<100	140	140	<0.2	<0.5	<1	<3	Not Detected
BH25	0.0-0.2	Fill: silty sand	<4	<0.4	11	14	37	<0.1	5	60	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<25	<50	<100	180	180	<0.2	<0.5	<1	<3	Not Detected
BH26	0.0-0.1	Fill: silty sand	4	<0.4	15	10	34	<0.1	5	34	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	Not Detected
BH27	0.0-0.2	Fill: silty sand	<4	<0.4	9	12	44	0.1	7	39	0.3	0.07	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	Not Detected
BH28	0.0-0.2	Fill: silty sand	4	<0.4	15	11	41	<0.1	3	40	0.84	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	Not Detected
BH29	0.0-0.2	Fill: silty sand	<4	<0.4	6	5	13	<0.1	3	21	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	Not Detected
BH30	0.05-0.15	Fill: sandy gravel	<4	<0.4	82	28	5	<0.1	**78**	44	0.2	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	Not Detected
BH30	0.05-0.15	Laboratory duplicate	<4	<0.4	70	22	4	<0.1	**69**	39	0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<25	<50	<100	100	100	<0.2	<0.5	<1	<3	NA
Total Number of samples			42	42	42	42	42	42	42	42	41	41	34	34	34	34	34	9	41	41	41	41	41	41	41	41	41	26
Maximum Value			17	<PQL	92	100	160	0.2	110	150	24	1.8	<PQL	<PQL	<PQL	0.2	<PQL	<PQL	<PQL	180	1000	900	2080	<PQL	<PQL	<PQL	<PQL	NC

*The VOC vinyl chloride has the lowest classification criteria for waste, therefore it has been adopted it as the criteria for total VOCs

Concentration above the CT1	VALUE
Concentration above SCC1	VALUE
Concentration above the SCC2	VALUE

JKEnvironments

TABLE E
SOIL LABORATORY TCLP RESULTS
All data in mg/L unless stated otherwise

			Lead	Nickel
PQL - Envirolab Services			0.03	0.02
TCLP1 - General Solid Waste			5	2
TCLP2 - Restricted Solid Waste			20	8
TCLP3 - Hazardous Waste			>20	>8
Sample Reference	**Sample Depth**	**Sample Description**		
BH2	0.0-0.1	Fill: silty sand	0.03	NA
BH4	0.1-0.2	Fill: silty gravelly sand	NA	0.06
BH6	0.1-0.2	Fill: silty gravelly sand	NA	0.1
BH18	0.05-0.25	Fill: sandy gravel	NA	0.02
BH22	0.05-0.2	Fill: sandy gravel	NA	0.04
BH23	0.0-0.1	Fill: silty sand	<0.03	NA
BH30	0.05-0.15	Fill: sandy gravel	NA	0.1
BH30	0.05-0.15	Laboratory duplicate	NA	0.09
Total Number of samples			2	6
Maximum Value			0.03	0.1

General Solid Waste	**VALUE**
Restricted Solid Waste	**VALUE**
Hazardous Waste	**VALUE**

TABLE F
SOIL LABORATORY RESULTS COMPARED TO MANAGEMENT LIMITS
All data in mg/kg unless stated otherwise

			C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	>C_{16}-C_{34} (F3)	>C_{34}-C_{40} (F4)
PQL - Envirolab Services			25	50	100	100
NEPM 2013 Land Use Category			RESIDENTIAL, PARKLAND & PUBLIC OPEN SPACE			
Sample Reference	**Sample Depth**	**Soil Texture**				
BH1	0.2-0.3	Coarse	<25	<50	<100	<100
BH1	0.2-0.3	Coarse	<25	<50	<100	<100
BH1	0.2-0.3	Coarse	NA	NA	NA	NA
BH2	0.0-0.1	Coarse	<25	<50	<100	<100
BH2	2.5-2.7	Coarse	<25	<50	<100	<100
BH3	0.1-0.2	Coarse	<25	<50	<100	<100
BH4	0.1-0.2	Coarse	<25	<50	120	180
BH5	0.1-0.2	Coarse	<25	<50	860	310
BH5	0.7-0.8	Coarse	<25	<50	<100	<100
BH6	0.1-0.2	Coarse	<25	<50	<100	<100
BH6	0.6-0.7	Coarse	<25	<50	<100	<100
BH7	0.0-0.1	Coarse	<25	<50	<100	<100
BH8	0.0-0.1	Coarse	<25	<50	200	150
BH8	0.3-0.4	Coarse	<25	<50	<100	<100
BH9	0.1-0.2	Coarse	<25	<50	<100	<100
BH10	0.0-0.1	Coarse	<25	<50	<100	<100
BH11	0.0-0.2	Coarse	<25	<50	<100	<100
BH11	0.0-0.2	Coarse	<25	<50	110	<100
BH12	0.3-0.5	Coarse	<25	<50	270	270
BH13	0.0-0.2	Coarse	<25	<50	310	240
BH14	0.05-0.25	Coarse	<25	<50	480	370
BH14	1.0-1.2	Coarse	<25	<50	<100	<100
BH15	0.0-0.3	Coarse	<25	<50	<100	<100
BH16	0.0-0.15	Coarse	<25	<50	<100	<100
BH17	0.05-0.25	Coarse	<25	<50	310	470
BH18	0.05-0.25	Coarse	<25	<50	200	250
BH19	0.0-0.1	Coarse	<25	100	340	240
BH20	0.0-0.2	Coarse	<25	<50	<100	<100
BH21	0.05-0.3	Coarse	<25	<50	610	850
BH21	0.05-0.3	Coarse	<25	<50	690	1000
BH21	0.6-0.9	Coarse	<25	<50	150	<100
BH22	0.05-0.2	Coarse	<25	<50	130	<100
BH23	0.0-0.1	Coarse	<25	210	1600	610
BH23	0.3-0.4	Coarse	<25	<50	<100	<100
BH24	0.0-0.3	Coarse	<25	<50	180	150
BH25	0.0-0.2	Coarse	<25	<50	170	180
BH26	0.0-0.1	Coarse	<25	<50	<100	<100
BH27	0.0-0.2	Coarse	<25	<50	<100	<100
BH28	0.0-0.2	Coarse	<25	<50	<100	<100
BH29	0.0-0.2	Coarse	<25	<50	<100	<100
BH30	0.05-0.15	Coarse	<25	<50	<100	120
BH30	0.05-0.15	Coarse	<25	<50	110	140
Total Number of Samples			41	41	41	41
Maximum Value			<PQL	210	1600	1000

Concentration above the SAC **VALUE**

MANAGEMENT LIMIT ASSESSMENT CRITERIA

			C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	>C_{16}-C_{34} (F3)	>C_{34}-C_{40} (F4)
PQL - Envirolab Services			25	50	100	100
NEPM 2013 Land Use Category			RESIDENTIAL, PARKLAND & PUBLIC OPEN SPACE			
Sample Reference	**Sample Depth**	**Soil Texture**				
BH1	0.2-0.3	Coarse	700	1000	2500	10000
BH1	0.2-0.3	Coarse	700	1000	2500	10000
BH1	0.2-0.3	Coarse	--	--	--	--
BH2	0.0-0.1	Coarse	700	1000	2500	10000
BH2	2.5-2.7	Coarse	700	1000	2500	10000
BH3	0.1-0.2	Coarse	700	1000	2500	10000
BH4	0.1-0.2	Coarse	700	1000	2500	10000
BH5	0.1-0.2	Coarse	700	1000	2500	10000
BH5	0.7-0.8	Coarse	700	1000	2500	10000
BH6	0.1-0.2	Coarse	700	1000	2500	10000
BH6	0.6-0.7	Coarse	700	1000	2500	10000
BH7	0.0-0.1	Coarse	700	1000	2500	10000
BH8	0.0-0.1	Coarse	700	1000	2500	10000
BH8	0.3-0.4	Coarse	700	1000	2500	10000
BH9	0.1-0.2	Coarse	700	1000	2500	10000
BH10	0.0-0.1	Coarse	700	1000	2500	10000
BH11	0.0-0.2	Coarse	700	1000	2500	10000
BH11	0.0-0.2	Coarse	700	1000	2500	10000
BH12	0.3-0.5	Coarse	700	1000	2500	10000
BH13	0.0-0.2	Coarse	700	1000	2500	10000
BH14	0.05-0.25	Coarse	700	1000	2500	10000
BH14	1.0-1.2	Coarse	700	1000	2500	10000
BH15	0.0-0.3	Coarse	700	1000	2500	10000
BH16	0.0-0.15	Coarse	700	1000	2500	10000
BH17	0.05-0.25	Coarse	700	1000	2500	10000
BH18	0.05-0.25	Coarse	700	1000	2500	10000
BH19	0.0-0.1	Coarse	700	1000	2500	10000
BH20	0.0-0.2	Coarse	700	1000	2500	10000
BH21	0.05-0.3	Coarse	700	1000	2500	10000
BH21	0.05-0.3	Coarse	700	1000	2500	10000
BH21	0.6-0.9	Coarse	700	1000	2500	10000
BH22	0.05-0.2	Coarse	700	1000	2500	10000
BH23	0.0-0.1	Coarse	700	1000	2500	10000
BH23	0.3-0.4	Coarse	700	1000	2500	10000
BH24	0.0-0.3	Coarse	700	1000	2500	10000
BH25	0.0-0.2	Coarse	700	1000	2500	10000
BH26	0.0-0.1	Coarse	700	1000	2500	10000
BH27	0.0-0.2	Coarse	700	1000	2500	10000
BH28	0.0-0.2	Coarse	700	1000	2500	10000
BH29	0.0-0.2	Coarse	700	1000	2500	10000
BH30	0.05-0.15	Coarse	700	1000	2500	10000
BH30	0.05-0.15	Coarse	700	1000	2500	10000

TABLE G
SOIL LABORATORY RESULTS COMPARED T0 DIRECT CONTACT CRITERIA
All data in mg/kg unless stated otherwise

Analyte		C_6-C_{10}	>C_{10}-C_{16}	>C_{16}-C_{34}	>C_{34}-C_{40}	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene	PID
PQL - Envirolab Services		25	50	100	100	0.2	0.5	1	1	1	
CRC 2011 -Direct contact Criteria		82,000	62,000	85,000	120,000	1,100	120,000	85,000	130,000	29,000	
Site Use		**Intrusive Maintenance Worker - DIRECT SOIL CONTACT**									
Sample Reference	**Sample Depth**										
BH1	0.2-0.3	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
BH1	0.2-0.3	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
BH1	0.2-0.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	0
BH2	0.0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
BH2	2.5-2.7	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
BH3	0.1-0.2	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
BH4	0.1-0.2	<25	<50	120	180	<0.2	<0.5	<1	<3	<1	0
BH5	0.1-0.2	<25	<50	860	310	<0.2	<0.5	<1	<3	<1	0
BH5	0.7-0.8	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
BH6	0.1-0.2	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
BH6	0.6-0.7	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
BH7	0.0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
BH8	0.0-0.1	<25	<50	200	150	<0.2	<0.5	<1	<3	<1	0
BH8	0.3-0.4	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
BH9	0.1-0.2	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
BH10	0.0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
BH11	0.0-0.2	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
BH11	0.0-0.2	<25	<50	110	<100	<0.2	<0.5	<1	<3	<1	0
BH12	0.3-0.5	<25	<50	270	270	<0.2	<0.5	<1	<3	<1	0
BH13	0.0-0.2	<25	<50	310	240	<0.2	<0.5	<1	<3	<1	0
BH14	0.05-0.25	<25	<50	480	370	<0.2	<0.5	<1	<3	<1	0
BH14	1.0-1.2	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
BH15	0.0-0.3	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
BH16	0.0-0.15	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
BH17	0.05-0.25	<25	<50	310	470	<0.2	<0.5	<1	<3	<1	0
BH18	0.05-0.25	<25	<50	200	250	<0.2	<0.5	<1	<3	<1	0
BH19	0.0-0.1	<25	100	340	240	<0.2	<0.5	<1	<3	<1	0
BH20	0.0-0.2	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
BH21	0.05-0.3	<25	<50	610	850	<0.2	<0.5	<1	<3	<1	0
BH21	0.05-0.3	<25	<50	690	1000	<0.2	<0.5	<1	<3	<1	0
BH21	0.6-0.9	<25	<50	150	<100	<0.2	<0.5	<1	<3	<1	0
BH22	0.05-0.2	<25	<50	130	<100	<0.2	<0.5	<1	<3	<1	0
BH23	0.0-0.1	<25	210	1600	610	<0.2	<0.5	<1	<3	<1	0
BH23	0.3-0.4	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
BH24	0.0-0.3	<25	<50	180	150	<0.2	<0.5	<1	<3	<1	0
BH25	0.0-0.2	<25	<50	170	180	<0.2	<0.5	<1	<3	<1	0
BH26	0.0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
BH27	0.0-0.2	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
BH28	0.0-0.2	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
BH29	0.0-0.2	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	0
BH30	0.05-0.15	<25	<50	<100	120	<0.2	<0.5	<1	<3	<1	0
BH30	0.05-0.15	<25	<50	110	140	<0.2	<0.5	<1	<3	<1	0
Total Number of Samples		41	41	41	41	41	41	41	41	41	42
Maximum Value		<PQL	210	1600	1000	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL

Concentration above the SAC **VALUE**

JKEnvironments

TABLE H
ASBESTOS QUANTIFICATION - FIELD OBSERVATIONS AND LABORATORY RESULTS
HSL-A: Residential with garden/accessible soils; children's day care centers; preschools; and primary schools

FIELD DATA															LABORATORY DATA											
Date Sampled	Sample reference	Sample Depth	Visible ACM in top 100mm	Approx. Volume of Soil (L)	Soil Mass (g)	Mass ACM (g)	Mass Asbestos in ACM (g)	[Asbestos from ACM in soil] (%w/w)	Mass ACM <7mm (g)	Mass Asbestos in ACM <7mm (g)	[Asbestos from ACM <7mm in soil] (%w/w)	Mass FA (g)	Mass Asbestos in FA (g)	[Asbestos from FA in soil] (%w/w)	Lab Report Number	Sample refeference	Sample Depth	Sample Mass (g)	Asbestos ID in soil (AS4964) >0.1g/kg	Trace Analysis	Total Asbestos (g/kg)	Asbestos ID in soil <0.1g/kg	ACM >7mm Estimation (g)	FA and AF Estimation (g)	ACM >7mm Estimation %(w/w)	FA and AF Estimation %(w/w)
SAC			**No**					**0.01**			**0.001**			**0.001**											**0.01**	**0.001**
22/07/2019	BH1	0.2-0.3	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
22/07/2019	BH1	0.5-0.7	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
22/07/2019	BH1	0.75-0.95	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
22/07/2019	BH1	1.6-1.8	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
22/07/2019	BH1	2.8-3.0	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
23/07/2019	BH2	0.0-0.1	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	222520	BH2	0.0-0.1	538.87	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
23/07/2019	BH2	0.6-0.7	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
23/07/2019	BH2	1.0-1.1	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
23/07/2019	BH3	0.1-0.2	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
23/07/2019	BH3	0.3-0.5	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
23/07/2019	BH3	0.5-0.6	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
23/07/2019	BH4	0.1-0.2	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
23/07/2019	BH4	0.2-0.3	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
23/07/2019	BH4	0.5-0.7	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
23/07/2019	BH4	1.3-1.4	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
23/07/2019	BH4	1.9-2.0	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
23/07/2019	BH5	0.1-0.2	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
23/07/2019	BH5	0.2-0.3	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
23/07/2019	BH6	0.1-0.2	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
23/07/2019	BH6	0.3-0.4	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
23/07/2019	BH7	0.0-0.1	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	222520	BH7	0.0-0.1	413.74	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
24/07/2019	BH8	0.0-0.1	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	222520	BH8	0.0-0.1	381.85	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
24/07/2019	BH9	0.1-0.2	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
24/07/2019	BH9	0.4-0.6	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
24/07/2019	BH9	0.6-0.9	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
24/07/2019	BH10	0.0-0.1	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
25/07/2019	BH11	0.0-0.2	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
25/07/2019	BH11	0.2-0.4	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
25/07/2019	BH11	0.4-0.6	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
25/07/2019	BH12	0.3-0.5	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
25/07/2019	BH12	1.0-1.2	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
25/07/2019	BH12	2.0-2.2	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
25/07/2019	BH12	2.5-2.7	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
25/07/2019	BH12	2.8-3.1	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
25/07/2019	BH12	3.8-4.0	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
25/07/2019	BH13	0.0-0.2	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	222520	BH13	0.0-0.2	661.1	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
25/07/2019	BH13	0.3-0.5	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
25/07/2019	BH14	0.05-0.25	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
25/07/2019	BH14	0.4-.6	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
25/07/2019	BH14	0.65-0.8	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
25/07/2019	BH14	1.0-1.2	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
25/07/2019	BH14	1.4-1.6	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
25/07/2019	BH14	2.3-2.4	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
25/07/2019	BH15	0.0-0.3	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
25/07/2019	BH15	0.4-0.5	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
25/07/2019	BH15	0.5-0.7	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
25/07/2019	BH15	0.9-1.1	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
24/07/2019	BH16	0.0-0.15	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
24/07/2019	BH16	0.15-0.3	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
24/07/2019	BH16	0.3-0.5	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
24/07/2019	BH17	0.05-0.25	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
24/07/2019	BH17	0.25-0.45	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
24/07/2019	BH17	0.7-0.75	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
24/07/2019	BH17	0.75-0.85	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
25/07/2019	BH18	0.05-0.25	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
25/07/2019	BH18	0.25-0.4	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
25/07/2019	BH18	0.4-0.6	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
25/07/2019	BH18	0.6-0.8	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
25/07/2019	BH18	0.9-1.1	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
25/07/2019	BH19	0.0-0.1	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
25/07/2019	BH19	0.1-0.2	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
24/07/2019	BH20	0.0-0.2	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
25/07/2019	BH21	0.05-0.3	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
25/07/2019	BH21	0.3-0.6	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
25/07/2019	BH21	0.6-0.9	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
25/07/2019	BH22	0.05-0.2	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
25/07/2019	BH22	0.3-0.5	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
25/07/2019	BH23	0.0-0.1	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
25/07/2019	BH23	0.3-0.4	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
24/07/2019	BH24	0.0-0.3	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
24/07/2019	BH24	0.3-0.5	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
24/07/2019	BH24	0.5-0.7	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
24/07/2019	BH25	0.0-0.2	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
24/07/2019	BH26	0.0-0.1	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
24/07/2019	BH26	0.1-0.3	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
24/07/2019	BH27	0.0-0.2	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
24/07/2019	BH27	0.25-0.45	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
24/07/2019	BH28	0.0-0.2	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
24/07/2019	BH28	0.2-0.3	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
24/07/2019	BH29	0.0-0.2	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
24/07/2019	BH29	0.3-0.4	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
24/07/2019	BH29	0.5-0.7	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
24/07/2019	BH29	0.8-0.9	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
24/07/2019	BH29	0.9-1.1	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
24/07/2019	BH30	0.05-0.15	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
24/07/2019	BH30	0.15-0.3	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
24/07/2019	BH30	0.3-0.45	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
24/07/2019	BH30	0.45-0.6	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
24/07/2019	BH30	0.6-0.7	No	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Concentration above the SAC **VALUE**

TABLE I
GROUNDWATER LABORATORY RESULTS COMPARED TO HSLs
All data in µg/L unless stated otherwise

				C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene	PID
PQL - Envirolab Services				10	50	1	1	1	3	1	
NEPM 2013 - Land Use Category				**HSL-A/B: LOW/HIGH DENSITY RESIDENTIAL**							
Sample Reference	**Water Depth**	**Depth Category**	**Soil Category**								
MW7	6.35	4m to <8m	Sand	19	300	<1	4	<1	15	<1	24.1
Total Number of Samples				1	1	1	1	1	1	1	1
Maximum Value				19	300	<PQL	4	<PQL	15	<PQL	24.1

Concentration above the SAC — VALUE
Site specific assesment (SSA) required — VALUE

The guideline corresponding to the elevated value is highlighted in grey in the Site Assessment Criteria Table below

HSL GROUNDWATER ASSESSMENT CRITERIA

				C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene
PQL - Envirolab Services				10	50	1	1	1	3	1
NEPM 2013 - Land Use Category				**HSL-A/B: LOW/HIGH DENSITY RESIDENTIAL**						
Sample Reference	**Water Depth**	**Depth Category**	**Soil Category**							
MW7	6.35	4m to <8m	Sand	1000	1000	800	NL	NL	NL	NL

TABLE J
SUMMARY OF GROUNDAWATER LABORATORY RESULTS COMPARED TO ECOLOGICAL GILs SAC
All results in µg/L unless stated otherwise.

	PQL Envirolab Services	ANZG 2018 Fresh Waters	SAMPLES MW7 1/08/2019
Inorganic Compounds and Parameters			
pH	0.1	6.5 - 8.5	6.7
Electrical Conductivity (µS/cm)	1	NSL	270
Metals and Metalloids			
Arsenic (As III)	1	24	<1
Cadmium	0.1	0.2	<0.1
Chromium (VI)	1	1	<1
Copper	1	1.4	**2**
Lead	1	3.4	<1
Total Mercury (inorganic)	0.05	0.06	<0.05
Nickel	1	11	2
Zinc	1	8	4
Monocyclic Aromatic Hydrocarbons (BTEX Compounds)			
Benzene	1	950	<1
Toluene	1	180	4
Ethylbenzene	1	80	<1
m+p-xylene	2	75	8
o-xylene	1	350	7
Total xylenes	2	NSL	15
Volatile Organic Compounds (VOCs), including chlorinated VOCs			
Dichlorodifluoromethane	10	NSL	<10
Chloromethane	10	NSL	<10
Vinyl Chloride	10	100	<10
Bromomethane	10	NSL	<10
Chloroethane	10	NSL	<10
Trichlorofluoromethane	10	NSL	<10
1,1-Dichloroethene	1	700	<1
Trans-1,2-dichloroethene	1	NSL	<1
1,1-dichloroethane	1	90	<1
Cis-1,2-dichloroethene	1	NSL	<1
Bromochloromethane	1	NSL	<1
Chloroform	1	370	18
2,2-dichloropropane	1	NSL	<1
1,2-dichloroethane	1	1900	<1
1,1,1-trichloroethane	1	270	<1
1,1-dichloropropene	1	NSL	<1
Cyclohexane	1	NSL	<1
Carbon tetrachloride	1	240	<1
Benzene	1	see BTEX	<1
Dibromomethane	1	NSL	<1
1,2-dichloropropane	1	900	<1
Trichloroethene	1	NSL	<1
Bromodichloromethane	1	NSL	14
trans-1,3-dichloropropene	1	NSL	<1
cis-1,3-dichloropropene	1	NSL	<1
1,1,2-trichloroethane	1	6500	<1
Toluene	1	see BTEX	4
1,3-dichloropropane	1	1100	<1
Dibromochloromethane	1	NSL	6
1,2-dibromoethane	1	NSL	<1
Tetrachloroethene	1	70	<1
1,1,1,2-tetrachloroethane	1	NSL	<1
Chlorobenzene	1	55	<1
Ethylbenzene	1	see BTEX	<1
Bromoform	1	NSL	<1
m+p-xylene	2	see BTEX	8
Styrene	1	NSL	<1
1,1,2,2-tetrachloroethane	1	400	<1
o-xylene	1	see BTEX	7
1,2,3-trichloropropane	1	NSL	<1
Isopropylbenzene	1	30	<1
Bromobenzene	1	NSL	<1
n-propyl benzene	1	NSL	<1
2-chlorotoluene	1	NSL	<1
4-chlorotoluene	1	NSL	<1
1,3,5-trimethyl benzene	1	NSL	3
Tert-butyl benzene	1	NSL	<1
1,2,4-trimethyl benzene	1	NSL	9
1,3-dichlorobenzene	1	260	<1
Sec-butyl benzene	1	NSL	<1
1,4-dichlorobenzene	1	60	<1
4-isopropyl toluene	1	NSL	1
1,2-dichlorobenzene	1	160	<1
n-butyl benzene	1	NSL	<1
1,2-dibromo-3-chloropropane	1	NSL	<1
1,2,4-trichlorobenzene	1	85	<1
Hexachlorobutadiene	1	NSL	<1
1,2,3-trichlorobenzene	1	3	<1
Polycyclic Aromatic Hydrocarbons (PAHs)			
Naphthalene	0.2	16	<0.2
Acenaphthylene	0.1	NSL	<0.1
Acenaphthene	0.1	NSL	<0.1
Fluorene	0.1	NSL	<0.1
Phenanthrene	0.1	0.6	<0.1
Anthracene	**0.1**	0.01	<0.1
Fluoranthene	0.1	1	<0.1
Pyrene	0.1	NSL	<0.1
Benzo(a)anthracene	0.1	NSL	<0.1
Chrysene	0.1	NSL	<0.1
Benzo(b,j+k)fluoranthene	0.2	NSL	<0.2
Benzo(a)pyrene	0.1	0.1	<0.1
Indeno(1,2,3-c,d)pyrene	0.1	NSL	<0.1
Dibenzo(a,h)anthracene	0.1	NSL	<0.1
Benzo(g,h,i)perylene	0.1	NSL	<0.1

Concentration above the GIL	VALUE
PQL exceeds GIL	**BOLD/RED**

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TABLE K
SUMMARY OF GROUNDAWATER LABORATORY RESULTS COMPARED TO HUMAN CONTACT GILs
All results in μg/L unless stated otherwise.

	PQL Envirolab Services	ANZG 2000 Recreational	NHMRC ADWG 2011	SAMPLES MW7 1/08/2019
Inorganic Compounds and Parameters				
pH	0.1	6.5 - 8.5	6.5 - 8.5	6.7
Electrical Conductivity (μS/cm)	1	NSL	NSL	270
Metals and Metalloids				
Arsenic (As III)	1	50	10	<1
Cadmium	0.1	5	2	<0.1
Chromium (total)	1	50	50	<1
Copper	1	1000	2000	2
Lead	1	50	10	<1
Total Mercury (inorganic)	0.05	1	1	<0.05
Nickel	1	100	20	2
Zinc	1	5000	3000	4
Monocyclic Aromatic Hydrocarbons (BTEX Compounds)				
Benzene	1	10	1	<1
Toluene	1	NSL	800	4
Ethylbenzene	1	NSL	300	<1
m+p-xylene	2	NSL	NSL	8
o-xylene	1	NSL	NSL	7
Total xylenes	2	NSL	600	15
Volatile Organic Compounds (VOCs), including chlorinated VOCs				
Dichlorodifluoromethane	10	NSL	NSL	<10
Chloromethane	10	NSL	NSL	<10
Vinyl Chloride	10	NSL	0.3	<10
Bromomethane	10	NSL	NSL	<10
Chloroethane	10	NSL	NSL	<10
Trichlorofluoromethane	10	NSL	NSL	<10
1,1-Dichloroethene	1	0.3	30	<1
Trans-1,2-dichloroethene	1	NSL	NSL	<1
1,1-dichloroethane	1	NSL	NSL	<1
Cis-1,2-dichloroethene	1	NSL	NSL	<1
Bromochloromethane	1	NSL	250	<1
Chloroform	1	NSL		18
2,2-dichloropropane	1	NSL	NSL	<1
1,2-dichloroethane	1	10	3	<1
1,1,1-trichloroethane	1	NSL	NSL	<1
1,1-dichloropropene	1	NSL	NSL	<1
Cyclohexane	1	NSL	NSL	<1
Carbon tetrachloride	1	3	NSL	<1
Benzene	1	NSL	see BTEX	<1
Dibromomethane	1	NSL	NSL	<1
1,2-dichloropropane	1	NSL	NSL	<1
Trichloroethene	1	30	NSL	<1
Bromodichloromethane	1	NSL	NSL	14
trans-1,3-dichloropropene	1	NSL	NSL	<1
cis-1,3-dichloropropene	1	NSL	NSL	<1
1,1,2-trichloroethane	1	NSL	NSL	<1
Toluene	1	NSL	see BTEX	4
1,3-dichloropropane	1	NSL	NSL	<1
Dibromochloromethane	1	NSL	NSL	6
1,2-dibromoethane	1	NSL	NSL	<1
Tetrachloroethene	1	10	NSL	<1
1,1,1,2-tetrachloroethane	1	NSL	NSL	<1
Chlorobenzene	1	NSL	300	<1
Ethylbenzene	1	NSL	see BTEX	<1
Bromoform	1	NSL	NSL	<1
m+p-xylene	2	NSL	see BTEX	8
Styrene	1	NSL	NSL	<1
1,1,2,2-tetrachloroethane	1	NSL	NSL	<1
o-xylene	1	NSL	see BTEX	7
1,2,3-trichloropropane	1	NSL	NSL	<1
Isopropylbenzene	1	NSL	NSL	<1
Bromobenzene	1	NSL	NSL	<1
n-propyl benzene	1	NSL	NSL	<1
2-chlorotoluene	1	NSL	NSL	<1
4-chlorotoluene	1	NSL	NSL	<1
1,3,5-trimethyl benzene	1	NSL	NSL	3
Tert-butyl benzene	1	NSL	NSL	<1
1,2,4-trimethyl benzene	1	NSL	NSL	9
1,3-dichlorobenzene	1	NSL	300	<1
Sec-butyl benzene	1	NSL	NSL	<1
1,4-dichlorobenzene	1	NSL	40	<1
4-isopropyl toluene	1	NSL	NSL	1
1,2-dichlorobenzene	1	NSL	1500	<1
n-butyl benzene	1	NSL	NSL	<1
1,2-dibromo-3-chloropropane	1	NSL	NSL	<1
1,2,4-trichlorobenzene	1	NSL	NSL	<1
Hexachlorobutadiene	1	NSL	NSL	<1
1,2,3-trichlorobenzene	1	NSL	NSL	<1
Polycyclic Aromatic Hydrocarbons (PAHs)				
Naphthalene	0.2	NSL	NSL	<0.2
Acenaphthylene	0.1	NSL	NSL	<0.1
Acenaphthene	0.1	NSL	NSL	<0.1
Fluorene	0.1	NSL	NSL	<0.1
Phenanthrene	0.1	NSL	NSL	<0.1
Anthracene	0.1	NSL	NSL	<0.1
Fluoranthene	0.1	NSL	NSL	<0.1
Pyrene	0.1	NSL	NSL	<0.1
Benzo(a)anthracene	0.1	NSL	NSL	<0.1
Chrysene	0.1	NSL	NSL	<0.1
Benzo(b,j+k)fluoranthene	0.2	NSL	NSL	<0.2
Benzo(a)pyrene	**0.1**	0.01	0.01	<0.1
Indeno(1,2,3-c,d)pyrene	0.1	NSL	NSL	<0.1
Dibenzo(a,h)anthracene	0.1	NSL	NSL	<0.1
Benzo(g,h,i)perylene	0.1	NSL	NSL	<0.1

Concentration above the GIL	VALUE
PQL exceeds GIL	**BOLD/RED**

TABLE L-1
SOIL INTRA-LABORATORY DUPLICATE RESULTS & RPD CALCULATIONS
All results in mg/kg unless stated otherwise

SAMPLE	ANALYSIS	Envirolab PQL	INITIAL	REPEAT	MEAN	RPD %
Sample Ref = BH1 (0.2-0.3)	Arsenic	4	<4	<4	NC	NC
Dup Ref = DUPKT1	Cadmium	0.4	<0.4	<0.4	NC	NC
	Chromium	1	14	12	13.0	15
Envirolab Report: 222520	Copper	1	22	32	27.0	37
	Lead	1	22	17	19.5	26
	Mercury	0.1	<0.1	<0.1	NC	NC
	Nickel	1	41	46	43.5	11
	Zinc	1	34	33	33.5	3
	Naphthalene	0.1	<0.1	<0.1	NC	NC
	Acenaphthylene	0.1	<0.1	<0.1	NC	NC
	Acenaphthene	0.1	<0.1	<0.1	NC	NC
	Fluorene	0.1	<0.1	<0.1	NC	NC
	Phenanthrene	0.1	<0.1	<0.1	NC	NC
	Anthracene	0.1	<0.1	<0.1	NC	NC
	Fluoranthene	0.1	0.2	<0.1	0.1	120
	Pyrene	0.1	0.2	0.1	0.2	67
	Benzo(a)anthracene	0.1	<0.1	<0.1	NC	NC
	Chrysene	0.1	0.2	<0.1	0.1	120
	Benzo(b,j+k)fluoranthene	0.2	<0.2	<0.2	NC	NC
	Benzo(a)pyrene	0.05	0.1	0.05	0.1	67
	Indeno(123-cd)pyrene	0.1	<0.1	<0.1	NC	NC
	Dibenzo(ah)anthracene	0.1	<0.1	<0.1	NC	NC
	Benzo(ghi)perylene	0.1	<0.1	<0.1	NC	NC
	TRH C_6-C_{10} (F1)	25	<25	<25	NC	NC
	TRH >C_{10}-C_{16} (F2)	50	<50	<50	NC	NC
	TRH >C_{16}-C_{34} (F3)	100	<100	<100	NC	NC
	TRH >C_{34}-C_{40} (F4)	100	<100	<100	NC	NC
	Benzene	0.2	<0.2	<0.2	NC	NC
	Toluene	0.5	<0.5	<0.5	NC	NC
	Ethylbenzene	1	<1	<1	NC	NC
	m+p-xylene	2	<2	<2	NC	NC
	o-xylene	1	<1	<1	NC	NC

RPD Results Above the Acceptance Criteria: VALUE

TABLE L-2
SOIL INTRA-LABORATORY DUPLICATE RESULTS & RPD CALCULATIONS
All results in mg/kg unless stated otherwise

SAMPLE	ANALYSIS	Envirolab PQL	INITIAL	REPEAT	MEAN	RPD %
Sample Ref = BH26 (0.0-0.1)	Arsenic	4	4	<4	3.0	67
Dup Ref = DUPMP1	Cadmium	0.4	<0.4	<0.4	NC	NC
	Chromium	1	15	12	13.5	22
Envirolab Report: 222520	Copper	1	10	10	10.0	0
	Lead	1	34	32	33.0	6
	Mercury	0.1	<0.1	<0.1	NC	NC
	Nickel	1	5	4	4.5	22
	Zinc	1	34	34	34.0	0
	Naphthalene	0.1	<0.1	<0.1	NC	NC
	Acenaphthylene	0.1	<0.1	<0.1	NC	NC
	Acenaphthene	0.1	<0.1	<0.1	NC	NC
	Fluorene	0.1	<0.1	<0.1	NC	NC
	Phenanthrene	0.1	<0.1	<0.1	NC	NC
	Anthracene	0.1	<0.1	<0.1	NC	NC
	Fluoranthene	0.1	<0.1	<0.1	NC	NC
	Pyrene	0.1	<0.1	<0.1	NC	NC
	Benzo(a)anthracene	0.1	<0.1	<0.1	NC	NC
	Chrysene	0.1	<0.1	<0.1	NC	NC
	Benzo(b,j+k)fluoranthene	0.2	<0.2	<0.2	NC	NC
	Benzo(a)pyrene	0.05	<0.05	<0.05	NC	NC
	Indeno(123-cd)pyrene	0.1	<0.1	<0.1	NC	NC
	Dibenzo(ah)anthracene	0.1	<0.1	<0.1	NC	NC
	Benzo(ghi)perylene	0.1	<0.1	<0.1	NC	NC
	TRH C6-C10 (F1)	25	<25	<25	NC	NC
	TRH >C10-C16 (F2)	50	<50	<50	NC	NC
	TRH >C16-C34 (F3)	100	<100	180	115.0	113
	TRH >C34-C40 (F4)	100	<100	110	80.0	75
	Benzene	0.2	<0.2	<0.2	NC	NC
	Toluene	0.5	<0.5	<0.5	NC	NC
	Ethylbenzene	1	<1	<1	NC	NC
	m+p-xylene	2	<2	<2	NC	NC
	o-xylene	1	<1	<1	NC	NC

RPD Results Above the Acceptance Criteria VALUE

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TABLE M-1
SOIL INTER-LABORATORY DUPLICATE RESULTS & RPD CALCULATIONS
All results in mg/kg unless stated otherwise

SAMPLE	ANALYSIS	Envirolab PQL	Envirolab VIC PQL	INITIAL	REPEAT	MEAN	RPD %
Sample Ref = BH10 (0.0-0.1)	Arsenic	4	4	<4	4	3.0	67
Dup Ref = DUPKT2	Cadmium	0.4	0.4	<0.4	<0.4	NC	NC
	Chromium	1	1	7	13	10.0	60
Envirolab Report: 222520	Copper	1	1	7	16	11.5	78
Envirolab VIC Report: 17565	Lead	1	1	26	88	57.0	109
	Mercury	0.1	0.1	<0.1	0.2	0.1	120
	Nickel	1	1	2	2	2.0	0
	Zinc	1	1	28	78	53.0	94
	Naphthalene	0.1	0.1	<0.1	<0.1	NC	NC
	Acenaphthylene	0.1	0.1	<0.1	<0.1	NC	NC
	Acenaphthene	0.1	0.1	<0.1	<0.1	NC	NC
	Fluorene	0.1	0.1	<0.1	<0.1	NC	NC
	Phenanthrene	0.1	0.1	<0.1	0.3	0.2	143
	Anthracene	0.1	0.1	<0.1	<0.1	NC	NC
	Fluoranthene	0.1	0.1	0.1	0.8	0.5	156
	Pyrene	0.1	0.1	0.1	0.8	0.5	156
	Benzo(a)anthracene	0.1	0.1	<0.1	0.4	0.2	156
	Chrysene	0.1	0.1	<0.1	0.4	0.2	156
	Benzo(b,j+k)fluoranthene	0.2	0.2	<0.2	0.8	0.5	156
	Benzo(a)pyrene	0.05	0.05	<0.05	0.45	0.2	179
	Indeno(123-cd)pyrene	0.1	0.1	<0.1	0.3	0.2	143
	Dibenzo(ah)anthracene	0.1	0.1	<0.1	0.1	0.1	67
	Benzo(ghi)perylene	0.1	0.1	<0.1	0.3	0.2	143
	TRH C6-C10 (F1)	25	25	<25	<25	NC	NC
	TRH >C10-C16 (F2)	50	50	<50	<50	NC	NC
	TRH >C16-C34 (F3)	100	100	<100	160	105.0	105
	TRH >C34-C40 (F4)	100	100	<100	<100	NC	NC
	Benzene	0.2	0.2	<0.2	<0.2	NC	NC
	Toluene	0.5	0.5	<0.5	<0.5	NC	NC
	Ethylbenzene	1	1	<1	<1	NC	NC
	m+p-xylene	2	2	<2	<2	NC	NC
	o-xylene	1	1	<1	<1	NC	NC

RPD Results Above the Acceptance Criteria: VALUE

TABLE M-2
SOIL INTER-LABORATORY DUPLICATE RESULTS & RPD CALCULATIONS
All results in mg/kg unless stated otherwise

SAMPLE	ANALYSIS	Envirolab PQL	Envirolab VIC PQL	INITIAL	REPEAT	MEAN	RPD %
Sample Ref = BH24 (0.0-0.3)	Arsenic	4	4	<4	<4	NC	NC
Dup Ref = DUPMP2	Cadmium	0.4	0.4	<0.4	<0.4	NC	NC
	Chromium	1	1	15	16	15.5	6
Envirolab Report: 222520	Copper	1	1	25	27	26.0	8
Envirolab VIC Report: 17565	Lead	1	1	54	57	55.5	5
	Mercury	0.1	0.1	<0.1	<0.1	NC	NC
	Nickel	1	1	25	29	27.0	15
	Zinc	1	1	150	150	150.0	0
	Naphthalene	0.1	0.1	<0.1	<0.1	NC	NC
	Acenaphthylene	0.1	0.1	<0.1	<0.1	NC	NC
	Acenaphthene	0.1	0.1	<0.1	<0.1	NC	NC
	Fluorene	0.1	0.1	<0.1	<0.1	NC	NC
	Phenanthrene	0.1	0.1	<0.1	<0.1	NC	NC
	Anthracene	0.1	0.1	<0.1	<0.1	NC	NC
	Fluoranthene	0.1	0.1	<0.1	<0.1	NC	NC
	Pyrene	0.1	0.1	<0.1	<0.1	NC	NC
	Benzo(a)anthracene	0.1	0.1	<0.1	<0.1	NC	NC
	Chrysene	0.1	0.1	<0.1	<0.1	NC	NC
	Benzo(b,j+k)fluoranthene	0.2	0.2	<0.2	<0.2	NC	NC
	Benzo(a)pyrene	0.05	0.05	<0.05	<0.05	NC	NC
	Indeno(123-cd)pyrene	0.1	0.1	<0.1	<0.1	NC	NC
	Dibenzo(ah)anthracene	0.1	0.1	<0.1	<0.1	NC	NC
	Benzo(ghi)perylene	0.1	0.1	<0.1	<0.1	NC	NC
	TRH C6-C10 (F1)	25	25	<25	<25	NC	NC
	TRH >C10-C16 (F2)	50	50	<50	<100	NC	NC
	TRH >C16-C34 (F3)	100	100	180	<100	115.0	113
	TRH >C34-C40 (F4)	100	100	150	<100	100.0	100
	Benzene	0.2	0.2	<0.2	<0.2	NC	NC
	Toluene	0.5	0.5	<0.5	<0.5	NC	NC
	Ethylbenzene	1	1	<1	<1	NC	NC
	m+p-xylene	2	2	<2	<2	NC	NC
	o-xylene	1	1	<1	<1	NC	NC

RPD Results Above the Acceptance Criteria: VALUE

TABLE N
SUMMARY OF FIELD QA/QC RESULTS

ANALYSIS	Envirolab PQL		TB1[s]	TS[s]
			22/07/2019	1/08/2019
	mg/kg	µg/L	mg/kg	% Recovery
Benzene	0.2	0.2	<0.2	131%
Toluene	0.5	0.5	<0.5	120%
Ethylbenzene	1	1	<1	120%
m+p-xylene	2	2	<2	116%
o-xylene	1	1	<1	118%

Explanation:
[W] Sample type (water)
[S] Sample type (sand)
BTEX concentrations in trip spikes are presented as % recovery

Values above PQLs/Acceptance criteria **VALUE**

ASI Borehole Logs

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BOREHOLE LOG

Borehole No. 101

1 / 2

Client: HAMMOND CARE
Project: PROPOSED HOSPITAL REDEVELOPMENT
Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: 32507R2 **Method:** SPIRAL AUGER **R.L. Surface:** ~42.1 m
Date: 6/10/21 **Datum:** AHD
Plant Type: JK205 **Logged/Checked By:** J.L./P.R.

Groundwater Record	SAMPLES (ES, U50, DB, DS)	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
DRY ON COMPLETION OF AUGERING			42	0		-	ASPHALTIC CONCRETE: 20mm.t	M			APPEARS MODERATELY COMPACTED
							FILL: Silty gravelly sand, fine to medium grained, grey, fine to medium grained, igneous gravel, trace of brick fragments.				
		N > 9 9,9/ 100mm REFUSAL					FILL: Silty sand, fine to medium grained, brown, trace of sandstone gravel, clay nodules, glass, plastic and earthenware fragments.				SCREEN: 5.2kg 0.02-0.4m NO FCF
			41	1							SCREEN: 6.7kg 0.4-1.4m NO FCF
		N = 11 3,5,6									SCREEN: 1.4-1.7m NO FCF
						-	Extremely Weathered sandstone: silty clayey SAND, fine to medium grained, yellow brown.	XW	(D - VD)		HAWKESBURY SANDSTONE
			40	2			SANDSTONE: fine to medium grained, yellow brown and orange brown.	DW	L - M		LOW TO MODERATE 'TC' BIT RESISTANCE
			39	3							
ON 20/10/21			38	4							
			37	5			REFER TO CORED BOREHOLE LOG				GROUNDWATER MONITORING WELL INSTALLED TO 7.5m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 1.2m TO 7.5m. CASING 0m TO 1.2m. 2mm SAND FILTER PACK 1.0m TO 7.5m. BENTONITE SEAL 0.25m TO 1.0m. BACKFILLED WITH SAND TO THE SURFACE. COMPLETED WITH A CONCRETED GATIC COVER.
			36	6							

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CORED BOREHOLE LOG

Borehole No.
101

Client: HAMMOND CARE
Project: PROPOSED HOSPITAL REDEVELOPMENT
Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: 32507R2 **Core Size:** NMLC **R.L. Surface:** ~42.1 m
Date: 6/10/21 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK205 **Bearing:** N/A **Logged/Checked By:** J.L./P.R.

Water Loss\Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION: Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$ (VL-0.1, L-0.3, M-1, H-3, VH-10, EH)	DEFECT SPACING (mm) (600, 200, 60, 20)	DEFECT DESCRIPTION (Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness) Specific / General	Formation
		38			START CORING AT 4.37m					ROCK STRENGTH BASED ON TACTILE ASSESSMENT	
100% RETURN		37	5		SANDSTONE: medium grained, yellow brown and orange brown, bedded at 0-25°.	HW - MW	(L - M)			(4.95m) Be, 0°, P, R, Fe Ct	Hawkesbury Sandstone
		36, 35	6, 7		SANDSTONE: fine to medium grained, light grey.	FR	(M - H)			(5.77m) CS, 0°, 5 mm.t	
		34, 33, 32	8, 9, 10		END OF BOREHOLE AT 7.50 m						

FRACTURES NOT MARKED ARE CONSIDERED TO BE DRILLING AND HANDLING BREAKS

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BOREHOLE LOG

Borehole No.
102
1 / 2

Client: HAMMOND CARE
Project: PROPOSED HOSPITAL REDEVELOPMENT
Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: 32507R2 **Method:** SPIRAL AUGER **R.L. Surface:** ~37.7 m
Date: 6/10/21 **Datum:** AHD
Plant Type: JK205 **Logged/Checked By:** J.L./P.R.

Groundwater Record	SAMPLES ES / U50 / DB / DS	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
DRY ON COMPLETION OF AUGERING				0			ASPHALTIC CONCRETE: 50mm.t				
						-	FILL: Silty gravely sand, fine to medium grained, brown, fine to medium grained igneous gravel, trace of concrete fragments and slag.	M			APPEARS POORLY TO MODERATELY COMPACTED
		N = 7 2,4,3	37				FILL: Silty clay, low to medium plasticity, grey and brown, trace of igneous, ironstone and siltstone gravel, and slag.	w<PL			SCREEN: 7.60kg 0.05-0.5m NO FCF SCREEN: 9.5kg 0.5-1.2m NO FCF
				1		-	SANDSTONE: fine to medium grained, orange brown.	DW	(L - M)		HAWKESBURY SANDSTONE LOW TO MODERATE 'TC' BIT RESISTANCE
			36	2			REFER TO CORED BOREHOLE LOG				GROUNDWATER MONITORING WELL INSTALLED TO 6.1m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 1.2m TO 6.1m. CASING 0m TO 1.2m. 2mm SAND FILTER PACK 1.0m TO 6.1m. BENTONITE SEAL 0.25m TO 1.0m. BACKFILLED WITH SAND TO THE SURFACE. COMPLETED WITH A CONCRETED GATIC COVER.
			35	3							
			34	4							
			33	5							
			32	6							
			31								

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CORED BOREHOLE LOG

Borehole No.
102

Client: HAMMOND CARE
Project: PROPOSED HOSPITAL REDEVELOPMENT
Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: 32507R2 **Core Size:** NMLC **R.L. Surface:** ~37.7 m
Date: 6/10/21 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK205 **Bearing:** N/A **Logged/Checked By:** J.L./P.R.

Water Loss\Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION: Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$	DEFECT DETAILS: SPACING (mm)	DEFECT DETAILS: DESCRIPTION (Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness) Specific / General	Formation
		36	2		START CORING AT 2.05m					ROCK STRENGTH BASED ON TACTILE ASSESSMENT	
100% RETURN; ON 20/10/21		35, 34	3, 4		SANDSTONE: medium grained, light grey and yellow brown, bedded at 0-20°.	MW	(L - M)				Hawkesbury Sandstone
		33, 32	5, 6		SANDSTONE: fine to medium grained, light grey, trace of dark grey laminae, bedded at 0-30°.	FR	(M)			(4.58m) Be, 10°, P, R, Cn (5.27m) CS, 0 - 10°, 75 mm.t	
		31, 30	7		END OF BOREHOLE AT 6.12 m						

Point load scale: VL -0.1, L -0.3, M -1, H -3, VH -10, EH
Spacing scale: 600, 200, 60, 20

FRACTURES NOT MARKED ARE CONSIDERED TO BE DRILLING AND HANDLING BREAKS

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **103**

1/1

PFASDUP5: 0.03-0.4m

Client: HAMMOND CARE

Project: PROPOSED HOSPITAL REDEVELOPMENT

Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: E32507BR **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 38.8m

Date: 6/10/2021 **Datum:** AHD

Plant Type: JK205 **Logged/Checked by:** M.M.E./V.B.

Groundwater Record	SAMPLES (ES, ASS, ASB, SAL, DB)	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE-TION			0		-	ASPHALTIC CONCRETE: 30mm.t	M			SCREEN: 7.4kg 0.03-0.05m NO FCF
						FILL: Silty gravelly sand, fine to medium grained, brown, fine to medium grained, sub-angular, igneous gravel, trace of ironstone gravel, ceramic fragments and concrete.				
		N = 16 3,3,13			CL-CI		w<PL			
			1		CI-CH	Sandy CLAY: low to medium plasticity, orange brown, fine to medium grained, trace of ironstone gravel.				
					CL-CI	Silty CLAY: medium to high plasticity, grey and brown, trace of ironstone gravel.				HYDROCARBON ODOUR
						Sandy CLAY: low to medium plasticity, grey and brown, fine to medium grained, trace of ironstone gravel.				REFUSAL ON INFERRED BEDROCK
			2			END OF BOREHOLE AT 1.5m				
			3							
			4							
			5							
			6							
			7							

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BOREHOLE LOG

Borehole No.
104
1 / 2

Client: HAMMOND CARE
Project: PROPOSED HOSPITAL REDEVELOPMENT
Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: 32507R2 **Method:** SPIRAL AUGER **R.L. Surface:** ~41.6 m
Date: 1/10/21 **Datum:** AHD
Plant Type: JK305 **Logged/Checked By:** J.L./P.R.

Groundwater Record	SAMPLES ES / U50 / DB / DS	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
DRY ON COMPLETION OF AUGERING				0		-	ASPHALTIC CONCRETE: 40mm.t	M			APPEARS POORLY TO MODERATELY COMPACTED
							FILL: Sandy gravel, fine to medium grained, dark grey, fine to medium grained, sub-angular, igneous gravel, trace of ironstone and sandstone gravel, and slag.				SCREEN: 4.45kg 0.04-0.3m NO FCF
		N = 9 2,5,4	41				FILL: Silty gravelly sand, fine to medium grained, yellow brown, fine to medium grained sandstone gravel, trace of metal and glass fragments, slag and ash.				SCREEN: 4.7kg 0.3-1.3m NO FCF
			40	1							SCREEN: 4.8kg 1.3-2.3m NO FCF
		N = 10 3,3,7	39	2							SCREEN: 5.45kg 2.3-3.2m NO FCF
		N > 10 4,6,4/ 100mm REFUSAL		3			FILL: Silty sand, fine to medium grained, brown, trace of igneous, sandstone and siltstone gravel, glass fragments and ash.				
			38				REFER TO CORED BOREHOLE LOG				GROUNDWATER MONITORING WELL INSTALLED TO 5.97m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 1.2m TO 5.97m. CASING 0m TO 1.2m. 2mm SAND FILTER PACK 1.0m TO 5.97m. BENTONITE SEAL 0.25m TO 1.0m. BACKFILLED WITH SAND TO THE SURFACE. COMPLETED WITH A CONCRETED GATIC COVER.
			37	4							
			36	5							
			35	6							

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CORED BOREHOLE LOG

Borehole No.
104

Client: HAMMOND CARE
Project: PROPOSED HOSPITAL REDEVELOPMENT
Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: 32507R2 **Core Size:** NMLC **R.L. Surface:** ~41.6 m
Date: 1/10/21 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK305 **Bearing:** N/A **Logged/Checked By:** J.L./P.R.

Water Loss\Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION: Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$ (VL -0.1, L -0.3, M -1, H -3, VH -10, EH)	DEFECT SPACING (mm) (600, 200, 60, 20)	DEFECT DESCRIPTION: Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness — Specific	General	Formation
					START CORING AT 3.40m						ROCK STRENGTH BASED ON TACTILE ASSESSMENT	
		38	4		NO CORE 0.74m							
100% RETURN		37			Extremely weathered sandstone: sandy silty CLAY, low to medium plasticity, light grey mottled orange brown.	XW	(Hd)					Hawkesbury Sandstone
		36	5		SANDSTONE: medium grained, light grey and orange brown, bedded at 0-20°.	MW	(L - M)			(4.45m) J, 40 - 90°, C, R, Fe Sn (4.58m) Be, 20°, P, R, Fe Sn (4.95m) CS, 5°, 50 mm.t (5.77m) Cr, 0 - 5°, 10 mm.t (5.82m) Be, 5°, C, R, Fe Ct		
		35, 34, 33, 32	6, 7, 8, 9		END OF BOREHOLE AT 5.97 m							

FRACTURES NOT MARKED ARE CONSIDERED TO BE DRILLING AND HANDLING BREAKS

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BOREHOLE LOG

Borehole No.
105
1 / 2

Client: HAMMOND CARE
Project: PROPOSED HOSPITAL REDEVELOPMENT
Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: 32507R2 **Method:** SPIRAL AUGER **R.L. Surface:** ~44.8 m
Date: 27/9/21 **Datum:** AHD
Plant Type: JK205 **Logged/Checked By:** J.L./P.R.

Groundwater Record	Samples (ES, U50, DB, DS)	Field Tests	RL (m AHD)	Depth (m)	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
DRY ON COMPLETION OF AUGERING					-	ASPHALTIC CONCRETE: 25mm.t.	M			SCREEN: 5.25kg 0.25-0.4m NO FCF
						FILL: Silty gravelly sand, fine to medium grained, grey, fine to coarse grained igneous gravel.				APPEARS POORLY COMPACTED
		N = 8 4,4,4	44	1		FILL: Clayey silty sand, fine to medium grained, dark grey, with fine to coarse grained ironstone and igneous gravel, trace of slag.				
					CL	Sandy CLAY: low plasticity, grey and brown, trace of fine to coarse grained ironstone gravel.	w>PL	(St)		RESIDUAL
		N > 14 18,14/ 100mm REFUSAL	43	2		Extremely Weathered sandstone: Sandy CLAY, low plasticity, orange brown and red brown, with occasional low strength sandstone bands and clay bands.	XW	(Hd)		HAWKESBURY SANDSTONE VERY LOW 'TC' BIT RESISTANCE WITH LOW RESISTANCE BANDS
			42	3		SANDSTONE: fine to medium grained, red brown.	MW	L		
			41, 40, 39, 38	4, 5, 6		REFER TO CORED BOREHOLE LOG				Groundwater monitoring well installed to 7.86m. Class 18 machine slotted 50mm dia. PVC standpipe 0.86m to 7.86m. Casing 0.1m to 0.86m. 2mm sand filter pack 1.6m to 7.86m. Bentonite seal 0.8m to 1.6m. Backfilled with sand to the surface. Completed with a concreted gatic cover. JKE SAMPLES WERE COLLECTED FROM THE CORED SAMPLES AT THE FOLLOWING DEPTHS: 3.9-4.0m 4.9-5.0m 5.9-6.0m 6.9-7.0m 7.7-7.83m

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CORED BOREHOLE LOG

Borehole No. **105**

Client: HAMMOND CARE
Project: PROPOSED HOSPITAL REDEVELOPMENT
Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: 32507R2 | **Core Size:** NMLC | **R.L. Surface:** ~44.8 m
Date: 27/9/21 | **Inclination:** VERTICAL | **Datum:** AHD
Plant Type: JK205 | **Bearing:** N/A | **Logged/Checked By:** J.L./P.R.

Water Loss\Level	RL (m AHD)	Depth (m)	CORE DESCRIPTION (Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components) START CORING AT 3.13m	Weathering	Strength	Point Load Strength Index $I_s(50)$	Defect Description (Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness) Specific	Formation
80% RETURN	41, 40, 39	4, 5, 6	SANDSTONE: medium grained, red brown, orange brown and light grey, bedded at 0-30°.	MW	M	0.60, 0.50, 0.90, 0.70, 0.60, 0.90	(3.21m) Be, 25°, P, R, Fe Sn (4.38m) Be, 30°, P, R, Fe Sn (4.57m) Be, 10°, P, R, Fe Sn (4.62m) Be, 0°, C, R, Fe Sn (4.65m) Be, 0°, P, R, Clay Ct (4.95m) Be, 0°, P, R, Fe Sn (5.15m) Be, 0°, P, R, Fe Sn (5.25m) J, 25°, P, R, Cn (5.53m) Be, 20°, C, R, Fe Sn (5.58m) Be, 20°, P, R, Fe Sn (5.70m) Be, 20°, P, R, Fe Sn (5.86m) Be, 0°, P, R, Fe Sn (5.91m) Be, 0°, P, R, Fe Sn	Hawkesbury Sandstone
ON 20/10/21; ON 22/10/21; 60% RETURN	38, 37	7			M - H	1.1, 1.4, 0.70, 0.70, 1.6	(6.35m) Bex2, 0°, P, R, Fe Ct (6.70m) Be, 0°, P, R, Fe Ct (7.46m) Be, 0°, P, R, Clay Ct (7.60m) CS, 0°, 12 mm.t (7.65m) XWS, 0°, 25 mm.t	
	36, 35	8, 9	END OF BOREHOLE AT 7.83 m					

FRACTURES NOT MARKED ARE CONSIDERED TO BE DRILLING AND HANDLING BREAKS

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BOREHOLE LOG

Borehole No.
106

Client: HAMMOND CARE
Project: PROPOSED HOSPITAL REDEVELOPMENT
Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: 32507R2 **Method:** SPIRAL AUGER **R.L. Surface:** ~49.1 m
Date: 28/9/21 **Datum:** AHD
Plant Type: JK205 **Logged/Checked By:** J.L./P.R.

Groundwater Record	Field Tests	RL (m AHD)	Depth (m)	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
DRY ON COMPLETION OF AUGERING		49		-	ASPHALTIC CONCRETE: 30mm.t				
					FILL: Clayey gravelly sand, fine to medium grained, grey, medium to coarse grained igneous gravel.	M			SCREEN: 3.8kg 0.03-0.3m NO FCF
	N > 10 10,10/ 50mm REFUSAL			CL	Silty CLAY: low plasticity, light grey with fine to medium grained sand and medium to coarse grained ironstone gravel.	w~PL	VSt - Hd	440 470 300	RESIDUAL
		48	1		Extremely Weathered sandstone: sandy CLAY, low to medium plasticity, fine to medium grained sand, light grey and red brown.	XW	(Hd)		HAWKESBURY SANDSTONE
					SANDSTONE: fine to medium grained, light grey and orange brown with occasional clay nodules.	MW	H		LOW 'TC' BIT RESISTANCE WITH VERY LOW BANDS
		47	2		REFER TO CORED BOREHOLE LOG				Groundwater monitoring well installed to 12.52m. Class 18 machine slotted 50mm dia. PVC standpipe 1.52m to 12.52m. Casing 0.11m to 1.52m. 2mm sand filter pack 1.2m to 12.52m. Bentonite seal 0.4m to 1.2m. Backfilled with sand to the surface. Completed with a concreted gatic cover.
		46	3						JKE SAMPLES WERE COLLECTED FROM THE CORED SAMPLES AT THE FOLLOWING DEPTHS: 1.4-1.5m 1.9-2.0m 2.4-2.5m 2.9-3.0m 3.9-4.0m 4.9-5.0m 5.9-6.0m 6.9-7.0m 7.9-8.0m 8.9-9.0m 9.9-10.0m 10.9-11.0m 11.9-12.0m 12.45-12.55m
		45	4						
		44	5						
		43	6						

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CORED BOREHOLE LOG

Borehole No.
106

Client: HAMMOND CARE
Project: PROPOSED HOSPITAL REDEVELOPMENT
Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: 32507R2 **Core Size:** NMLC **R.L. Surface:** ~49.1 m
Date: 28/9/21 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK205 **Bearing:** N/A **Logged/Checked By:** J.L./P.R.

Water Loss\Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION: Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$	DEFECT DETAILS: Specific	Formation
		48			START CORING AT 1.24m					
100% RETURN					SANDSTONE: medium grained, light grey with grey laminations, and orange brown bands, bedded at 0-25°.	MW	H	1.4, 1.6, 1.6, 1.7, 1.8, 1.9, 1.6, 1.5	(1.43m) Be, 10°, P, R, Cn (2.04m) Be, 25°, P, R, Fe Sn (3.03m) Bex2, P, R, Fe Sn (3.38m) Be, 15°, C, R, Fe Sn (4.37m) Be, 0°, P, R, Fe Sn	Hawkesbury Sandstone
		47	2							
		46	3							
		45	4							
		44	5		SANDSTONE: medium grained, light grey with orange brown bands, bedded at 0-25°.	SW	M - H	1.0, 1.0, 1.0	(4.87m) Be, 20°, P, R, Clay Ct (5.18m) Be, 25°, P, R, Fe Sn (5.43m) CS, 0°, 20 mm.t (6.28m) Be, 25°, P, R, Clay Ct (6.40m) CS, 20°, 20 mm.t	
		43	6							
					SANDSTONE: medium grained, light grey with grey and dark grey laminations, and red brown bands, bedded at 0-25°.	FR	M	0.90		
		42	7		SANDSTONE: medium grained, light grey with grey and dark grey laminations, and occasional red brown bands, bedded at 0-25°.			0.70, 0.90	(7.11m) Be, 25°, P, R, Fe Sn (7.20m) Be, 25°, P, R, Fe Sn (7.30m) XWS, 0°, 40 mm.t (7.35m) CS, 0°, 5 mm.t	

FRACTURES NOT MARKED ARE CONSIDERED TO BE DRILLING AND HANDLING BREAKS

JK 9.02.4 LIB.GLB Log JK CORED BOREHOLE - MASTER 32507R2 GREENWICH.GPJ <<DrawingFile>> 21/01/2022 12:46 10.01.00.01 Datgel Lab and In Situ Tool - DGD | Lib: JK 9.02.4 2019-05-31 Prj: JK 9.01.0 2018-03-20

JKGeotechnics

CORED BOREHOLE LOG

Client: HAMMOND CARE
Project: PROPOSED HOSPITAL REDEVELOPMENT
Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: 32507R2	**Core Size:** NMLC	**R.L. Surface:** ~49.1 m
Date: 28/9/21	**Inclination:** VERTICAL	**Datum:** AHD
Plant Type: JK205	**Bearing:** N/A	**Logged/Checked By:** J.L./P.R.

Water Loss\Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION: Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$ (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT SPACING (mm) (600, 200, 60, 20)	DEFECT DESCRIPTION: Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness — Specific	General	Formation
		41			SANDSTONE: medium grained, light grey with grey and dark grey laminations, and occasional red brown bands, bedded at 0-25°. *(continued)*	FR	M	0.60		(8.05m) Be, 0°, P, R, Cn		Hawkesbury Sandstone
										(8.52m) Be, 0°, P, R, Fe Sn		
										(8.63m) CS, 0°, 35 mm.t		
								0.70		(8.82m) CS, 10°, 5 mm.t		
ON 20/10/21		40	9					0.90				
ON 22/10/21										(9.47m) Be, 20°, P, R, Fe Sn		
								0.80				
										(9.90m) Be, 10°, P, R, Cb Ct		
100% RETURN		39	10							(10.12m) Cr, 0°, 50 mm.t		
					as above, but brown and red brown banded.	MW	H	1.3		(10.19m) Be, 20°, P, R, Fe Ct		
								1.4				
		38	11			FR		1.5				
					as above, but light grey, with grey and dark grey laminations.					(11.54m) CS, 15°, 3 mm.t		
								1.1		(11.60m) Be, 20°, P, R, Clay Ct		
		37	12					1.8				
								1.4				
					END OF BOREHOLE AT 12.55 m							
		36	13									
		35	14									

FRACTURES NOT MARKED ARE CONSIDERED TO BE DRILLING AND HANDLING BREAKS

JKGeotechnics

BOREHOLE LOG

Borehole No.
107

Client: HAMMOND CARE
Project: PROPOSED HOSPITAL REDEVELOPMENT
Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: 32507R2 **Method:** SPIRAL AUGER **R.L. Surface:** ~51.6 m
Date: 27/9/21 **Datum:** AHD
Plant Type: JK205 **Logged/Checked By:** J.L./P.R.

Groundwater Record	Field Tests	RL (m AHD)	Depth (m)	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Remarks
DRY ON COMPLETION OF AUGERING					FILL: Silty clay, low plasticity, dark brown, trace of fine to coarse grained igneous, ironstone and sandstone gravel, fine grained sand, roots and root fibres.	w~PL		TOP 100mm ROOT AFFECTED; SCREEN: 11.05kg 0-0.2m NO FCF
	N = 3 2,1,2	51		SM	FILL: Sandy clay, low plasticity, grey and brown, fine grained sand, medium to coarse grained ironstone gravel.	M		SCREEN: 4.55kg 0.2-0.4m NO FCF
			1	CI	Silty SAND: fine to medium grained, light grey brown mottled orange brown, with clay fines and clay nodules.	w>PL		RESIDUAL
		50		-	Silty CLAY: medium plasticity, orange brown, red brown and grey, with fine to medium grained sand.	MW	M	HAWKESBURY SANDSTONE
					SANDSTONE: fine to medium grained, light grey and orange brown, with occasional clay seams.			LOW 'TC' BIT RESISTANCE
			2		REFER TO CORED BOREHOLE LOG			Groundwater monitoring well installed to 14.93m. Class 18 machine slotted 50mm dia. PVC standpipe 1.93m to 14.93m. Casing 0.05m to 1.93m. 2mm sand filter pack 1.5m to 14.93m. Bentonite seal 0.3m to 1.5m. Backfilled with sand to the surface. Completed with a concreted gatic cover.
		49	3					JKE SAMPLES WERE COLLECTED FROM THE CORED SAMPLES AT THE FOLLOWING DEPTHS: 1.9-2.0m 2.4-2.5m 2.75-2.85m 3.9-4.0m 4.9-5.0m 5.9-6.0m 6.9-7.0m 7.9-8.0m 8.9-9.0m 9.9-10.0m 10.9-11.0m 11.9-12.0m 12.9-13.0m 13.9-14.0m 14.9-15.0m
		48	4					
		47	5					
		46	6					
		45						

Columns also include: SAMPLES (ES, U50, DB, DS), Graphic Log, Hand Penetrometer Readings (kPa).

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CORED BOREHOLE LOG

Borehole No.
107

Client: HAMMOND CARE
Project: PROPOSED HOSPITAL REDEVELOPMENT
Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: 32507R2	**Core Size:** NMLC	**R.L. Surface:** ~51.6 m
Date: 27/9/21	**Inclination:** VERTICAL	**Datum:** AHD
Plant Type: JK205	**Bearing:** N/A	**Logged/Checked By:** J.L./P.R.

Water Loss\Level	Barrel Lift	RL (m AHD)	Depth (m)	CORE DESCRIPTION: Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$	DEFECT DETAILS – DESCRIPTION: Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness (Specific / General)	Formation
		50		START CORING AT 1.80m					
30% RETURN		49	2	SANDSTONE: fine to medium grained, light grey, red brown and orange brown, bedded at 0-20°.	MW	M	0.40, 0.60	(2.21m) Be, 10°, P, R, Clay Ct; (2.43m) XWS, 5°, 30 mm.t	Hawkesbury Sandstone
						H	1.1	(2.56m) CS, 0 - 5°, 145 mm.t; (2.85m) CS, 5°, 30 mm.t	
				NO CORE 0.13m					
		48	3	SANDSTONE: medium to coarse grained, light grey and orange brown, bedded at 0-25°.	MW	H	2.0, 1.5	(3.16m) Be, 5°, P, R, Fe Sn	Hawkesbury Sandstone
90% RETURN		47	4				1.8, 2.0	(4.05m) Be, 25°, P, R, Fe Sn; (4.30m) Be, 15°, P, R, Fe Sn	
		46	5				1.9, 1.9	(4.94m) Bex2, 20°, P, R, Cn; (5.06m) Be, 20°, P, R, Fe Sn; (5.27m) Be, 0°, P, R, Fe Sn; (5.78m) Be, 15°, P, R, Clay Vn	
			6		SW		1.3	(6.18m) Be, 20°, P, R, Cn; (6.28m) Be, 20°, P, R, Cn	
		45		SANDSTONE: medium grained, light grey with grey laminations, bedded at 0-25°.	FR		1.7	(6.72m) Be, 20°, P, R, Fe Sn	
		44	7	SANDSTONE: medium grained, light grey with grey laminations, bedded at 0-25°.			1.8, 1.2	(7.22m) Be, 20°, P, R, Fe Sn; (7.75m) CS, 0 - 20°, 60 mm.t	

Point load strength index scale: VL -0.1, L -0.3, M -1, H -3, VH -10, EH. Spacing (mm): 600, 200, 60, 20.

FRACTURES NOT MARKED ARE CONSIDERED TO BE DRILLING AND HANDLING BREAKS

JKGeotechnics

CORED BOREHOLE LOG

Borehole No.
107

Client: HAMMOND CARE
Project: PROPOSED HOSPITAL REDEVELOPMENT
Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: 32507R2 **Core Size:** NMLC **R.L. Surface:** ~51.6 m
Date: 27/9/21 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK205 **Bearing:** N/A **Logged/Checked By:** J.L./P.R.

Depth (m)	RL (m AHD)	Core Description (Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components)	Weathering	Strength	Point Load Strength Index $I_s(50)$	Defect Details – Description (Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness)	Formation
to ~8.7	43	SANDSTONE: medium grained, light grey with grey laminations, bedded at 0-25°. *(continued)*	FR	H	1.5, 1.2		Hawkesbury Sandstone
~8.7–10.72	42, 41	SANDSTONE: medium grained, light grey, with grey laminations and trace of carbonaceous lenses, bedded at 0-25°.			0.30, 1.7, 1.2, 1.7, 1.1	(8.71m) CS, 10°, 25 mm.t (9.00m) Be, 0°, P, R, Cb Vn (10.31m) Be, 25°, C, R, Cb Sn (10.40m) Be, 0°, P, R, Cb Sn (10.72m) Be, 10°, P, R, Cn	
		Extremely Weathered siltstone band:	XW				
		NO CORE 0.22m					
		Extremely Weathered siltstone band.	XW				
~11.1–13.5	40, 39	SANDSTONE: medium grained, light grey and orange brown, bedded at 0-25°.	FR MW FR	H	1.3, 1.7, 1.5, 1.8, 1.9	(11.27m) Be, 10°, P, R, Cb Vn (11.31m) Be, 0°, P, R, Fe FILLED (11.33m) Be, 0°, P, R, Fe Ct (11.65m) Be, 0°, C, R, Fe Sn (12.15m) CS, 10°, 10 mm.t	Hawkesbury Sandstone
~13.5–15.00	38, 37	SANDSTONE: medium grained, light grey, with grey lamination, bedded at 0-25°.			1.4, 1.5, 1.7	(13.47m) Be, 25°, P, R, Cn (13.71m) Be, 15°, P, R, Clay FILLED (14.28m) Be, 0°, P, R, Clay Ct (14.78m) Be, 10°, C, R, Cb Vn	

Water Loss\Level: ON 22/10/21; ON 20/10/21; 90% RETURN

END OF BOREHOLE AT 15.00 m

FRACTURES NOT MARKED ARE CONSIDERED TO BE DRILLING AND HANDLING BREAKS

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BOREHOLE LOG

SDUP7: 0-0.1m

Client: HAMMOND CARE
Project: PROPOSED HOSPITAL REDEVELOPMENT
Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: 32507R2 **Method:** SPIRAL AUGER **R.L. Surface:** ~50.5 m
Date: 30/9/21 **Datum:** AHD
Plant Type: JK305 **Logged/Checked By:** J.L./P.R.

Groundwater Record	Field Tests	RL (m AHD)	Depth (m)	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
DRY ON COMPLETION OF AUGERING			0		FILL: Sandy silty clay, low plasticity, orange brown, fine grained sand, trace of fine to medium grained ironstone gravel.	w<PL			GRASS COVER TOP 100mm ROOT AFFECTED
	N=SPT 10/ 50mm REFUSAL	50		-	SANDSTONE: fine to medium grained, light grey and red brown, with high strength iron indurated bands.	DW	L		HAWKESBURY SANDSTONE
			1				L - M		LOW 'TC' BIT RESISTANCE
		49			REFER TO CORED BOREHOLE LOG				JKE SAMPLES WERE COLLECTED FROM THE CORED SAMPLES AT THE FOLLOWING DEPTHS: 1.9-2.0m 2.4-2.5m 2.9-3.0m 3.9-4.0m 4.9-5.0m 5.9-6.0m 6.9-7.0m 7.9-8.0m 8.9-9.0m 9.9-10.0m 10.9-11.0m 11.9-12.0m 12.9-13.0m 13.85-13.95m
		48	2						
		47	3						
		46	4						
		45	5						
		44	6						

SAMPLES: ES, U50, DB, DS

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CORED BOREHOLE LOG

Borehole No.
108
2 / 3

SDUP7: 0-0.1m

Client: HAMMOND CARE
Project: PROPOSED HOSPITAL REDEVELOPMENT
Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: 32507R2 | **Core Size:** NMLC | **R.L. Surface:** ~50.5 m
Date: 30/9/21 | **Inclination:** VERTICAL | **Datum:** AHD
Plant Type: JK305 | **Bearing:** N/A | **Logged/Checked By:** J.L./P.R.

Water Loss\Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$	DEFECT SPACING (mm)	DEFECT DESCRIPTION Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness (Specific / General)	Formation
					START CORING AT 1.49m						
100% RETURN		49			SANDSTONE: fine to medium grained, red brown orange brown and light grey, bedded at 0-25°.	MW	H	1.8		(1.58m) Be, 5°, P, R, Fe Sn	Hawkesbury Sandstone
			2					1.1		(1.81m) Be, 25°, P, R, Fe Sn	
		48						1.0		(2.35m) Be, 0°, P, R, Fe Sn	
		47	3					1.1		(3.05m) Bex2, P, R, Fe Sn	
			4					1.7			
		46						1.6			
			5		SANDSTONE: medium to coarse grained, light grey, with grey laminations, bedded at 0-25°.	SW	M - H	0.70		(4.77m) Be, 20°, P, R, Fe Sn	
		45						1.5			
			6					1.1		(6.07m) Be, 10°, P, R, Fe Sn	
		44				FR		0.90		(6.56m) Be, 0°, P, R, Cn	
			7					1.0		(7.07m) CS, 0°, 5 mm.t	
		43					H	1.4		(7.25m) Be, 20°, P, R, Clay Ct	
								1.3			

FRACTURES NOT MARKED ARE CONSIDERED TO BE DRILLING AND HANDLING BREAKS

JKGeotechnics

CORED BOREHOLE LOG

Borehole No.
108
3 / 3

SDUP7: 0-0.1m

Client: HAMMOND CARE
Project: PROPOSED HOSPITAL REDEVELOPMENT
Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: 32507R2 **Core Size:** NMLC **R.L. Surface:** ~50.5 m
Date: 30/9/21 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK305 **Bearing:** N/A **Logged/Checked By:** J.L./P.R.

Water Loss\Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$	DEFECT DETAILS SPACING (mm) 600 200 60 20	DEFECT DETAILS DESCRIPTION Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness — Specific	General	Formation
100% RETURN		42, 41, 40, 39, 38, 37	9, 10, 11, 12, 13		SANDSTONE: medium to coarse grained, light grey, with grey laminations, bedded at 0-25°. *(continued)*	FR	H	2.0, 1.3, 1.1, 1.3, 1.4, 1.5, 2.4, 1.9, 1.5, 1.7, 1.4, 1.7		(8.67m) Bex2, P, R, Clay Ct (10.21m) CS, 10°, 10 mm.t (11.50m) Be, 20°, P, Cb Vn		Hawkesbury Sandstone
		36	14		END OF BOREHOLE AT 13.95 m							

FRACTURES NOT MARKED ARE CONSIDERED TO BE DRILLING AND HANDLING BREAKS

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BOREHOLE LOG

Borehole No.
109

Client: HAMMOND CARE
Project: PROPOSED HOSPITAL REDEVELOPMENT
Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: 32507R2 **Method:** SPIRAL AUGER **R.L. Surface:** ~49.1 m
Date: 30/9/21 **Datum:** AHD
Plant Type: JK205 **Logged/Checked By:** J.L./P.R.

Groundwater Record	SAMPLES ES U50 DB DS	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
DRY ON COMPLETION OF AUGERING			49				ASPHALTIC CONCRETE: 100mm.t				
						-	FILL: Clayey gravelly sand, fine to medium grained, dark grey and brown, fine to coarse grained igneous gravel, with clay nodules.	M			SCREEN: 4.7kg 0.1-0.4m NO FCF
		N = 28 14,16,12					FILL: Sandy clay, low plasticity, grey brown and orange brown, with medium to coarse grained ironstone sandstone and igneous gravel, trace of slag.	w<PL		280 140 180	APPEARS MODERATELY COMPACTED
						CL	Sandy CLAY: low plasticity, orange brown, fine to medium grained sand, trace of fine to medium grained sandstone.	w~PL	VSt - Hd	560 500 340	SCREEN: 7.4kg 0.4-0.8m NO FCF RESIDUAL
			48	1		-	SANDSTONE: fine to medium grained, light grey and orange brown.	MW	M - H		HAWKESBURY SANDSTONE LOW TO MODERATE 'TC' BIT RESISTANCE
							REFER TO CORED BOREHOLE LOG				Groundwater monitoring well installed to 12.54m. Class 18 machine slotted 50mm dia. PVC standpipe 1.54m to 12.54m. Casing 0.1m to 1.54m. 2mm sand filter pack 1.4m to 12.54m. Bentonite seal 0.3m to 1.4m. Backfilled with sand to the surface. Completed with a concreted gatic cover.
			47	2							JKE SAMPLES WERE COLLECTED FROM THE CORED SAMPLES AT THE FOLLOWING DEPTHS: 1.42-1.5m 1.9-2.0m 2.4-2.5m 2.9-3.0m 3.9-4.0m 4.9-5.0m 5.9-6.0m 6.9-7.0m 7.9-8.0m 8.9-9.0m 9.9-10.0m 10.96-11.0m 11.35-11.45m 11.9-12.0m 12.45-12.56m
			46	3							
			45	4							
			44	5							
			43	6							

JK 9.02.4 LIB.GLB Log JK AUGERHOLE - MASTER 32507R2 GREENWICH.GPJ <<DrawingFile>> 21/01/2022 12:47 10.01.00.01 Datgel Lab and In Situ Tool - DGD | Lib: JK 9.02.4 2019-05-31 Prj: JK 9.01.0 2018-03-20

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CORED BOREHOLE LOG

Borehole No.
109

Client: HAMMOND CARE
Project: PROPOSED HOSPITAL REDEVELOPMENT
Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: 32507R2 | **Core Size:** NMLC | **R.L. Surface:** ~49.1 m
Date: 30/9/21 | **Inclination:** VERTICAL | **Datum:** AHD
Plant Type: JK205 | **Bearing:** N/A | **Logged/Checked By:** J.L./P.R.

Water Loss\Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION (Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components)	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$	DEFECT SPACING (mm)	DEFECT DESCRIPTION (Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness) Specific / General	Formation
		48			START CORING AT 1.42m						
100% RETURN		47	2		SANDSTONE: fine to medium grained, light grey with red brown bands, bedded at 0-25°. JKE sample 1.42-1.5m	MW	M - H	1.2, 1.7, 0.80		(2.15m) Cr, 20 mm.t (2.25m) Be, P, R, Fe Sn	Hawkesbury Sandstone
		46, 45, 44, 43, 42	3, 4, 5, 6, 7		SANDSTONE: medium grained, light grey with grey lamination, and orange brown bands, bedded at 0-25°.	SW		0.90, 0.80, 0.80, 0.70, 1.1, 0.80, 1.5, 1.1, 0.70, 0.80		(3.04m) Be, P, R, Fe Sn (3.24m) XWS, 15 mm.t (3.53m) J, P, R, Clay FILLED (4.66m) CS, 35 mm.t (4.80m) CS, 150 mm.t (5.31m) Be, P, R, Cb Ct (5.40m) Be, P, R, Clay Ct (6.14m) CS, 15 mm.t (6.29m) CS, 5 mm.t (6.46m) Cr, 20 mm.t (6.86m) CS, 5 mm.t (7.83m) Be, P, R, Cb Ct (7.91m) CS, 3 mm.t	
ON 22/10/21											

Strength scale: VL -0.1, L -0.3, M -1, H -3, VH -10, EH. Spacing scale: 600, 200, 60, 20.

 FRACTURES NOT MARKED ARE CONSIDERED TO BE DRILLING AND HANDLING BREAKS

JKGeotechnics

CORED BOREHOLE LOG

Borehole No.
109

Client: HAMMOND CARE
Project: PROPOSED HOSPITAL REDEVELOPMENT
Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: 32507R2 **Core Size:** NMLC **R.L. Surface:** ~49.1 m
Date: 30/9/21 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK205 **Bearing:** N/A **Logged/Checked By:** J.L./P.R.

Water Loss\Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION: Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$	DEFECT DETAILS: Specific (Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness)	Formation
ON 20/10/21; 100% RETURN		41–38	8.1–11.0		SANDSTONE: medium grained, light grey with grey lamination, and orange brown bands, bedded at 0-25°.	SW	M - H	1.0, 1.3, 1.2, 0.60, 1.5, 1.1	(8.27m) Be, 15°, P, R, Cb Ct (8.88m) Be, 25°, P, R, Fe Sn (9.37m) Be, 25°, P, R, Cb Ct (9.57m) XWS, 15°, 15 mm.t (9.85m) CS, 10°, 20 mm.t (10.76m) Be, 0°, P, R, Clay Ct (10.96m) Be, 0 - 20°, C, R, Cn	Hawkesbury Sandstone
		38	11.0–11.5		SILTSTONE: dark grey, bedded sub horizontally.	MW	L	0.30	(11.45m) CS, 0°, 30 mm.t (11.48m) Cr, 0°, 25 mm.t	
		37	11.5–12.56		SANDSTONE: medium grained, light grey with grey lamination, trace of siltstone, bedded at 0-20°.	FR	H	1.0, 1.3, 1.4	(12.50m) CS, 0°, 15 mm.t	
		36–35	13–14		END OF BOREHOLE AT 12.56 m					

Point load scale: VL -0.1, L -0.3, M -1, H -3, VH -10, EH
Spacing (mm): 600, 200, 60, 20

FRACTURES NOT MARKED ARE CONSIDERED TO BE DRILLING AND HANDLING BREAKS

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BOREHOLE LOG

Client: HAMMOND CARE
Project: PROPOSED HOSPITAL REDEVELOPMENT
Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: 32507R2 **Method:** SPIRAL AUGER **R.L. Surface:** ~48.5 m
Date: 30/9/21 **Datum:** AHD
Plant Type: JK305 **Logged/Checked By:** J.L./P.R.

Groundwater Record	SAMPLES ES	U50	DB	DS	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
DRY ON COMPLETION OF AUGERING							0			FILL: Clayey silt, low plasticity, dark brown, trace of fine grained igneous and ironstone gravel.	w<PL			MULCH COVER
										FILL: Clayey sand, fine to medium grained, orange brown, trace of fine to medium grained sandstone and ironstone gravel, and clay nodules.	D			APPEARS MODERATELY COMPACTED
					N = 9 4,5,4	48					w<PL			
										FILL: Silty clay, low plasticity, brown, grey and orange brown, with fine to medium grained sand, trace of medium to coarse grained ironstone and sandstone gravel.				
							1		CI	Silty CLAY: medium plasticity, orange brown, trace of fine to medium grained sand.	w~PL	(St - VSt)		RESIDUAL
						47				REFER TO CORED BOREHOLE LOG				
							2							
						46								
							3							
						45								
							4							
						44								
							5							
						43								
							6							
						42								

CORED BOREHOLE LOG

Client: HAMMOND CARE
Project: PROPOSED HOSPITAL REDEVELOPMENT
Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: 32507R2 **Core Size:** NMLC **R.L. Surface:** ~48.5 m
Date: 30/9/21 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK305 **Bearing:** N/A **Logged/Checked By:** J.L./P.R.

Water Loss\Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION: Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$	DEFECT DETAILS: SPACING (mm)	DEFECT DETAILS: DESCRIPTION (Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness) Specific / General	Formation
					START CORING AT 1.36m						
100% RETURN		47			SANDSTONE: medium to coarse grained, brown orange, bedded at 0-25°.	MW	M - H	0.80		(1.58m) J, 80°, P, Fe Sn	Hawkesbury Sandstone
			2					0.90			
								0.40			
		46			SANDSTONE: medium to coarse grained, light grey with red brown bands.	SW		1.1			
			3							(3.03m) Bex2, 25°, P, R, Fe Sn	
						MW	L - M	0.30			
		45						0.40		(3.64m) CS, 15°, 40 mm.t	
						SW	M - H				
80% RETURN			4					0.60		(4.28m) CS, 10°, 30 mm.t	
		44									
			5					1.1			
								0.90			
		43						0.90			
			6							(6.04m) CS, 5°, 10 mm.t	
								1.0		(6.26m) CS, 5°, 15 mm.t	
										(6.34m) Be, 0°, P, R, Fe Sn	
		42			as above, but bedded at 30°.						
								1.6			
			7					1.0			
		41						1.1			

CORED BOREHOLE LOG

Client: HAMMOND CARE
Project: PROPOSED HOSPITAL REDEVELOPMENT
Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: 32507R2 **Core Size:** NMLC **R.L. Surface:** ~48.5 m
Date: 30/9/21 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK305 **Bearing:** N/A **Logged/Checked By:** J.L./P.R.

Water Loss\Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION (Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components)	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$	DEFECT DETAILS – DESCRIPTION (Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness) Specific	General	Formation
80% RETURN		40, 39	9		SANDSTONE: medium to coarse grained, light grey with red brown bands, bedded at 30°.	FR	M - H	1.0, 1.4			Hawkesbury Sandstone
					SILTSTONE: dark grey, bedded at 20-30°.	MW	L	0.30, 0.30	(8.97m) CS, 10°		
100% RETURN		38, 37, 36	10, 11, 12		SANDSTONE: medium grained, light grey with grey lamination, trace of siltstone clasts, bedded at 0-20°.	FR	M - H	0.90, 1.1, 1.4, 1.4, 1.3, 1.7	(10.63m) Be, 5°, P, R, Fe Sn; (11.91m) CS, 0°, 10 mm.t		
		35, 34	13, 14		END OF BOREHOLE AT 12.85 m						

Point load scale: VL -0.1, L -0.3, M -1, H -3, VH -10, EH. Spacing (mm): 600, 200, 60, 20.

FRACTURES NOT MARKED ARE CONSIDERED TO BE DRILLING AND HANDLING BREAKS

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **110A**

1/1

SDUP6: 0.0-0.1m

Client: HAMMOND CARE

Project: PROPOSED HOSPITAL REDEVELOPMENT

Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: E32507BR **Method:** PUSH TUBE **R.L. Surface:** ≈ 48.5m

Date: 29/9/2021 **Datum:** AHD

Plant Type: EZIPROBE **Logged/Checked by:** M.M.E./V.B.

Groundwater Record	SAMPLES (ES, ASS, ASB, SAL, DB)	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION			0			FILL: Silty gravelly sand, fine to medium grained, dark brown, fine to medium grained igneous gravel, trace of ash, slag and root fibres.	M			GRASS COVER
							w<PL			SCREEN: 10.0kg 0.0-0.1m NO FCF
						FILL: Sandy gravel, fine to medium grained igneous gravel, grey, fine to medium grained, trace of ash, asphaltic concrete fragments and root fibres.				SCREEN: 4.2kg 0.1-0.2m NO FCF
			1		CL-CI	FILL: Sandy clay, low to medium plasticity, yellow brown mottled red brown, trace of sandstone cobble and ironstone gravel, terracotta and root fibres.	w<PL			SCREEN: 5.8kg 0.2-1.1m NO FCF
						Sandy CLAY: low to medium plasticity, yellow brown, trace of ironstone gravel, ash and root fibres.				RESIDUAL
						END OF BOREHOLE AT 1.3m				REFUSAL ON INFERRED BEDROCK
			2							
			3							
			4							
			5							
			6							
			7							

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ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. 111

1/1

SDUP3: 0.0-0.1m

Client: HAMMOND CARE

Project: PROPOSED HOSPITAL REDEVELOPMENT

Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: E32507BR **Method:** HAND AUGER **R.L. Surface:** ≈ 48.6m

Date: 28/9/2021 **Datum:** AHD

Plant Type: - **Logged/Checked by:** M.M.E./V.B.

Groundwater Record	SAMPLES (ES, ASS, ASB, SAL, DB)	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION			0			FILL: Silty sand, fine to medium grained, dark brown, trace of ironstone, siltstone and sandstone gravel, tile fragments and root fibres.	D			GRASS COVER
										SCREEN: 10.8kg 0.0-0.1m NO FCF
						FILL: Silty clay, medium to high plasticity, brown, trace of sand, ironstone and igneous gravel and ash.	w<PL			SCREEN: 4.8kg 0.1-0.3m NO FCF
										SCREEN: 5.2kg 0.3-0.6m NO FCF
			1			FILL: Silty clayey sand, fine to medium grained, brown, trace of ironstone and igneous gravel and ash.	D			SCREEN: 4.9kg 0.6-0.8m NO FCF
						END OF BOREHOLE AT 0.8m				HAND AUGER REFUSAL ON INFERRED BEDROCK
			2							
			3							
			4							
			5							
			6							
			7							

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ENVIRONMENTAL LOG

Log No. **112**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: HAMMOND CARE

Project: PROPOSED HOSPITAL REDEVELOPMENT

Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: E32507BR **Method:** PUSH TUBE **R.L. Surface:** ≈ 48.6m

Date: 29/9/2021 **Datum:** AHD

Plant Type: EZIPROBE **Logged/Checked by:** H.W./V.B.

Groundwater Record	SAMPLES (ES, ASS, ASB, SAL, DB)	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION			0			CONCRETE: 220mm.t				STEEL REINFORCEMENT AT 150mm
	ES, ASB, DB				-	FILL: Silty gravelly sand, fine to medium grained, brown, fine to medium grained sandstone gravel, trace of clay nodules, igneous and ironstone gravel and asphaltic concrete fragments.	M			SCREEN: 6.90kg 0.22-0.65m NO FCF
	ES, ASB				-	Extremely Weathered sandstone: silty SAND, fine to medium grained, yellow brown.	XW			HAWKESBURY SANDSTONE
			1			END OF BOREHOLE AT 0.8m				REFUSAL
			2							
			3							
			4							
			5							
			6							
			7							

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ENVIRONMENTAL LOG

Log No. **113**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: HAMMOND CARE

Project: PROPOSED HOSPITAL REDEVELOPMENT

Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: E32507BR **Method:** PUSH TUBE **R.L. Surface:** ≈ 52.0m

Date: 29/9/2021 **Datum:** AHD

Plant Type: EZIPROBE **Logged/Checked by:** M.M.E./V.B.

Groundwater Record	Samples (ES / ASS / ASB / SAL / DB)	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION			0			FILL: Silty sand, fine to medium grained, brown, trace of igneous gravel, glass and root fibres.	D			GRASS COVER
							M			SCREEN: 10.1kg 0.0-0.1m NO FCF
					CL-CI	FILL: Silty clayey sand, fine to medium grained, light brown, trace of ironstone and igneous gravel, ash and root fibres.				SCREEN: 9.6kg 0.1-0.35m NO FCF
						Sandy CLAY: low to medium plasticity, dark brown mottled yellow, trace of ironstone gravel, ash and root fibres.	w<PL			RESIDUAL
						Sandy CLAY: low to medium plasticity, yellow brown, trace of ironstone gravel and root fibres.				
						END OF BOREHOLE AT 0.65m				REFUSAL ON INFERRED BEDROCK
			1							
			2							
			3							
			4							
			5							
			6							
			7							

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ENVIRONMENTAL LOG

Log No. **114**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: HAMMOND CARE

Project: PROPOSED HOSPITAL REDEVELOPMENT

Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: E32507BR **Method:** PUSH TUBE **R.L. Surface:** ≈ 50.7m

Date: 29/9/2021 **Datum:** AHD

Plant Type: EZIPROBE **Logged/Checked by:** M.M.E./V.B.

Groundwater Record	SAMPLES (ES / ASS / ASB / SAL / DB)	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION			0		-	ASPHALTIC CONCRETE: 50mm.t	D			SCREEN: 9.61kg 0.05-0.2m NO FCF
					SC	FILL: Silty sandy gravel, fine to medium grained, igneous gravel, sub angular, light grey, fine to medium grained sand, trace of ironstone gravel and asphaltic concrete fragments.	M			
					CL-CI	Silty clayey SAND: fine to medium grained, light brown, trace of ironstone and sandstone gravel and root fibres.				RESIDUAL
						Sandy CLAY: low to medium plasticity, yellow brown with ironstone gravel.	w<PL			REFUSAL ON INFERRED BEDROCK
			1			END OF BOREHOLE AT 0.5m				
			2							
			3							
			4							
			5							
			6							
			7							

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ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **115**

1/1

SDUP4: 0.0-0.1m

Client: HAMMOND CARE

Project: PROPOSED HOSPITAL REDEVELOPMENT

Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: E32507BR **Method:** PUSH TUBE **R.L. Surface:** ≈ 50.1m

Date: 29/9/2021 **Datum:** AHD

Plant Type: EZIPROBE **Logged/Checked by:** M.M.E./V.B.

Groundwater Record	SAMPLES (ES, ASS, ASB, SAL, DB)	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION			0			FILL: Silty clayey sand, fine to medium grained, brown, trace of ironstone and sandstone gravel, and root fibres.	D			GRASS COVER SCREEN: 11.8kg 0.0-0.1m NO FCF
					CL-CI	Silty CLAY: low to medium plasticity, light grey, with ironstone banding, trace of root fibres.	w<PL			RESIDUAL
			1			END OF BORHEOLE AT 1.1m				REFUSAL ON INFERRED BEDROCK
			2							
			3							
			4							
			5							
			6							
			7							

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ENVIRONMENTAL LOG

Log No. **116**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: HAMMOND CARE

Project: PROPOSED HOSPITAL REDEVELOPMENT

Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: E32507BR **Method:** PUSH TUBE **R.L. Surface:** ≈ 50.1m

Date: 29/9/2021 **Datum:** AHD

Plant Type: EZIPROBE **Logged/Checked by:** M.M.E./V.B.

Groundwater Record	SAMPLES (ES, ASS, ASB, SAL, DB)	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION			0		-	ASPHALTIC CONCRETE: 20mm.t	D			
					SC	FILL: Silty sandy gravel, fine to medium grained, igneous gravel, sub angular, light grey, fine to medium grained sand, trace of ironstone gravel and asphaltic concrete fragments.	M			SCREEN: 11.9kg 0.02-0.1m NO FCF
					CL-CI	Silty clayey SAND: light brown mottled yellow brown, trace of ironstone gravel, ash and root fibres.	w<PL			RESIDUAL
						Sandy CLAY: low to medium plasticity, yellow brown, with ironstone banding.				
					-	Extremely Weathered sandstone: silty SAND, fine to medium grained, yellow brown.	XW			HAWKESBURY SANDSTONE
						END OF BOREHOLE AT 0.6m				REFUSAL
			1							
			2							
			3							
			4							
			5							
			6							
			7							

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ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **117**

1/1

SDUP10: 0.0-0.1m

Client: HAMMOND CARE

Project: PROPOSED HOSPITAL REDEVELOPMENT

Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: E32507BR **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 49.3m

Date: 6/10/2021 **Datum:** AHD

Plant Type: JK205 **Logged/Checked by:** A.D./V.B.

Groundwater Record	SAMPLES (ES, ASS, ASB, SAL, DB)	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION			0			FILL: Silty sand, fine to medium grained, brown, trace of tile fragments and root fibres.	M			GRASS COVER SCREEN: 10.0kg 0-0.1m NO FCF
		N = 25 8,13,12				FILL: Silty sand, fine to medium grained, grey and brown, trace of igneous gravel and sandstone gravel.	D			
			1							
						END OF BOREHOLE AT 1.5m				
			2							
			3							
			4							
			5							
			6							
			7							

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ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **118**

1/1

SDUP5: 0.0-0.1m

Client: HAMMOND CARE

Project: PROPOSED HOSPITAL REDEVELOPMENT

Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: E32507BR **Method:** PUSH TUBE **R.L. Surface:** ≈ 40.0m

Date: 29/9/2021 **Datum:** AHD

Plant Type: EZIPROBE **Logged/Checked by:** M.M.E./V.B.

Groundwater Record	SAMPLES (ES / ASS / ASB / SAL / DB)	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION			0			FILL: Silty sandy clay, low to medium plasticity, light brown mottled red and yellow, trace of siltstone, ironstone and sandstone gravel, ash, tile fragments and root fibres.	D			GRASS COVER SCREEN: 10.6kg 0.0-0.1m NO FCF SCREEN: 9.85kg 0.1-1.1m NO FCF SCREEN: 8.1kg 1.1-1.6m NO FCF
			1							
			2		CL-CI	Sandy CLAY: low to medium plasticity, yellow brown mottled red, trace of ironstone gravel.	w<PL			RESIDUAL
					CI-CH	Sandy CLAY: medium to high plasticity, light brown mottled yellow and red, with ironstone banding.				
						END OF BOREHOLE AT 2.5m				REFUSAL
			3							
			4							
			5							
			6							
			7							

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BOREHOLE LOG

Borehole No.
119

Client: HAMMOND CARE
Project: PROPOSED HOSPITAL REDEVELOPMENT
Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: 32507R2 **Method:** SPIRAL AUGER **R.L. Surface:** 42.5 m
Date: 1/10/21 **Datum:** AHD
Plant Type: JK305 **Logged/Checked By:** J.L./P.R.

Groundwater Record	SAMPLES (ES, U50, DB, DS)	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
DRY ON COMPLETION OF AUGERING				0		-	ASPHALTIC CONCRETE: 50mm.t				
							FILL: Silty sand, fine to medium grained, yellow brown, trace of igneous and sandstone gravel, and ceramic tile fragments.	D			SCREEN: 3.2kg 0.05-0.3m NO FCF
			42			-	SANDSTONE: fine to medium grained, yellow brown.	DW	MD / M		HAWKESBURY SANDSTONE MODERATE 'TC' BIT RESISTANCE
			41	1							
			40	2					L - M		LOW TO MODERATE RESISTANCE
									H		HIGH RESISTANCE
			39	3			REFER TO CORED BOREHOLE LOG				GROUNDWATER MONITORING WELL INSTALLED TO 5.75m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 1.2m TO 5.75m. CASING 0m TO 1.2m. 2mm SAND FILTER PACK 1.0m TO 5.75m. BENTONITE SEAL 0.25m TO 1.0m. BACKFILLED WITH SAND TO THE SURFACE. COMPLETED WITH A CONCRETED GATIC COVER.
			38	4							
			37	5							
			36	6							

JK 9.02.4 LIB.GLB Log JK AUGERHOLE - MASTER 32507R2 GREENWICH.GPJ <<DrawingFile>> 21/01/2022 12:47 10.01.00.01 Datgel Lab and In Situ Tool - DGD | Lib: JK 9.02.4 2019-05-31 Prj: JK 9.01.0 2018-03-20

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CORED BOREHOLE LOG

Borehole No.
119

Client: HAMMOND CARE
Project: PROPOSED HOSPITAL REDEVELOPMENT
Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: 32507R2 **Core Size:** NMLC **R.L. Surface:** 42.5 m
Date: 1/10/21 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK305 **Bearing:** N/A **Logged/Checked By:** J.L./P.R.

Water Loss\Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION: Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$ (VL -0.1, L -0.3, M -1, H -3, VH -10, EH)	SPACING (mm) (600, 200, 60, 20)	DEFECT DETAILS DESCRIPTION: Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness — Specific / General	Formation
		40			START CORING AT 2.94m					ROCK STRENGTH BASED ON TACTILE ASSESSMENT	
100% RETURN		39, 38	3, 4, 5		SANDSTONE: medium grained, light grey, orange brown and red brown, bedded at 0-25°.	MW	(L - M)			(4.10m) CS, 5°, 10 mm.t (4.61m) J, 45°, P, R, Fe Ct (5.15m) Be, 20°, C, R, Fe Sn (5.16m) CS, 5°, 10 mm.t	Hawkesbury Sandstone
		37			SANDSTONE: fine to medium grained, light grey, bedded at 0-20°.	FR	(M)		60 20	(5.32m) Be x 2, 0°, C, R, Fe Ct (5.49m) Cr, 0°, 15 mm.t	
		36, 35, 34	6, 7, 8		END OF BOREHOLE AT 5.75 m				600 200 60 20		

FRACTURES NOT MARKED ARE CONSIDERED TO BE DRILLING AND HANDLING BREAKS

ENVIRONMENTAL LOGS EXPLANATION NOTES

INTRODUCTION

These notes have been provided to amplify the environmental report in regard to classification methods, field procedures and certain matters relating to the logging of soil and rock. Not all notes are necessarily relevant to all reports.

Where geotechnical borehole logs are utilised for environmental purpose, reference should also be made to the explanatory notes included in the geotechnical report. Environmental logs are not suitable for geotechnical purposes.

The ground is a product of continuing natural and man-made processes and therefore exhibits a variety of characteristics and properties which vary from place to place and can change with time. Environmental studies include gathering and assimilating limited facts about these characteristics and properties in order to understand or predict the behaviour of the ground on a particular site under certain conditions. This report may contain such facts obtained by inspection, excavation, probing, sampling, testing or other means of investigation. If so, they are directly relevant only to the ground at the place where and time when the investigation was carried out.

DESCRIPTION AND CLASSIFICATION METHODS

The methods of description and classification of soils and rocks used in this report are based on Australian Standard 1726:2017 *'Geotechnical Site Investigations'*. In general, descriptions cover the following properties – soil or rock type, colour, structure, strength or density, and inclusions. Identification and classification of soil and rock involves judgement and the Company infers accuracy only to the extent that is common in current geoenvironmental practice.

Soil types are described according to the predominating particle size and behaviour as set out in the attached soil classification table qualified by the grading of other particles present (eg. sandy clay) as set out below:

Soil Classification	Particle Size
Clay	< 0.002mm
Silt	0.002 to 0.075mm
Sand	0.075 to 2.36mm
Gravel	2.36 to 63mm
Cobbles	63 to 200mm
Boulders	> 200mm

Non-cohesive soils are classified on the basis of relative density, generally from the results of Standard Penetration Test (SPT) as below:

Relative Density	SPT 'N' Value (blows/300mm)
Very loose (VL)	< 4
Loose (L)	4 to 10
Medium dense (MD)	10 to 30
Dense (D)	30 to 50
Very Dense (VD)	> 50

Cohesive soils are classified on the basis of strength (consistency) either by use of a hand penetrometer, vane shear, laboratory testing and/or tactile engineering examination. The strength terms are defined as follows.

Classification	Unconfined Compressive Strength (kPa)	Indicative Undrained Shear Strength (kPa)
Very Soft (VS)	≤ 25	≤ 12
Soft (S)	> 25 and ≤ 50	> 12 and ≤ 25
Firm (F)	> 50 and ≤ 100	> 25 and ≤ 50
Stiff (St)	> 100 and ≤ 200	> 50 and ≤ 100
Very Stiff (VSt)	> 200 and ≤ 400	> 100 and ≤ 200
Hard (Hd)	> 400	> 200
Friable (Fr)	Strength not attainable – soil crumbles	

Rock types are classified by their geological names, together with descriptive terms regarding weathering, strength, defects, etc. Where relevant, further information regarding rock classification is given in the text of the report. In the Sydney Basin, 'shale' is used to describe fissile mudstone, with a weakness parallel to bedding. Rocks with alternating inter-laminations of different grain size (eg. siltstone/claystone and siltstone/fine grained sandstone) are referred to as 'laminite'.

INVESTIGATION METHODS

The following is a brief summary of investigation methods currently adopted by the Company and some comments on their use and application. All methods except test pits, hand auger drilling and portable Dynamic Cone Penetrometers require the use of a mechanical rig which is commonly mounted on a truck chassis or track base.

Test Pits: These are normally excavated with a backhoe or a tracked excavator, allowing close examination of the insitu soils and 'weaker' bedrock if it is safe to descend into the pit. The depth of penetration is limited to about 3m for a backhoe and up to 6m for a large excavator. Limitations of test pits are the problems associated with disturbance and difficulty of reinstatement and the consequent effects on close-by structures. Care must be taken if construction is to be carried out near test pit locations to either properly recompact the backfill during construction or to design and construct the structure so as not to be adversely affected by poorly compacted backfill at the test pit location.

Hand Auger Drilling: A borehole of 50mm to 100mm diameter is advanced by manually operated equipment. Refusal of the hand auger can occur on a variety of materials such as obstructions within any fill, tree roots, hard clay, gravel or ironstone, cobbles and boulders, and does not necessarily indicate rock level.

Continuous Spiral Flight Augers: The borehole is advanced using 75mm to 115mm diameter continuous spiral flight augers, which are withdrawn at intervals to allow sampling and insitu testing. This is a relatively economical means of drilling in clays and in sands above the water table. Samples are returned to the surface by the flights or may be collected after withdrawal of the auger flights, but they can be very disturbed and layers may become mixed. Information from the auger sampling (as distinct from specific sampling by SPTs or undisturbed samples) is of limited reliability due to mixing or softening of samples by groundwater, or uncertainties as to the original depth of the samples. Augering below the groundwater table is of even lesser reliability than augering above the water table.

Rock Augering: Use can be made of a Tungsten Carbide (TC) bit for auger drilling into rock to indicate rock quality and continuity by variation in drilling resistance and from examination of recovered rock cuttings. This method of investigation is quick and relatively inexpensive but provides only an indication of the likely rock strength and predicted values may be in error by a strength order. Where rock strengths may have a significant impact on construction feasibility or costs, then further investigation by means of cored boreholes may be warranted.

Wash Boring: The borehole is usually advanced by a rotary bit, with water being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be assessed from the cuttings, together with some information from "feel" and rate of penetration.

Mud Stabilised Drilling: Either Wash Boring or Continuous Core Drilling can use drilling mud as a circulating fluid to stabilise the borehole. The term 'mud' encompasses a range of products ranging from bentonite to polymers. The mud tends to mask the cuttings and reliable identification is only possible from intermittent intact sampling (eg. from SPT and U50 samples) or from rock coring, etc.

Continuous Core Drilling: A continuous core sample is obtained using a diamond tipped core barrel. Provided full core recovery is achieved (which is not always possible in very low strength rocks and granular soils), this technique provides a very reliable (but relatively expensive) method of investigation. In rocks, NMLC or HQ triple tube core barrels, which give a core of about 50mm and 61mm diameter, respectively, is usually used with water flush. The length of core recovered is compared to the length drilled and any length not recovered is shown as NO CORE. The location of NO CORE recovery is determined on site by the supervising engineer; where the location is uncertain, the loss is placed at the bottom of the drill run.

Standard Penetration Tests: Standard Penetration Tests (SPT) are used mainly in non-cohesive soils, but can also be used in cohesive soils, as a means of indicating density or strength and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289.6.3.1–2004 (R2016) *'Methods of Testing Soils for Engineering Purposes, Soil Strength and Consolidation Tests – Determination of the Penetration Resistance of a Soil – Standard Penetration Test (SPT)'*.

The test is carried out in a borehole by driving a 50mm diameter split sample tube with a tapered shoe, under the impact of a 63.5kg hammer with a free fall of 760mm. It is normal for the tube to be driven in three successive 150mm increments and the 'N' value is taken as the number of blows for the last 300mm. In dense sands, very hard clays or weak rock, the full 450mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form:

- In the case where full penetration is obtained with successive blow counts for each 150mm of, say, 4, 6 and 7 blows, as

  N = 13
  4, 6, 7

- In a case where the test is discontinued short of full penetration, say after 15 blows for the first 150mm and 30 blows for the next 40mm, as

  N > 30
  15, 30/40mm

The results of the test can be related empirically to the engineering properties of the soil.

A modification to the SPT is where the same driving system is used with a solid 60° tipped steel cone of the same diameter as the SPT hollow sampler. The solid cone can be continuously driven for some distance in soft clays or loose sands, or may be used where damage would otherwise occur to the SPT. The results of this Solid Cone Penetration Test (SCPT) are shown as 'N_c' on the borehole logs, together with the number of blows per 150mm penetration.

LOGS

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

The terms and symbols used in preparation of the logs are defined in the following pages.

Interpretation of the information shown on the logs, and its application to design and construction, should therefore take into account the spacing of boreholes or test pits, the method of drilling or excavation, the frequency of sampling and testing and the possibility of other than 'straight line' variations between the boreholes or test pits. Subsurface conditions between boreholes or test pits may vary significantly from conditions encountered at the borehole or test pit locations.

GROUNDWATER

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

- Although groundwater may be present, in low permeability soils it may enter the hole slowly or perhaps not at all during the time it is left open.
- A localised perched water table may lead to an erroneous indication of the true water table.
- Water table levels will vary from time to time with seasons or recent weather changes and may not be the same at the time of construction.
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must be washed out of the hole or 'reverted' chemically if reliable water observations are to be made.

More reliable measurements can be made by installing standpipes which are read after the groundwater level has stabilised at intervals ranging from several days to perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from perched water tables or surface water.

FILL

The presence of fill materials can often be determined only by the inclusion of foreign objects (eg. bricks, steel, etc) or by distinctly unusual colour, texture or fabric. Identification of the extent of fill materials will also depend on investigation methods and frequency. Where natural soils similar to those at the site are used for fill, it may be difficult with limited testing and sampling to reliably assess the extent of the fill.

The presence of fill materials is usually regarded with caution as the possible variation in density and material type is much greater than with natural soil deposits. Consequently, there is an increased risk of adverse environmental characteristics or behaviour. If the volume and nature of fill is of importance to a project, then frequent test pit excavations are preferable to boreholes.

LABORATORY TESTING

Laboratory testing has not been undertaken to confirm the soil classification and rock strengths indicated on the environmental logs unless noted in the report.

SYMBOL LEGENDS

SOIL	ROCK
FILL	CONGLOMERATE
TOPSOIL	SANDSTONE
CLAY (CL, CI, CH)	SHALE/MUDSTONE
SILT (ML, MH)	SILTSTONE
SAND (SP, SW)	CLAYSTONE
GRAVEL (GP, GW)	COAL
SANDY CLAY (CL, CI, CH)	LAMINITE
SILTY CLAY (CL, CI, CH)	LIMESTONE
CLAYEY SAND (SC)	PHYLLITE, SCHIST
SILTY SAND (SM)	TUFF
GRAVELLY CLAY (CL, CI, CH)	GRANITE, GABBRO
CLAYEY GRAVEL (GC)	DOLERITE, DIORITE
SANDY SILT (ML, MH)	BASALT, ANDESITE
PEAT AND HIGHLY ORGANIC SOILS (Pt)	QUARTZITE

OTHER MATERIALS

- BRICKS OR PAVERS
- CONCRETE
- ASPHALTIC CONCRETE

CLASSIFICATION OF COARSE AND FINE GRAINED SOILS

Major Divisions		Group Symbol	Typical Names	Field Classification of Sand and Gravel	Laboratory Classification	
Coarse grained soil (more than 65% of soil excluding oversize fraction is greater than 0.075mm)	GRAVEL (more than half of coarse fraction is larger than 2.36mm	GW	Gravel and gravel-sand mixtures, little or no fines	Wide range in grain size and substantial amounts of all intermediate sizes, not enough fines to bind coarse grains, no dry strength	≤ 5% fines	$C_u > 4$ $1 < C_c < 3$
		GP	Gravel and gravel-sand mixtures, little or no fines, uniform gravels	Predominantly one size or range of sizes with some intermediate sizes missing, not enough fines to bind coarse grains, no dry strength	≤ 5% fines	Fails to comply with above
		GM	Gravel-silt mixtures and gravel-sand-silt mixtures	'Dirty' materials with excess of non-plastic fines, zero to medium dry strength	≥ 12% fines, fines are silty	Fines behave as silt
		GC	Gravel-clay mixtures and gravel-sand-clay mixtures	'Dirty' materials with excess of plastic fines, medium to high dry strength	≥ 12% fines, fines are clayey	Fines behave as clay
	SAND (more than half of coarse fraction is smaller than 2.36mm)	SW	Sand and gravel-sand mixtures, little or no fines	Wide range in grain size and substantial amounts of all intermediate sizes, not enough fines to bind coarse grains, no dry strength	≤ 5% fines	$C_u > 6$ $1 < C_c < 3$
		SP	Sand and gravel-sand mixtures, little or no fines	Predominantly one size or range of sizes with some intermediate sizes missing, not enough fines to bind coarse grains, no dry strength	≤ 5% fines	Fails to comply with above
		SM	Sand-silt mixtures	'Dirty' materials with excess of non-plastic fines, zero to medium dry strength	≥ 12% fines, fines are silty	N/A
		SC	Sand-clay mixtures	'Dirty' materials with excess of plastic fines, medium to high dry strength	≥ 12% fines, fines are clayey	

Major Divisions		Group Symbol	Typical Names	Field Classification of Silt and Clay			Laboratory Classification
				Dry Strength	Dilatancy	Toughness	% < 0.075mm
ine grained soils (more than 35% of soil excluding oversize fraction is less than 0.075mm)	SILT and CLAY (low to medium plasticity)	ML	Inorganic silt and very fine sand, rock flour, silty or clayey fine sand or silt with low plasticity	None to low	Slow to rapid	Low	Below A line
		CL, CI	Inorganic clay of low to medium plasticity, gravelly clay, sandy clay	Medium to high	None to slow	Medium	Above A line
		OL	Organic silt	Low to medium	Slow	Low	Below A line
	SILT and CLAY (high plasticity)	MH	Inorganic silt	Low to medium	None to slow	Low to medium	Below A line
		CH	Inorganic clay of high plasticity	High to very high	None	High	Above A line
		OH	Organic clay of medium to high plasticity, organic silt	Medium to high	None to very slow	Low to medium	Below A line
	Highly organic soil	Pt	Peat, highly organic soil	–	–	–	–

Laboratory Classification Criteria

A well graded coarse grained soil is one for which the coefficient of uniformity $Cu > 4$ and the coefficient of curvature $1 < C_c < 3$. Otherwise, the soil is poorly graded. These coefficients are given by:

$$C_U = \frac{D_{60}}{D_{10}} \quad \text{and} \quad C_C = \frac{(D_{30})^2}{D_{10}\,D_{60}}$$

Where D_{10}, D_{30} and D_{60} are those grain sizes for which 10%, 30% and 60% of the soil grains, respectively, are smaller.

NOTES:

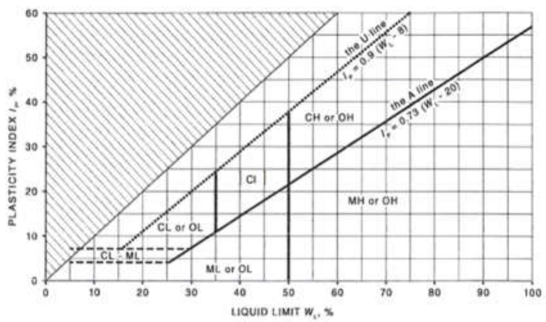
1 For a coarse grained soil with a fines content between 5% and 12%, the soil is given a dual classification comprising the two group symbols separated by a dash; for example, for a poorly graded gravel with between 5% and 12% silt fines, the classification is GP-GM.

2 Where the grading is determined from laboratory tests, it is defined by coefficients of curvature (C_c) and uniformity (C_u) derived from the particle size distribution curve.

3 Clay soils with liquid limits > 35% and ≤ 50% may be classified as being of medium plasticity.

4 The U line on the Modified Casagrande Chart is an approximate upper bound for most natural soils.

Modified Casagrande Chart for Classifying Silts and Clays according to their Behaviour



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LOG SYMBOLS

Log Column	Symbol	Definition
Groundwater Record		Standing water level. Time delay following completion of drilling/excavation may be shown.
	C	Extent of borehole/test pit collapse shortly after drilling/excavation.
		Groundwater seepage into borehole or test pit noted during drilling or excavation.
Samples	ES U50 DB DS ASB ASS SAL PFAS	Sample taken over depth indicated, for environmental analysis. Undisturbed 50mm diameter tube sample taken over depth indicated. Bulk disturbed sample taken over depth indicated. Small disturbed bag sample taken over depth indicated. Soil sample taken over depth indicated, for asbestos analysis. Soil sample taken over depth indicated, for acid sulfate soil analysis. Soil sample taken over depth indicated, for salinity analysis. Soil sample taken over depth indicated, for analysis of Per- and Polyfluoroalkyl Substances.
Field Tests	N = 17 4, 7, 10	Standard Penetration Test (SPT) performed between depths indicated by lines. Individual figures show blows per 150mm penetration. 'Refusal' refers to apparent hammer refusal within the corresponding 150mm depth increment.
	N_c = 5 7 3R	Solid Cone Penetration Test (SCPT) performed between depths indicated by lines. Individual figures show blows per 150mm penetration for 60° solid cone driven by SPT hammer. 'R' refers to apparent hammer refusal within the corresponding 150mm depth increment.
	VNS = 25 PID = 100	Vane shear reading in kPa of undrained shear strength. Photoionisation detector reading in ppm (soil sample headspace test).
Moisture Condition (Fine Grained Soils)	*w* > PL *w* ≈ PL *w* < PL *w* ≈ LL *w* > LL	Moisture content estimated to be greater than plastic limit. Moisture content estimated to be approximately equal to plastic limit. Moisture content estimated to be less than plastic limit. Moisture content estimated to be near liquid limit. Moisture content estimated to be wet of liquid limit.
(Coarse Grained Soils)	D M W	DRY – runs freely through fingers. MOIST – does not run freely but no free water visible on soil surface. WET – free water visible on soil surface.
Strength (Consistency) Cohesive Soils	VS S F St VSt Hd Fr ( )	VERY SOFT – unconfined compressive strength ≤ 25kPa. SOFT – unconfined compressive strength > 25kPa and ≤ 50kPa. FIRM – unconfined compressive strength > 50kPa and ≤ 100kPa. STIFF – unconfined compressive strength > 100kPa and ≤ 200kPa. VERY STIFF – unconfined compressive strength > 200kPa and ≤ 400kPa. HARD – unconfined compressive strength > 400kPa. FRIABLE – strength not attainable, soil crumbles. Bracketed symbol indicates estimated consistency based on tactile examination or other assessment.
Density Index/ Relative Density (Cohesionless Soils)		**Density Index (I_D) Range (%)** / **SPT 'N' Value Range (Blows/300mm)**
	VL	VERY LOOSE ≤ 15 / 0 – 4
	L	LOOSE > 15 and ≤ 35 / 4 – 10
	MD	MEDIUM DENSE > 35 and ≤ 65 / 10 – 30
	D	DENSE > 65 and ≤ 85 / 30 – 50
	VD	VERY DENSE > 85 / > 50
	( )	Bracketed symbol indicates estimated density based on ease of drilling or other assessment.

Log Column	Symbol	Definition
Hand Penetrometer Readings	300 250	Measures reading in kPa of unconfined compressive strength. Numbers indicate individual test results on representative undisturbed material unless noted otherwise.
Remarks	'V' bit	Hardened steel 'V' shaped bit.
	'TC' bit	Twin pronged tungsten carbide bit.
	T_{60}	Penetration of auger string in mm under static load of rig applied by drill head hydraulics without rotation of augers.
	Soil Origin	The geological origin of the soil can generally be described as: RESIDUAL – soil formed directly from insitu weathering of the underlying rock. No visible structure or fabric of the parent rock. EXTREMELY WEATHERED – soil formed directly from insitu weathering of the underlying rock. Material is of soil strength but retains the structure and/or fabric of the parent rock. ALLUVIAL – soil deposited by creeks and rivers. ESTUARINE – soil deposited in coastal estuaries, including sediments caused by inflowing creeks and rivers, and tidal currents. MARINE – soil deposited in a marine environment. AEOLIAN – soil carried and deposited by wind. COLLUVIAL – soil and rock debris transported downslope by gravity, with or without the assistance of flowing water. Colluvium is usually a thick deposit formed from a landslide. The description 'slopewash' is used for thinner surficial deposits. LITTORAL – beach deposited soil.

Classification of Material Weathering

<table>
<tr><th colspan="2">Term</th><th colspan="2">Abbreviation</th><th>Definition</th></tr>
<tr><td colspan="2">Residual Soil</td><td colspan="2">RS</td><td>Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are no longer visible, but the soil has not been significantly transported.</td></tr>
<tr><td colspan="2">Extremely Weathered</td><td colspan="2">XW</td><td>Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are still visible.</td></tr>
<tr><td>Highly Weathered</td><td rowspan="2">Distinctly Weathered (Note 1)</td><td>HW</td><td rowspan="2">DW</td><td>The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable. Rock strength is significantly changed by weathering. Some primary minerals have weathered to clay minerals. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores.</td></tr>
<tr><td>Moderately Weathered</td><td>MW</td><td>The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable, but shows little or no change of strength from fresh rock.</td></tr>
<tr><td colspan="2">Slightly Weathered</td><td colspan="2">SW</td><td>Rock is partially discoloured with staining or bleaching along joints but shows little or no change of strength from fresh rock.</td></tr>
<tr><td colspan="2">Fresh</td><td colspan="2">FR</td><td>Rock shows no sign of decomposition of individual minerals or colour changes.</td></tr>
</table>

NOTE 1: The term 'Distinctly Weathered' is used where it is not practicable to distinguish between 'Highly Weathered' and 'Moderately Weathered' rock. 'Distinctly Weathered' is defined as follows: *'Rock strength usually changed by weathering. The rock may be highly discoloured, usually by iron staining. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores'*. There is some change in rock strength.

Rock Material Strength Classification

<table>
<tr><th rowspan="2">Term</th><th rowspan="2">Abbreviation</th><th rowspan="2">Uniaxial Compressive Strength (MPa)</th><th colspan="2">Guide to Strength</th></tr>
<tr><th>Point Load Strength Index $Is_{(50)}$ (MPa)</th><th>Field Assessment</th></tr>
<tr><td>Very Low Strength</td><td>VL</td><td>0.6 to 2</td><td>0.03 to 0.1</td><td>Material crumbles under firm blows with sharp end of pick; can be peeled with knife; too hard to cut a triaxial sample by hand. Pieces up to 30mm thick can be broken by finger pressure.</td></tr>
<tr><td>Low Strength</td><td>L</td><td>2 to 6</td><td>0.1 to 0.3</td><td>Easily scored with a knife; indentations 1mm to 3mm show in the specimen with firm blows of the pick point; has dull sound under hammer. A piece of core 150mm long by 50mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling.</td></tr>
<tr><td>Medium Strength</td><td>M</td><td>6 to 20</td><td>0.3 to 1</td><td>Scored with a knife; a piece of core 150mm long by 50mm diameter can be broken by hand with difficulty.</td></tr>
<tr><td>High Strength</td><td>H</td><td>20 to 60</td><td>1 to 3</td><td>A piece of core 150mm long by 50mm diameter cannot be broken by hand but can be broken by a pick with a single firm blow; rock rings under hammer.</td></tr>
<tr><td>Very High Strength</td><td>VH</td><td>60 to 200</td><td>3 to 10</td><td>Hand specimen breaks with pick after more than one blow; rock rings under hammer.</td></tr>
<tr><td>Extremely High Strength</td><td>EH</td><td>> 200</td><td>> 10</td><td>Specimen requires many blows with geological pick to break through intact material; rock rings under hammer.</td></tr>
</table>

DSI Borehole Logs

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BOREHOLE LOG

Borehole No. 1

1 / 2

Client: HAMMOND CARE
Project: PROPOSED HOSPITAL REDEVELOPMENT
Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: 32507R **Method:** SPIRAL AUGER **R.L. Surface:** 37.3 m
Date: 22/7/19 **Datum:** AHD
Plant Type: JK205 **Logged/Checked By:** S.M./P.R.

Groundwater Record	Field Tests	RL (m AHD)	Depth (m)	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
DRY ON COMPLETION OF CORING			0		CONCRETE: 170mm.t				8mm DIA. REINFORCEMENT, 12mm & 35mm BOTTOM COVER
		37		-	FILL: Silty sandy gravel, fine to medium grained, igneous, angular, dark grey, fine to coarse grained sand.	M / D			60mm VOID UNDERNEATH SLAB
	N = 11 4,7,4				FILL: Clayey sand, medium to coarse grained, yellow brown and orange brown, with sub-angular fine to medium grained sandstone gravel.			490 390 360	APPEARS MODERATELY COMPACTED
		36	1		FILL: Silty clay, medium to high plasticity, light grey mottled brown and dark grey, trace of ash, slag, and angular fine to medium grained igneous gravel.	w>PL			
	N = 8 3,4,4	35	2		FILL: Silty clay, medium plasticity, light grey, with angular medium to coarse grained ironstone gravel.			250 270 190	APPEARS MODERATELY COMPACTED
ON COMPLETION	N = 2 1,1,1	34	3		FILL: Sand, medium to coarse grained, light grey and brown.	M / W		200 180 140	
		33	4	-	SANDSTONE: fine to medium grained, light grey.	DW / SW	L / M - H		HAWKESBURY SANDSTONE LOW TO MODERATE 'TC' BIT RESISTANCE / HIGH RESISTANCE
		32, 31	5, 6		REFER TO CORED BOREHOLE LOG				

JK 9.02.4 LIB.GLB Log JK AUGERHOLE - MASTER 32507R GREENWICH.GPJ <<DrawingFile>> 30/08/2019 10:46 10.01.00.01 Datgel Lab and In Situ Tool - DGD | Lib: JK 9.02.4 2019-05-31 Prj: JK 9.01.0 2018-03-20

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CORED BOREHOLE LOG

Borehole No.
1

Client: HAMMOND CARE
Project: PROPOSED HOSPITAL REDEVELOPMENT
Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: 32507R | **Core Size:** NMLC | **R.L. Surface:** 37.3 m
Date: 22/7/19 | **Inclination:** VERTICAL | **Datum:** AHD
Plant Type: JK205 | **Bearing:** N/A | **Logged/Checked By:** S.M./P.R.

Water Loss\Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION: Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$ (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT SPACING (mm) 600 200 60 20	DEFECT DETAILS DESCRIPTION: Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness — Specific	General	Formation
					START CORING AT 4.24m							
50% RETURN		33			SANDSTONE: fine to medium grained, light grey, with shale clasts, bedded at 0-10°.	SW	M					Hawkesbury Sandstone
			5				M - H			(5.15m) J, 15°, P, S, Cn		
		32								(5.27m) Be, 5°, P, S, Cn		
										(5.55m) XWS, 0°, 4 mm.t		
0% RETURN		31	6									
			7		as above, but bedded at 0-20°.							
		30			END OF BOREHOLE AT 7.29 m							
		29	8									
		28	9									
		27	10									

JK 9.02.4 LIB.GLB Log JK CORED BOREHOLE - MASTER 32507R GREENWICH.GPJ <<DrawingFile>> 30/08/2019 10:46 10.01.00.01 Datgel Lab and In Situ Tool - DGD | Lib: JK 9.02.4 2019-05-31 Prj: JK 9.01.0 2018-03-20

FRACTURES NOT MARKED ARE CONSIDERED TO BE DRILLING AND HANDLING BREAKS

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BOREHOLE LOG

Borehole No. 2

Client: HAMMOND CARE
Project: PROPOSED HOSPITAL REDEVELOPMENT
Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: 32507R **Method:** SPIRAL AUGER **R.L. Surface:** 39 m
Date: 23/7/19 **Datum:** AHD
Plant Type: JK205 **Logged/Checked By:** S.M./P.R.

Groundwater Record	Field Tests	RL (m AHD)	Depth (m)	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
DRY ON COMPLETION					FILL: Silty sand, fine to medium grained, dark brown, with root fibres.	M			GRASS COVER APPEARS WELL COMPACTED
	N = 21 2,12,9				FILL: Silty sand, medium to coarse grained, brown, with clay fines an sub-angular medium to coarse grained sandstone gravel, trace of ash.				
	N = 4 2,2,2	38 37	1 2		FILL: Silty sandy clay, low to medium plasticity, brown mottled orange brown, medium to coarse grained sand, with sub-angular medium to coarse grained ironstone and sandstone gravel, trace of slag and ash.				APPEARS MODERATELY COMPACTED
		36	3	-	SANDSTONE: fine to medium grained, light grey.	SW DW	M - H VL		HAWKESBURY SANDSTONE HIGH 'TC' BIT RESISTANCE WITH VERY LOW RESISTANCE BANDS
					as above, but yellow brown.	SW	M		
					as above, but orange brown.	DW	VL		
		35 34 33	4 5 6		as above, but light grey.	SW DW SW	M VL M		MODERATE RESISTANCE WITH VERY LOW RESISTANCE BANDS GROUNDWATER MONITORING WELL INSTALLED TO 2.3m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 0.4m TO 2.3m. CASING 0.11m TO 0.4m. 2mm SAND FILTER PACK 0.4m TO 2.3m. BENTONITE SEAL 0.11m TO 0.4m. BACKFILLED WITH SAND TO THE SURFACE. COMPLETED WITH A CONCRETED GATIC COVER.
					END OF BOREHOLE AT 6.30 m				

SAMPLES: ES, U50, DB, DS

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BOREHOLE LOG

Borehole No.
3
1 / 2

Client: HAMMOND CARE
Project: PROPOSED HOSPITAL REDEVELOPMENT
Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: 32507R **Method:** SPIRAL AUGER **R.L. Surface:** 42.8 m
Date: 23/7/19 **Datum:** AHD
Plant Type: JK205 **Logged/Checked By:** S.M./P.R.

Groundwater Record	SAMPLES (ES, U50, DB, DS)	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
DRY ON COMPLETION OF CORING						-	ASPHALTIC CONCRETE: 45mm.t				
							FILL: Silty gravelly sand, medium to coarse grained, dark grey, angular medium to coarse grained igneous gravel.	D			APPEARS MODERATELY COMPACTED
		N = 11 8,4,7	42				FILL: Sand, medium to coarse grained, light grey, with dark grey silty clay nodules, trace of ash.				
				1			FILL: Silty sand, medium to coarse grained, brown and light grey, with sub-angular medium to coarse grained sandstone gravel, trace of clay fines, slag and ash.				
			41			-	FILL: Clayey sand, medium to coarse grained, light brown.				
				2			SANDSTONE: fine to medium grained, light grey.	SW	M - H		HAWKESBURY SANDSTONE HIGH 'TC' BIT RESISTANCE
							REFER TO CORED BOREHOLE LOG				
			40	3							
			39	4							
			38	5							
			37	6							
			36								

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CORED BOREHOLE LOG

Borehole No.
3

Client: HAMMOND CARE
Project: PROPOSED HOSPITAL REDEVELOPMENT
Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: 32507R **Core Size:** NMLC **R.L. Surface:** 42.8 m
Date: 23/7/19 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK205 **Bearing:** N/A **Logged/Checked By:** S.M./P.R.

Water Loss\Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION: Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$	DEFECT DETAILS: DESCRIPTION — Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness — Specific / General	Formation
					START CORING AT 1.22m					
COMPLETION / ON		41	2		SANDSTONE: fine to medium grained, dark red brown, light grey and orange brown, bedded at 0-20°.	MW	H / L		(1.87m) XWS, 20°, 3 mm.t (2.13m) XWS, 10°, 8 mm.t (2.21m) XWS, 10°, 15 mm.t	Hawkesbury Sandstone
					NO CORE 0.42m					
100% RETURN		40	3		SANDSTONE: fine to medium grained, light grey and dark red brown, bedded at 0-10°.	MW	L / M		(2.65m) XWS, 0°, 25 mm.t (2.92m) Cb, 0°, 5mm.t (3.14m) XWS, 0°, 3-8mm.t (3.21m) Be, 0°, P, S, Cb Sn (3.22m) J, 30°, P, S, Cb Sn, 5 mm.t (3.67m) Be, 0°, P, S, Cb Sn, 5 mm.t (3.84m) XWS, 0°, 75 mm.t	Hawkesbury Sandstone
		39, 38, 37	4, 5, 6		as above, but light grey and orange brown.	SW	H		(6.57m) XWS, 0°, 65 mm.t	
		36	7		as above, but light grey, red brown and yellow brown, with slump bedding structure.					
		35			END OF BOREHOLE AT 7.20 m					

FRACTURES NOT MARKED ARE CONSIDERED TO BE DRILLING AND HANDLING BREAKS

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BOREHOLE LOG

Borehole No.
4
1 / 2

Client: HAMMOND CARE
Project: PROPOSED HOSPITAL REDEVELOPMENT
Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: 32507R **Method:** SPIRAL AUGER **R.L. Surface:** 41.5 m
Date: 23/7/19 **Datum:** AHD
Plant Type: JK205 **Logged/Checked By:** S.M./P.R.

Groundwater Record	SAMPLES (ES, U50, DB, DS)	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
DRY ON COMPLETION OF CORING				0		-	ASPHALTIC CONCRETE:				
							FILL: Silty gravelly sand, medium to coarse grained, dark grey, angular fine to coarse grained igneous gravel.	M W			APPEARS POORLY COMPACTED
		N = 3 4,2,1	41				FILL: Silty sand, medium to coarse grained, brown and dark yellow brown, with sub-angular medium to coarse grained sandstone gravel.	M			
				1			as above, but orange brown and yellow brown.				
		N = 4 3,2,2	40								
				2			as above, but brown, with clay fines.				
						SC	Clayey SAND: fine to medium grained, red brown and orange brown.	M	(L)		RESIDUAL
			39			-	SANDSTONE: fine to medium grained, light grey.	DW	VL - L		HAWKESBURY SANDSTONE LOW 'TC' BIT RESISTANCE
				3			REFER TO CORED BOREHOLE LOG				GROUNDWATER MONITORING WELL INSTALLED TO 2.2m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 0.1m TO 2.2m. 2mm SAND FILTER PACK 0.3m TO 2.2m. BENTONITE SEAL 0.1m TO 0.3m. BACKFILLED WITH SAND TO THE SURFACE. COMPLETED WITH A CONCRETED GATIC COVER.
			38								
				4							
			37								
				5							
			36								
				6							
			35								

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CORED BOREHOLE LOG

Borehole No.
4

Client: HAMMOND CARE
Project: PROPOSED HOSPITAL REDEVELOPMENT
Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: 32507R | **Core Size:** NMLC | **R.L. Surface:** 41.5 m
Date: 23/7/19 | **Inclination:** VERTICAL | **Datum:** AHD
Plant Type: JK205 | **Bearing:** N/A | **Logged/Checked By:** S.M./P.R.

Water Loss\Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION: Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$ (VL -0.1, L -0.3, M -1, H -3, VH -10, EH)	SPACING (mm) (600, 200, 60, 20)	DEFECT DETAILS – DESCRIPTION: Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness (Specific / General)	Formation
		39			START CORING AT 3.03m						
			3		SANDSTONE: fine to medium grained, light grey and orange brown, bedded at 0-10°.	DW	L			(3.11m) XWS, 0°, 5mm.t, HP: 150, 330, 410 kPa	Hawkesbury Sandstone
		38			Extremely Weathered sandstone: sandy CLAY: low to medium plasticity, light grey mottled orange brown, fine to medium grained sand.	XW	Hd				
ON COMPLETION			4		SANDSTONE: fine to medium grained, light grey, yellow brown and red brown, bedded at 0-20°.	SW	M			(4.36m) Be, 0°, P, S, Cn	
0% RETURN		37	5								
		36					M - H			(5.66m) CS, 0°, 3 mm.t	
		35	6		as above, but light grey and yellow brown, with slump bedding structure.		H				
			7		END OF BOREHOLE AT 7.25 m						
		34	8								
		33									

FRACTURES NOT MARKED ARE CONSIDERED TO BE DRILLING AND HANDLING BREAKS

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BOREHOLE LOG

Borehole No.
5
1 / 1

Client: HAMMOND CARE
Project: PROPOSED HOSPITAL REDEVELOPMENT
Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: 32507R **Method:** SPIRAL AUGER **R.L. Surface:** 44.5 m
Date: 23/7/19 **Datum:** AHD
Plant Type: JK205 **Logged/Checked By:** S.M./P.R.

Groundwater Record	Samples (ES / U50 / DB / DS)	Field Tests	RL (m AHD)	Depth (m)	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
DRY ON COMPLETION				0		ASPHALTIC CONCRETE: 65mm.t				
					-	FILL: Silty gravelly sand, medium to coarse grained igneous, angular, dark grey, medium to coarse grained sand.	D			
		N = 14 5,5,9	44		CL-CI	FILL: Sand, medium to coarse grained, orange brown, with clay fines, and sub-angular medium to coarse grained sandstone gravel.	w<PL	Hd	460 600 570	RESIDUAL
				1	-	Sandy CLAY: low to medium plasticity, orange brown and yellow brown, fine to medium grained.	DW	L		HAWKESBURY SANDSTONE
			43			as above, but light grey, with low strength iron indurated bands.	SW	M		LOW 'TC' BIT RESISTANCE HIGH RESISTANCE
				2		SANDSTONE: fine to medium grained, light grey and orange brown.	DW	VL		VERY LOW RESISTANCE
						as above, but red brown and light grey.	SW	M		HIGH RESISTANCE
			42			END OF BOREHOLE AT 2.30 m				

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BOREHOLE LOG

Borehole No. 6

Client: HAMMOND CARE
Project: PROPOSED HOSPITAL REDEVELOPMENT
Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: 32507R **Method:** SPIRAL AUGER **R.L. Surface:** 49.5 m
Date: 23/7/19 **Datum:** AHD
Plant Type: JK205 **Logged/Checked By:** S.M./P.R.

Groundwater Record	SAMPLES (ES, U50, DB, DS)	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
DRY ON COMPLETION OF CORING				0		-	ASPHALTIC CONCRETE: 60mm.t				
	ES						FILL: Silty gravelly sand, medium to coarse grained, dark grey, sub-angular medium to coarse grained igneous gravel.	D			
	ES	N=SPT 2/ 20mm REFUSAL	49			CI-CH	FILL: Clayey sand, medium to coarse grained, with sub-angular medium to coarse grained sandstone gravel.	w<PL	(VSt)		RESIDUAL
				1		-	Sandy CLAY: low plasticity, light grey, fine to medium grained, with low strength iron indurated bands.	SW	L		HAWKESBURY SANDSTONE
			48				SANDSTONE: fine to medium grained, light grey.		M - H		LOW 'TC' BIT RESISTANCE
							REFER TO CORED BOREHOLE LOG				HIGH RESISTANCE
				2							
			47								
				3							
			46								
				4							
			45								
				5							
			44								
				6							
			43								

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CORED BOREHOLE LOG

Borehole No. 6

Client: HAMMOND CARE
Project: PROPOSED HOSPITAL REDEVELOPMENT
Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: 32507R | **Core Size:** NMLC | **R.L. Surface:** 49.5 m
Date: 23/7/19 | **Inclination:** VERTICAL | **Datum:** AHD
Plant Type: JK205 | **Bearing:** N/A | **Logged/Checked By:** S.M./P.R.

Water Loss\Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION: Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$	SPACING (mm)	DEFECT DETAILS – DESCRIPTION: Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness – Specific	General	Formation
					START CORING AT 1.24m							
100% RETURN; ON COMPLETION		48			SANDSTONE: fine to medium grained, light grey and orange brown, bedded at 0-20°.	SW	H			(1.68m) XWS, 0°, 3 mm.t		Hawkesbury Sandstone
		47	2		as above, but orange brown and grey.							
		46	3				M			(3.52m) Be, 0°, P, S, Fe Sn		
		45	4				H			(4.39m) Be, 0°, P, S, Cn		
					as above, but light grey.	FR	M					
		44	5							(5.36m) XWS, 0°, 25 mm.t; (5.45m) XWS, 0°, 70 mm.t		
		43	6									
		42	7		END OF BOREHOLE AT 7.26 m							

Point load scale: VL -0.1, L -0.3, M -1, H -3, VH -10, EH. Spacing scale: 600, 200, 60, 20.

FRACTURES NOT MARKED ARE CONSIDERED TO BE DRILLING AND HANDLING BREAKS

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BOREHOLE LOG

Borehole No. 7

Client: HAMMOND CARE
Project: PROPOSED HOSPITAL REDEVELOPMENT
Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: 32507R **Method:** SPIRAL AUGER **R.L. Surface:** 52 m
Date: 23/7/19 **Datum:** AHD
Plant Type: JK205 **Logged/Checked By:** S.M./P.R.

Groundwater Record	SAMPLES (ES, U50, DB, DS)	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
DRY ON COMPLETION OF CORING			52	0			FILL: Silty sand, fine to medium grained, dark brown, with root fibres.	D			
						-	SANDSTONE: fine to medium grained, yellow brown and brown, with extremely weathered bands.	DW	L		HAWKESBURY SANDSTONE LOW 'TC' BIT RESISTANCE
			51	1					VL		VERY LOW RESISTANCE
									L		LOW RESISTANCE
			50	2			as above, but red brown and light grey.	SW	M		MODERATE RESISTANCE
							as above, but light grey.				
			49	3			REFER TO CORED BOREHOLE LOG				
			48	4							
			47	5							
			46	6							

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ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. BH11 1/1

Client: HAMMONDCARE

Project: PROPOSED HOSPITAL REDEVELOPMENT

Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: E32507BT **Method:** SPIRAL AUGER/PUSHTUBE **R.L. Surface:** 38.5m

Date: 25/7/19 **Datum:** AHD

Plant Type: EZIPROBE **Logged/Checked by:** M.M.P./T.H.

Groundwater Record	SAMPLES: ES	ASS	ASB	SAL	DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Silty sand, fine to medium grained, dark brown, trace of root fibres.	D			GRASS COVER
										FILL: Sandy clay, low to medium plasticity, light grey and red brown, trace of ironstone, sandstone and igneous gravel and ash.	w<PL			
							0.5			FILL: Silty sand, fine to medium grained, light brown, trace of ironstone, igneous and sandstone gravel, ash and slag.	D			
										END OF BOREHOLE AT 0.7m				REFUSAL
							1							
							1.5							
							2							
							2.5							
							3							
							3.5							

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ENVIRONMENTAL LOG

Log No. **BH12** 1/2

Environmental logs are not to be used for geotechnical purposes

Client: HAMMONDCARE
Project: PROPOSED HOSPITAL REDEVELOPMENT
Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: E32507BT **Method:** SPIRAL AUGER/PUSHTUBE **R.L. Surface:** 37.0m
Date: 25/7/19 **Datum:** AHD
Plant Type: EZIPROBE **Logged/Checked by:** M.M.P./T.H.

Groundwater Record	SAMPLES (ES / ASS / ASB / SAL / DB)	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE-TION			0			MULCH: 300mm.t.				MULCH COVER
			0.5			FILL: Silty sand, fine to medium grained, light brown, trace of blue metal, igneous, ironstone and sandstone gravel and ash.	D			
			1			FILL: Sandy clay, low to medium plasticity, dark brown, trace of igneous and sandstone gravel and ash.	w<PL			
			1.5							
			2			FILL: Sandy clay, low to medium plasticity, yellow brown and brown, trace of sandstone, igneous and ironstone gravel, ash and slag.	w<PL			
			2.5			FILL: Silty clay, low to medium plasticity, light grey, trace of igneous gravel.	w<PL			
			3			FILL: Sand, fine to medium grained, yellow brown, trace of sandstone gravel.	D			
			3.5							

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ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH12**

2/2

Client: HAMMONDCARE

Project: PROPOSED HOSPITAL REDEVELOPMENT

Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: E32507BT **Method:** SPIRAL AUGER/PUSHTUBE **R.L. Surface:** 37.0m

Date: 25/7/19 **Datum:** AHD

Plant Type: EZIPROBE **Logged/Checked by:** M.M.P./T.H.

Groundwater Record	SAMPLES ES	ASS	ASB	SAL	DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
										FILL: Sand, fine to medium grained, yellow brown, trace of sandstone gravel.	D			
							4			FILL: Silty sand, fine to medium grained, brown, trace of sandstone and quartz gravel.	M			
							4.5			END OF BOREHOLE AT 4.1m				REFUSAL
							5							
							5.5							
							6							
							6.5							
							7							

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ENVIRONMENTAL LOG

Log No. **BH13**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: HAMMONDCARE

Project: PROPOSED HOSPITAL REDEVELOPMENT

Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: E32507BT **Method:** SPIRAL AUGER/PUSHTUBE **R.L. Surface:** 37.0m

Date: 25/7/19 **Datum:** AHD

Plant Type: EZIPROBE **Logged/Checked by:** M.M.P./T.H.

Groundwater Record	SAMPLES: ES	ASS	ASB	SAL	DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Silty sand, fine to medium grained, dark brown, trace of ironstone and sandstone gravel, brick, terracotta pipe and concrete fragments.	D			
							0.5			FILL: Silty clayey sand, fine to medium grained, brown and red brown, trace of ironstone, igneous and sandstone gravel, brick, concrete and terracotta fragments.	D			
							1			END OF BOREHOLE AT 0.9m				REFUSAL
							1.5							
							2							
							2.5							
							3							
							3.5							

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ENVIRONMENTAL LOG

Log No. **BH14**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: HAMMONDCARE

Project: PROPOSED HOSPITAL REDEVELOPMENT

Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: E32507BT | **Method:** SPIRAL AUGER/PUSHTUBE | **R.L. Surface:** 38.0m

Date: 25/7/19 | **Datum:** AHD

Plant Type: EZIPROBE | **Logged/Checked by:** M.M.P./T.H.

Groundwater Record	Depth (m)	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	0	ASPHALTIC CONCRETE: 50mm.t.				
		FILL: Silty sand, fine to medium grained, dark brown, trace of blue metal gravel.	D			
	0.5	FILL: Sandy clay, low to medium plasticity, light grey and light red brown, trace of ironstone gravel.	w<PL			
		FILL: Sandy clay, low to medium plasticity, dark brown and yellow brown, trace of ironstone, igneous and sandstone gravel and brick fragments.	w<PL			
	1	FILL: Clayey sand, fine to medium grained, yellow brown, trace of ironstone gravel and brick fragments.	D			
	1.5	FILL: Silty sandy clay, low to medium plasticity, yellow brown mottled grey, trace of ironstone gravel.	w<PL			
	2					
		FILL: Silty sand, fine to medium grained, dark brown, trace of sandstone gravel.	D			
	2.5	END OF BOREHOLE AT 2.4m				REFUSAL
	3					
	3.5					

SAMPLES: ES, ASS, ASB, SAL, DB

Field Tests

Graphic Log

Unified Classification

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ENVIRONMENTAL LOG

Log No. **BH15** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: HAMMONDCARE

Project: PROPOSED HOSPITAL REDEVELOPMENT

Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: E32507BT **Method:** SPIRAL AUGER/PUSHTUBE **R.L. Surface:** 37.5m

Date: 25/7/19 **Datum:** AHD

Plant Type: EZIPROBE **Logged/Checked by:** M.M.P./T.H.

Groundwater Record	SAMPLES ES	ASS	ASB	SAL	DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Silty sand, fine to medium grained, brown, trace of root fibres, ironstone and igneous gravel.	D			GRASS COVER
							0.5			FILL: Silty clay, low to medium plasticity, grey and red brown, trace of ironstone gravel.	w<PL			
										FILL: Clayey sand, fine to medium grained, yellow brown and brown, trace of ironstone, igneous and sandstone gravel and ash.	D			
							1			FILL: Clayey sand, fine to medium grained, brown, trace of sandstone gravel.	D			
										END OF BOREHOLE AT 1.1m				REFUSAL ON INFERRED SANDSTONE BEDROCK
							1.5							
							2							
							2.5							
							3							
							3.5							

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ENVIRONMENTAL LOG

Log No. **BH16** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: HAMMONDCARE

Project: PROPOSED HOSPITAL REDEVELOPMENT

Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: E32507BT **Method:** SPIRAL AUGER/PUSHTUBE **R.L. Surface:** 38.5m

Date: 25/7/19 **Datum:** AHD

Plant Type: EZIPROBE **Logged/Checked by:** M.M.P./T.H.

Groundwater Record	SAMPLES (ES, ASS, ASB, SAL, DB)	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION			0			ASPHALTIC COVER: 50mm.t.				
						FILL: Silty clayey sand, fine to medium grained, dark grey, trace of blue metal gravel.	D			
							D			
						FILL: Silty clayey sand, fine to medium grained, grey, trace of ironstone and igneous gravel.	w<PL			
			0.5			FILL: Silty sandy clay, low to medium plasticity, grey mottled orange brown, trace of ironstone gravel.				
						FILL: Sandstone, medium to coarse grained, light grey and brown.	D			REFUSAL
						END OF BOREHOLE AT 0.75m				
			1							
			1.5							
			2							
			2.5							
			3							
			3.5							

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ENVIRONMENTAL LOG

Log No. **BH17**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: HAMMONDCARE

Project: PROPOSED HOSPITAL REDEVELOPMENT

Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: E32507BT **Method:** SPIRAL AUGER/PUSHTUBE **R.L. Surface:** 41.5m

Date: 25/7/19 **Datum:** AHD

Plant Type: EZIPROBE **Logged/Checked by:** M.M.P./T.H.

Groundwater Record	SAMPLES (ES, ASS, ASB, SAL, DB)	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION			0			ASPHALTIC COVER: 50mm.t.				
						FILL: Sandy gravel, medium to coarse grained, dark grey, fine to medium grained, blue metal gravel.	D			ROADBASE
			0.5			FILL: Silty sand, fine to medium grained, brown, trace of ironstone, igneous and sandstone gravel and ash.	D			
						FILL: Sandy clay, low to medium plasticity, grey, trace of sandstone gravel.	w≈PL			
						FILL: Silty sand, fine to medium grained, dark brown, trace of ironstone, igneous and sandstone gravel and ash.	D			REFUSAL ON INFERRED ROCK
			1			END OF BOREHOLE AT 0.9m				
			1.5							
			2							
			2.5							
			3							
			3.5							

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ENVIRONMENTAL LOG

Log No. BH18 1/1

Environmental logs are not to be used for geotechnical purposes

Client: HAMMONDCARE

Project: PROPOSED HOSPITAL REDEVELOPMENT

Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: E32507BT **Method:** SPIRAL AUGER/PUSHTUBE **R.L. Surface:** 41.0m

Date: 25/7/19 **Datum:** AHD

Plant Type: EZIPROBE **Logged/Checked by:** M.M.P./T.H.

Groundwater Record	SAMPLES (ES, ASS, ASB, SAL, DB)	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION			0			ASPHALTIC CONCRETE: 50mm.t.				
						FILL: Sandy gravel, medium to coarse grained, dark grey, blue metal gravel.	D			
						FILL: Silty sand, fine to medium grained, light brown and orange brown, trace of ironstone and sandstone gravel.	D			
							D			
			0.5			FILL: Sand, fine to medium grained, yellow brown.				
						FILL: Silty sand, medium to coarse grained, orange brown, trace of ironstone gravel.	D			
			1			FILL: Silty sand, fine to medium grained, brown, trace of ironstone and igneous gravel.	W			
						END OF BOREHOLE AT 1.1m				REFUSAL
			1.5							
			2							
			2.5							
			3							
			3.5							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **BH19** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: HAMMONDCARE
Project: PROPOSED HOSPITAL REDEVELOPMENT
Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: E32507BT **Method:** HAND AUGER **R.L. Surface:** 43.0m
Date: 25/7/19 **Datum:** AHD
Plant Type: N/A **Logged/Checked by:** M.M.P./T.H.

Groundwater Record	SAMPLES ES	ASS	ASB	SAL	DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Silty sand, fine to medium grained, dark brown, trace of mulch.	D			MULCH COVER
										FILL: Silty sand, fine to medium grained, dark brown, trace of blue metal gravel.	D			
										END OF BOREHOLE AT 0.3m				HAND AUGER REFUSAL
							0.5							
							1							
							1.5							
							2							
							2.5							
							3							
							3.5							

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ENVIRONMENTAL LOG

Log No. **BH20**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: HAMMONDCARE

Project: PROPOSED HOSPITAL REDEVELOPMENT

Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: E32507BT | **Method:** HAND AUGER | **R.L. Surface:** 45.5m

Date: 24/7/19 | **Datum:** AHD

Plant Type: N/A | **Logged/Checked by:** M.M.P./T.H.

Groundwater Record	SAMPLES ES	ASS	ASB	SAL	DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■				0			FILL: Silty sand, fine to medium grained, dark brown, trace of ironstone, igneous and sandstone gravel, concrete fragments and mulch.	D			
							0.5			END OF BOREHOLE AT 0.4m				HAND AUGER REFUSAL ON INFERRED BURRIED SLAB
							1							
							1.5							
							2							
							2.5							
							3							
							3.5							

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ENVIRONMENTAL LOG

Log No. **BH21** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: HAMMONDCARE
Project: PROPOSED HOSPITAL REDEVELOPMENT
Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: E32507BT **Method:** SPIRAL AUGER/PUSHTUBE **R.L. Surface:** 44.5m
Date: 25/7/19 **Datum:** AHD
Plant Type: EZIPROBE **Logged/Checked by:** M.M.P./T.H.

Groundwater Record	SAMPLES ES	ASS	ASB	SAL	DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			ASPHALTIC COVER: 50mm.t.				
										FILL: Silty sand, fine to medium grained, dark grey, with fine to medium grained blue metal gravel.	D			
							0.5			FILL: Silty sand, fine to medium grained, grey, with fine to medium grained blue metal gravel, trace of ironstone, igneous and sandstone gravel.	D			
										FILL: Clayey sand, fine to medium grained, dark brown, trace of ironstone and sandstone gravel and ash.	D			
							1		CL-CI	Sandy CLAY: low to medium plasticity, yellow brown, fine to medium grained, trace of ironstone gravel.	w<PL			
							1.5			END OF BOREHOLE AT 1.4m				
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **BH22**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: HAMMONDCARE

Project: PROPOSED HOSPITAL REDEVELOPMENT

Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: E32507BT **Method:** SPIRAL AUGER/PUSHTUBE **R.L. Surface:** 43.0m

Date: 25/7/19 **Datum:** AHD

Plant Type: EZIPROBE **Logged/Checked by:** M.M.P./T.H.

Groundwater Record	Samples (ES / ASS / ASB / SAL / DB)	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION			0			ASPHALTIC COVER: 50mm.t.				
					-	FILL: Sandy gravel, medium to coarse grained, dark grey, blue metal gravel, fine to medium grained.	D			ROADBASE
			0.5			FILL: Silty sand, fine to medium grained, brown, trace of ironstone, igneous and sandstone gravel and ash.	D			
					SP	SAND: fine to medium grained, yellow brown, trace of ironstone gravel.	D			
					CL-CI	Sandy CLAY: low to medium plasticity, grey, fine to medium grained.	w≈PL			REFUSAL
			1			END OF BOREHOLE AT 0.9m				
			1.5							
			2							
			2.5							
			3							
			3.5							

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ENVIRONMENTAL LOG

Log No. **BH23**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: HAMMONDCARE

Project: PROPOSED HOSPITAL REDEVELOPMENT

Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: E32507BT **Method:** HAND AUGER **R.L. Surface:** 40.5m

Date: 25/7/19 **Datum:** AHD

Plant Type: N/A **Logged/Checked by:** M.M.P./T.H.

Groundwater Record	SAMPLES ES	ASS	ASB	SAL	DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE-TION	■		■				0			FILL: Silty sand, fine to medium grained, dark brown, trace of organic material, mulch, igneous gravel and ash.	D			
	■									FILL: Silty clay, low to medium plasticity, red brown mottled grey, trace of ironstone gravel.	w<PL			
							0.5			END OF BOREHOLE AT 0.4m				HAND AUGER REFUSAL
							1							
							1.5							
							2							
							2.5							
							3							
							3.5							

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ENVIRONMENTAL LOG

Log No. **BH24** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: HAMMONDCARE
Project: PROPOSED HOSPITAL REDEVELOPMENT
Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: E32507BT **Method:** HAND AUGER **R.L. Surface:** 48.8m
Date: 24/7/19 **Datum:** AHD
Plant Type: N/A **Logged/Checked by:** M.M.P./T.H.

Groundwater Record	SAMPLES ES	ASS	ASB	SAL	DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Silty sand, fine to medium grained, dark brown, trace of root fibres and mulch.	D			MULCH COVER
										FILL: Silty sand, fine to medium grained, dark brown and yellow brown, trace of ironstone and igneous gravel and root fibres.	D			
							0.5			FILL: Silty sand, fine to medium grained, yellow brown and dark brown, trace of ironstone gravel.	D			
										END OF BOREHOLE AT 0.7m				HAND AUGER REFUSAL ON INFERRED SANDSTONE BEDROCK
							1							
							1.5							
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Log No.
BH25
1/1

Environmental logs are not to be used for geotechnical purposes

Client: HAMMONDCARE

Project: PROPOSED HOSPITAL REDEVELOPMENT

Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: E32507BT **Method:** HAND AUGER **R.L. Surface:** 48.5m

Date: 24/7/19 **Datum:** AHD

Plant Type: N/A **Logged/Checked by:** M.M.P./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■				0			FILL: Silty sand, fine to medium grained, dark brown, trace of ironstone, igneous and sandstone gravel and root fibres.	D			GRASS COVER
							0.5			END OF BOREHOLE AT 0.4m				HAND AUGER REFUSAL ON INFERRED SANDSTONE BEDROCK
							1							
							1.5							
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **BH26** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: HAMMONDCARE
Project: PROPOSED HOSPITAL REDEVELOPMENT
Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: E32507BT **Method:** SPIRAL AUGER/PUSHTUBE **R.L. Surface:** 50.7m
Date: 24/7/19 **Datum:** AHD
Plant Type: EZIPROBE **Logged/Checked by:** M.M.P./T.H.

Groundwater Record	SAMPLES (ES, ASS, ASB, SAL, DB)	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION			0			FILL: Silty sand, fine to medium grained, dark brown, trace of root fibres.	D			GRASS COVER
						FILL: Clayey sand, fine to medium grained, dark yellow brown, trace of ironstone, igneous and sandstone gravel and root fibres.	D			
					CL-CI	Sandy CLAY: low to medium plasticity, yellow brown, trace of ironstone gravel.	w<PL			
			0.5							
						Sandy CLAY: low to medium plasticity, red brown and light grey, trace of ironstone gravel.	w<PL			
			1							
						END OF BOREHOLE AT 1.2m				
			1.5							
			2							
			2.5							
			3							
			3.5							

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ENVIRONMENTAL LOG

Log No. **BH27** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: HAMMONDCARE

Project: PROPOSED HOSPITAL REDEVELOPMENT

Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: E32507BT **Method:** SPIRAL AUGER/PUSHTUBE **R.L. Surface:** 49.7m

Date: 24/7/19 **Datum:** AHD

Plant Type: EZIPROBE **Logged/Checked by:** M.M.P./T.H.

Groundwater Record	SAMPLES ES	ASS	ASB	SAL	DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Silty sand, fine to medium grained, dark brown, trace of root fibres and sandstone gravel.	D			GRASS COVER
										FILL: Sandy clay, low to medium plasticity, dark grey, fine to medium grained, trace of ironstone and sandstone gravel and root fibres.	w<PL			
							0.5		CL-CI	Sandy CLAY: low to medium plasticity, yellow brown, fine to medium grained sand.	w<PL			
										Sandy CLAY: low to medium plasticity, yellow brown and grey, fine to medium grained sand, trace of ironstone gravel.	w<PL			
							1			END OF BOREHOLE AT 0.9m				REFUSAL ON IRONSTONE GRAVEL
							1.5							
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Log No. BH28 1/1

Environmental logs are not to be used for geotechnical purposes

Client: HAMMONDCARE
Project: PROPOSED HOSPITAL REDEVELOPMENT
Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: E32507BT **Method:** SPIRAL AUGER/PUSHTUBE **R.L. Surface:** 40.8m
Date: 24/7/19 **Datum:** AHD
Plant Type: EZIPROBE **Logged/Checked by:** M.M.P./T.H.

Groundwater Record	SAMPLES (ES / ASS / ASB / SAL / DB)	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION			0			FILL: Silty sand, fine to medium grained, dark brown, trace of ironstone gravel and root fibres.	D			GRASS COVER
						FILL: Silty sand, fine to medium grained, light yellow brown, trace of ironstone and igneous gravel, ash and root fibres.	D			
					SC		D			
			0.5		CL-CI	Clayey SAND: fine to medium grained, yellow brown.	w<PL			
						Sandy CLAY: low to medium plasticity, fine to medium grained, yellow brown, with ironstone gravel.				REFUSAL ON IRONSTONE GRAVEL
						END OF BOREHOLE AT 0.6m				
			1							
			1.5							
			2							
			2.5							
			3							
			3.5							

JKEnvironments

ENVIRONMENTAL LOG

Log No.
BH29
1/1

Environmental logs are not to be used for geotechnical purposes

Client: HAMMONDCARE

Project: PROPOSED HOSPITAL REDEVELOPMENT

Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: E32507BT **Method:** SPIRAL AUGER/PUSHTUBE **R.L. Surface:** 52.0m

Date: 24/7/19 **Datum:** AHD

Plant Type: EZIPROBE **Logged/Checked by:** M.M.P./T.H.

Groundwater Record	SAMPLES: ES	ASS	ASB	SAL	DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE-TION							0			FILL: Silty sand, fine to medium grained, dark brown, trace of root fibres.	D			GRASS COVER
										FILL: Silty sand, fine to medium grained, light brown, trace of ironstone, sandstone, igneous and blue metal gravel.	D			
							0.5			FILL: Sandy gravel, fine to medium grained, dark brown, blue metal gravel and fine to medium grained sand.	D			
										FILL: Sand, fine to medium grained, yellow brown.	D			
							1			FILL: Clayey sand, fine to medium grained, dark grey, trace of ironstone gravel.	D			
									CL-CI	Sandy CLAY: low to medium plasticity, yellow brown, trace of ironstone gravel.	w<PL			
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Log No.
BH30
1/1

Environmental logs are not to be used for geotechnical purposes

Client: HAMMONDCARE

Project: PROPOSED HOSPITAL REDEVELOPMENT

Location: 97-115 RIVER ROAD, GREENWICH, NSW

Job No.: E32507BT **Method:** SPIRAL AUGER/PUSHTUBE **R.L. Surface:** 49.5m

Date: 24/7/19 **Datum:** AHD

Plant Type: EZIPROBE **Logged/Checked by:** M.M.P./T.H.

Groundwater Record	SAMPLES (ES / ASS / ASB / SAL / DB)	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION			0			ASPHALTIC COVER: 50mm.t.				
						FILL: Sandy gravel, medium to coarse grained, dark grey, trace of metal fragments and ironstone gravel.	D			
							D			
						FILL: Silty sand, fine to medium grained, dark grey, with ash, trace of rounded igneous and sandstone gravel and slag.	D			
			0.5			FILL: Silty sand, fine to medium grained, light brown, trace of ironstone, sandstone and igneous gravel.	D			
						FILL: Sand, fine to medium grained, yellow brown.	D			POSSIBLY NATURAL
						FILL: Sand, fine to medium grained, yellow brown, trace of ironstone gravel.				REFUSAL
			1			END OF BOREHOLE AT 0.7m				
			1.5							
			2							
			2.5							
			3							
			3.5							

ENVIRONMENTAL LOGS EXPLANATION NOTES

INTRODUCTION

These notes have been provided to amplify the environmental report in regard to classification methods, field procedures and certain matters relating to the logging of soil and rock. Not all notes are necessarily relevant to all reports.

Where geotechnical borehole logs are utilised for environmental purpose, reference should also be made to the explanatory notes included in the geotechnical report. Environmental logs are not suitable for geotechnical purposes.

The ground is a product of continuing natural and man-made processes and therefore exhibits a variety of characteristics and properties which vary from place to place and can change with time. Environmental studies include gathering and assimilating limited facts about these characteristics and properties in order to understand or predict the behaviour of the ground on a particular site under certain conditions. This report may contain such facts obtained by inspection, excavation, probing, sampling, testing or other means of investigation. If so, they are directly relevant only to the ground at the place where and time when the investigation was carried out.

DESCRIPTION AND CLASSIFICATION METHODS

The methods of description and classification of soils and rocks used in this report are based on Australian Standard 1726:2017 *'Geotechnical Site Investigations'*. In general, descriptions cover the following properties – soil or rock type, colour, structure, strength or density, and inclusions. Identification and classification of soil and rock involves judgement and the Company infers accuracy only to the extent that is common in current geoenvironmental practice.

Soil types are described according to the predominating particle size and behaviour as set out in the attached soil classification table qualified by the grading of other particles present (eg. sandy clay) as set out below:

Soil Classification	Particle Size
Clay	< 0.002mm
Silt	0.002 to 0.075mm
Sand	0.075 to 2.36mm
Gravel	2.36 to 63mm
Cobbles	63 to 200mm
Boulders	> 200mm

Non-cohesive soils are classified on the basis of relative density, generally from the results of Standard Penetration Test (SPT) as below:

Relative Density	SPT 'N' Value (blows/300mm)
Very loose (VL)	< 4
Loose (L)	4 to 10
Medium dense (MD)	10 to 30
Dense (D)	30 to 50
Very Dense (VD)	> 50

Cohesive soils are classified on the basis of strength (consistency) either by use of a hand penetrometer, vane shear, laboratory testing and/or tactile engineering examination. The strength terms are defined as follows.

Classification	Unconfined Compressive Strength (kPa)	Indicative Undrained Shear Strength (kPa)
Very Soft (VS)	≤ 25	≤ 12
Soft (S)	> 25 and ≤ 50	> 12 and ≤ 25
Firm (F)	> 50 and ≤ 100	> 25 and ≤ 50
Stiff (St)	> 100 and ≤ 200	> 50 and ≤ 100
Very Stiff (VSt)	> 200 and ≤ 400	> 100 and ≤ 200
Hard (Hd)	> 400	> 200
Friable (Fr)	Strength not attainable – soil crumbles	

Rock types are classified by their geological names, together with descriptive terms regarding weathering, strength, defects, etc. Where relevant, further information regarding rock classification is given in the text of the report. In the Sydney Basin, 'shale' is used to describe fissile mudstone, with a weakness parallel to bedding. Rocks with alternating inter-laminations of different grain size (eg. siltstone/claystone and siltstone/fine grained sandstone) are referred to as 'laminite'.

INVESTIGATION METHODS

The following is a brief summary of investigation methods currently adopted by the Company and some comments on their use and application. All methods except test pits, hand auger drilling and portable Dynamic Cone Penetrometers require the use of a mechanical rig which is commonly mounted on a truck chassis or track base.

Test Pits: These are normally excavated with a backhoe or a tracked excavator, allowing close examination of the insitu soils and 'weaker' bedrock if it is safe to descend into the pit. The depth of penetration is limited to about 3m for a backhoe and up to 6m for a large excavator. Limitations of test pits are the problems associated with disturbance and difficulty of reinstatement and the consequent effects on close-by structures. Care must be taken if construction is to be carried out near test pit locations to either properly recompact the backfill during construction or to design and construct the structure so as not to be adversely affected by poorly compacted backfill at the test pit location.

Hand Auger Drilling: A borehole of 50mm to 100mm diameter is advanced by manually operated equipment. Refusal of the hand auger can occur on a variety of materials such as obstructions within any fill, tree roots, hard clay, gravel or ironstone, cobbles and boulders, and does not necessarily indicate rock level.

Continuous Spiral Flight Augers: The borehole is advanced using 75mm to 115mm diameter continuous spiral flight augers, which are withdrawn at intervals to allow sampling and insitu testing. This is a relatively economical means of drilling in clays and in sands above the water table. Samples are returned to the surface by the flights or may be collected after withdrawal of the auger flights, but they can be very disturbed and layers may become mixed. Information from the auger sampling (as distinct from specific sampling by SPTs or undisturbed samples) is of limited reliability due to mixing or softening of samples by groundwater, or uncertainties as to the original depth of the samples. Augering below the groundwater table is of even lesser reliability than augering above the water table.

Rock Augering: Use can be made of a Tungsten Carbide (TC) bit for auger drilling into rock to indicate rock quality and continuity by variation in drilling resistance and from examination of recovered rock cuttings. This method of investigation is quick and relatively inexpensive but provides only an indication of the likely rock strength and predicted values may be in error by a strength order. Where rock strengths may have a significant impact on construction feasibility or costs, then further investigation by means of cored boreholes may be warranted.

Wash Boring: The borehole is usually advanced by a rotary bit, with water being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be assessed from the cuttings, together with some information from "feel" and rate of penetration.

Mud Stabilised Drilling: Either Wash Boring or Continuous Core Drilling can use drilling mud as a circulating fluid to stabilise the borehole. The term 'mud' encompasses a range of products ranging from bentonite to polymers. The mud tends to mask the cuttings and reliable identification is only possible from intermittent intact sampling (eg. from SPT and U50 samples) or from rock coring, etc.

Continuous Core Drilling: A continuous core sample is obtained using a diamond tipped core barrel. Provided full core recovery is achieved (which is not always possible in very low strength rocks and granular soils), this technique provides a very reliable (but relatively expensive) method of investigation. In rocks, NMLC or HQ triple tube core barrels, which give a core of about 50mm and 61mm diameter, respectively, is usually used with water flush. The length of core recovered is compared to the length drilled and any length not recovered is shown as NO CORE. The location of NO CORE recovery is determined on site by the supervising engineer; where the location is uncertain, the loss is placed at the bottom of the drill run.

Standard Penetration Tests: Standard Penetration Tests (SPT) are used mainly in non-cohesive soils, but can also be used in cohesive soils, as a means of indicating density or strength and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289.6.3.1–2004 (R2016) *'Methods of Testing Soils for Engineering Purposes, Soil Strength and Consolidation Tests – Determination of the Penetration Resistance of a Soil – Standard Penetration Test (SPT)'*.

The test is carried out in a borehole by driving a 50mm diameter split sample tube with a tapered shoe, under the impact of a 63.5kg hammer with a free fall of 760mm. It is normal for the tube to be driven in three successive 150mm increments and the 'N' value is taken as the number of blows for the last 300mm. In dense sands, very hard clays or weak rock, the full 450mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form:

- In the case where full penetration is obtained with successive blow counts for each 150mm of, say, 4, 6 and 7 blows, as

  N = 13
  4, 6, 7

- In a case where the test is discontinued short of full penetration, say after 15 blows for the first 150mm and 30 blows for the next 40mm, as

  N > 30
  15, 30/40mm

The results of the test can be related empirically to the engineering properties of the soil.

A modification to the SPT is where the same driving system is used with a solid 60° tipped steel cone of the same diameter as the SPT hollow sampler. The solid cone can be continuously driven for some distance in soft clays or loose sands, or may be used where damage would otherwise occur to the SPT. The results of this Solid Cone Penetration Test (SCPT) are shown as 'N_c' on the borehole logs, together with the number of blows per 150mm penetration.

LOGS

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

The terms and symbols used in preparation of the logs are defined in the following pages.

Interpretation of the information shown on the logs, and its application to design and construction, should therefore take into account the spacing of boreholes or test pits, the method of drilling or excavation, the frequency of sampling and testing and the possibility of other than 'straight line' variations between the boreholes or test pits. Subsurface conditions between boreholes or test pits may vary significantly from conditions encountered at the borehole or test pit locations.

GROUNDWATER

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

- Although groundwater may be present, in low permeability soils it may enter the hole slowly or perhaps not at all during the time it is left open.
- A localised perched water table may lead to an erroneous indication of the true water table.
- Water table levels will vary from time to time with seasons or recent weather changes and may not be the same at the time of construction.
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must be washed out of the hole or 'reverted' chemically if reliable water observations are to be made.

More reliable measurements can be made by installing standpipes which are read after the groundwater level has stabilised at intervals ranging from several days to perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from perched water tables or surface water.

FILL

The presence of fill materials can often be determined only by the inclusion of foreign objects (eg. bricks, steel, etc) or by distinctly unusual colour, texture or fabric. Identification of the extent of fill materials will also depend on investigation methods and frequency. Where natural soils similar to those at the site are used for fill, it may be difficult with limited testing and sampling to reliably assess the extent of the fill.

The presence of fill materials is usually regarded with caution as the possible variation in density and material type is much greater than with natural soil deposits. Consequently, there is an increased risk of adverse environmental characteristics or behaviour. If the volume and nature of fill is of importance to a project, then frequent test pit excavations are preferable to boreholes.

LABORATORY TESTING

Laboratory testing has not been undertaken to confirm the soil classification and rock strengths indicated on the environmental logs unless noted in the report.

SYMBOL LEGENDS

SOIL

- FILL
- TOPSOIL
- CLAY (CL, CI, CH)
- SILT (ML, MH)
- SAND (SP, SW)
- GRAVEL (GP, GW)
- SANDY CLAY (CL, CI, CH)
- SILTY CLAY (CL, CI, CH)
- CLAYEY SAND (SC)
- SILTY SAND (SM)
- GRAVELLY CLAY (CL, CI, CH)
- CLAYEY GRAVEL (GC)
- SANDY SILT (ML, MH)
- PEAT AND HIGHLY ORGANIC SOILS (Pt)

ROCK

- CONGLOMERATE
- SANDSTONE
- SHALE/MUDSTONE
- SILTSTONE
- CLAYSTONE
- COAL
- LAMINITE
- LIMESTONE
- PHYLLITE, SCHIST
- TUFF
- GRANITE, GABBRO
- DOLERITE, DIORITE
- BASALT, ANDESITE
- QUARTZITE

OTHER MATERIALS

- BRICKS OR PAVERS
- CONCRETE
- ASPHALTIC CONCRETE

CLASSIFICATION OF COARSE AND FINE GRAINED SOILS

Major Divisions		Group Symbol	Typical Names	Field Classification of Sand and Gravel	Laboratory Classification	
Coarse grained soil (more than 65% of soil excluding oversize fraction is greater than 0.075mm)	GRAVEL (more than half of coarse fraction is larger than 2.36mm	GW	Gravel and gravel-sand mixtures, little or no fines	Wide range in grain size and substantial amounts of all intermediate sizes, not enough fines to bind coarse grains, no dry strength	≤ 5% fines	$C_u > 4$ $1 < C_c < 3$
		GP	Gravel and gravel-sand mixtures, little or no fines, uniform gravels	Predominantly one size or range of sizes with some intermediate sizes missing, not enough fines to bind coarse grains, no dry strength	≤ 5% fines	Fails to comply with above
		GM	Gravel-silt mixtures and gravel-sand-silt mixtures	'Dirty' materials with excess of non-plastic fines, zero to medium dry strength	≥ 12% fines, fines are silty	Fines behave as silt
		GC	Gravel-clay mixtures and gravel-sand-clay mixtures	'Dirty' materials with excess of plastic fines, medium to high dry strength	≥ 12% fines, fines are clayey	Fines behave as clay
	SAND (more than half of coarse fraction is smaller than 2.36mm)	SW	Sand and gravel-sand mixtures, little or no fines	Wide range in grain size and substantial amounts of all intermediate sizes, not enough fines to bind coarse grains, no dry strength	≤ 5% fines	$C_u > 6$ $1 < C_c < 3$
		SP	Sand and gravel-sand mixtures, little or no fines	Predominantly one size or range of sizes with some intermediate sizes missing, not enough fines to bind coarse grains, no dry strength	≤ 5% fines	Fails to comply with above
		SM	Sand-silt mixtures	'Dirty' materials with excess of non-plastic fines, zero to medium dry strength	≥ 12% fines, fines are silty	N/A
		SC	Sand-clay mixtures	'Dirty' materials with excess of plastic fines, medium to high dry strength	≥ 12% fines, fines are clayey	

Major Divisions		Group Symbol	Typical Names	Field Classification of Silt and Clay			Laboratory Classification
				Dry Strength	Dilatancy	Toughness	% < 0.075mm
ine grained soils (more than 35% of soil excluding oversize fraction is less than 0.075mm)	SILT and CLAY (low to medium plasticity)	ML	Inorganic silt and very fine sand, rock flour, silty or clayey fine sand or silt with low plasticity	None to low	Slow to rapid	Low	Below A line
		CL, CI	Inorganic clay of low to medium plasticity, gravelly clay, sandy clay	Medium to high	None to slow	Medium	Above A line
		OL	Organic silt	Low to medium	Slow	Low	Below A line
	SILT and CLAY (high plasticity)	MH	Inorganic silt	Low to medium	None to slow	Low to medium	Below A line
		CH	Inorganic clay of high plasticity	High to very high	None	High	Above A line
		OH	Organic clay of medium to high plasticity, organic silt	Medium to high	None to very slow	Low to medium	Below A line
	Highly organic soil	Pt	Peat, highly organic soil	–	–	–	–

Laboratory Classification Criteria

A well graded coarse grained soil is one for which the coefficient of uniformity $Cu > 4$ and the coefficient of curvature $1 < C_c < 3$. Otherwise, the soil is poorly graded. These coefficients are given by:

$$C_U = \frac{D_{60}}{D_{10}} \quad \text{and} \quad C_C = \frac{(D_{30})^2}{D_{10}\,D_{60}}$$

Where D_{10}, D_{30} and D_{60} are those grain sizes for which 10%, 30% and 60% of the soil grains, respectively, are smaller.

NOTES:

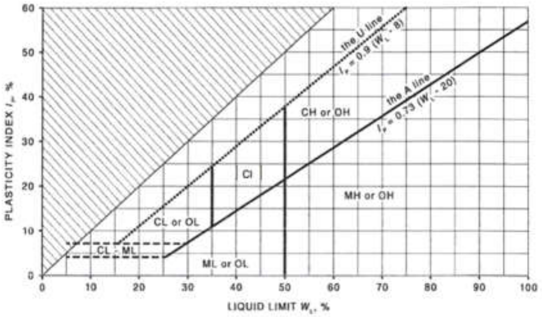
1 For a coarse grained soil with a fines content between 5% and 12%, the soil is given a dual classification comprising the two group symbols separated by a dash; for example, for a poorly graded gravel with between 5% and 12% silt fines, the classification is GP-GM.

2 Where the grading is determined from laboratory tests, it is defined by coefficients of curvature (C_c) and uniformity (C_u) derived from the particle size distribution curve.

3 Clay soils with liquid limits > 35% and ≤ 50% may be classified as being of medium plasticity.

4 The U line on the Modified Casagrande Chart is an approximate upper bound for most natural soils.

Modified Casagrande Chart for Classifying Silts and Clays according to their Behaviour



LOG SYMBOLS

Log Column	Symbol	Definition
Groundwater Record		Standing water level. Time delay following completion of drilling/excavation may be shown.
	C	Extent of borehole/test pit collapse shortly after drilling/excavation.
		Groundwater seepage into borehole or test pit noted during drilling or excavation.
Samples	ES	Sample taken over depth indicated, for environmental analysis.
	U50	Undisturbed 50mm diameter tube sample taken over depth indicated.
	DB	Bulk disturbed sample taken over depth indicated.
	DS	Small disturbed bag sample taken over depth indicated.
	ASB	Soil sample taken over depth indicated, for asbestos analysis.
	ASS	Soil sample taken over depth indicated, for acid sulfate soil analysis.
	SAL	Soil sample taken over depth indicated, for salinity analysis.
Field Tests	N = 17 4, 7, 10	Standard Penetration Test (SPT) performed between depths indicated by lines. Individual figures show blows per 150mm penetration. 'Refusal' refers to apparent hammer refusal within the corresponding 150mm depth increment.
	N_c = 5 7 3R	Solid Cone Penetration Test (SCPT) performed between depths indicated by lines. Individual figures show blows per 150mm penetration for 60° solid cone driven by SPT hammer. 'R' refers to apparent hammer refusal within the corresponding 150mm depth increment.
	VNS = 25	Vane shear reading in kPa of undrained shear strength.
	PID = 100	Photoionisation detector reading in ppm (soil sample headspace test).
Moisture Condition (Fine Grained Soils)	w > PL	Moisture content estimated to be greater than plastic limit.
	w ≈ PL	Moisture content estimated to be approximately equal to plastic limit.
	w < PL	Moisture content estimated to be less than plastic limit.
	w ≈ LL	Moisture content estimated to be near liquid limit.
	w > LL	Moisture content estimated to be wet of liquid limit.
(Coarse Grained Soils)	D	DRY – runs freely through fingers.
	M	MOIST – does not run freely but no free water visible on soil surface.
	W	WET – free water visible on soil surface.
Strength (Consistency) Cohesive Soils	VS	VERY SOFT – unconfined compressive strength ≤ 25kPa.
	S	SOFT – unconfined compressive strength > 25kPa and ≤ 50kPa.
	F	FIRM – unconfined compressive strength > 50kPa and ≤ 100kPa.
	St	STIFF – unconfined compressive strength > 100kPa and ≤ 200kPa.
	VSt	VERY STIFF – unconfined compressive strength > 200kPa and ≤ 400kPa.
	Hd	HARD – unconfined compressive strength > 400kPa.
	Fr	FRIABLE – strength not attainable, soil crumbles.
	( )	Bracketed symbol indicates estimated consistency based on tactile examination or other assessment.

Log Column	Symbol	Definition	Density Index (I_D) Range (%)	SPT 'N' Value Range (Blows/300mm)
Density Index/ Relative Density (Cohesionless Soils)	VL	VERY LOOSE	≤ 15	0 – 4
	L	LOOSE	> 15 and ≤ 35	4 – 10
	MD	MEDIUM DENSE	> 35 and ≤ 65	10 – 30
	D	DENSE	> 65 and ≤ 85	30 – 50
	VD	VERY DENSE	> 85	> 50
	( )	Bracketed symbol indicates estimated density based on ease of drilling or other assessment.		

Log Column	Symbol	Definition
Hand Penetrometer Readings	300 250	Measures reading in kPa of unconfined compressive strength. Numbers indicate individual test results on representative undisturbed material unless noted otherwise.

Log Column	Symbol	Definition
Remarks	'V' bit	Hardened steel 'V' shaped bit.
	'TC' bit	Twin pronged tungsten carbide bit.
	T_{60}	Penetration of auger string in mm under static load of rig applied by drill head hydraulics without rotation of augers.
	Soil Origin	The geological origin of the soil can generally be described as:
		RESIDUAL – soil formed directly from insitu weathering of the underlying rock. No visible structure or fabric of the parent rock.
		EXTREMELY WEATHERED – soil formed directly from insitu weathering of the underlying rock. Material is of soil strength but retains the structure and/or fabric of the parent rock.
		ALLUVIAL – soil deposited by creeks and rivers.
		ESTUARINE – soil deposited in coastal estuaries, including sediments caused by inflowing creeks and rivers, and tidal currents.
		MARINE – soil deposited in a marine environment.
		AEOLIAN – soil carried and deposited by wind.
		COLLUVIAL – soil and rock debris transported downslope by gravity, with or without the assistance of flowing water. Colluvium is usually a thick deposit formed from a landslide. The description 'slopewash' is used for thinner surficial deposits.
		LITTORAL – beach deposited soil.

Classification of Material Weathering

<table>
<tr><th colspan="2">Term</th><th colspan="2">Abbreviation</th><th>Definition</th></tr>
<tr><td colspan="2">Residual Soil</td><td colspan="2">RS</td><td>Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are no longer visible, but the soil has not been significantly transported.</td></tr>
<tr><td colspan="2">Extremely Weathered</td><td colspan="2">XW</td><td>Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are still visible.</td></tr>
<tr><td>Highly Weathered</td><td rowspan="2">Distinctly Weathered (Note 1)</td><td>HW</td><td rowspan="2">DW</td><td>The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable. Rock strength is significantly changed by weathering. Some primary minerals have weathered to clay minerals. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores.</td></tr>
<tr><td>Moderately Weathered</td><td>MW</td><td>The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable, but shows little or no change of strength from fresh rock.</td></tr>
<tr><td colspan="2">Slightly Weathered</td><td colspan="2">SW</td><td>Rock is partially discoloured with staining or bleaching along joints but shows little or no change of strength from fresh rock.</td></tr>
<tr><td colspan="2">Fresh</td><td colspan="2">FR</td><td>Rock shows no sign of decomposition of individual minerals or colour changes.</td></tr>
</table>

NOTE 1: The term 'Distinctly Weathered' is used where it is not practicable to distinguish between 'Highly Weathered' and 'Moderately Weathered' rock. 'Distinctly Weathered' is defined as follows: *'Rock strength usually changed by weathering. The rock may be highly discoloured, usually by iron staining. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores'*. There is some change in rock strength.

Rock Material Strength Classification

Term	Abbreviation	Uniaxial Compressive Strength (MPa)	Guide to Strength: Point Load Strength Index $Is_{(50)}$ (MPa)	Guide to Strength: Field Assessment
Very Low Strength	VL	0.6 to 2	0.03 to 0.1	Material crumbles under firm blows with sharp end of pick; can be peeled with knife; too hard to cut a triaxial sample by hand. Pieces up to 30mm thick can be broken by finger pressure.
Low Strength	L	2 to 6	0.1 to 0.3	Easily scored with a knife; indentations 1mm to 3mm show in the specimen with firm blows of the pick point; has dull sound under hammer. A piece of core 150mm long by 50mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling.
Medium Strength	M	6 to 20	0.3 to 1	Scored with a knife; a piece of core 150mm long by 50mm diameter can be broken by hand with difficulty.
High Strength	H	20 to 60	1 to 3	A piece of core 150mm long by 50mm diameter cannot be broken by hand but can be broken by a pick with a single firm blow; rock rings under hammer.
Very High Strength	VH	60 to 200	3 to 10	Hand specimen breaks with pick after more than one blow; rock rings under hammer.
Extremely High Strength	EH	> 200	> 10	Specimen requires many blows with geological pick to break through intact material; rock rings under hammer.

Appendix D: Example Waste Tracking Record

Offsite Disposal

Waste Classification Report/ Letter			**Source Area Matches Area in Classification Letter/ Report?**	Stockpile [2]					Material Observations		Treatments [7]				Statistics [7]	
Reference	Classification Under Letter[1]	Volume Classified Under Letter (m^3)		ID	Volume	Temporary Storage Area/ Reference	Volume (m^3)	Bulking Factor Used	Description	Evidence of Contamination	Treatment Details	Post-Treatment	Post Treatment Sampling	Post Treatment Classification [1]	Type	Results

[1] After NSW EPA Waste Classification Guidelines/ The excavated natural material order 2014 / Meets POEO VENM Definition / other

[2] If material was excavated and stockpiled post classification

[3] Samples must include those collected specifically for waste classification purposes and samples collected from the source area for purposes other than waste classification

[4] Keep Units Consistant

[5] If volume on docket is different to volume on Waste Classification Letter

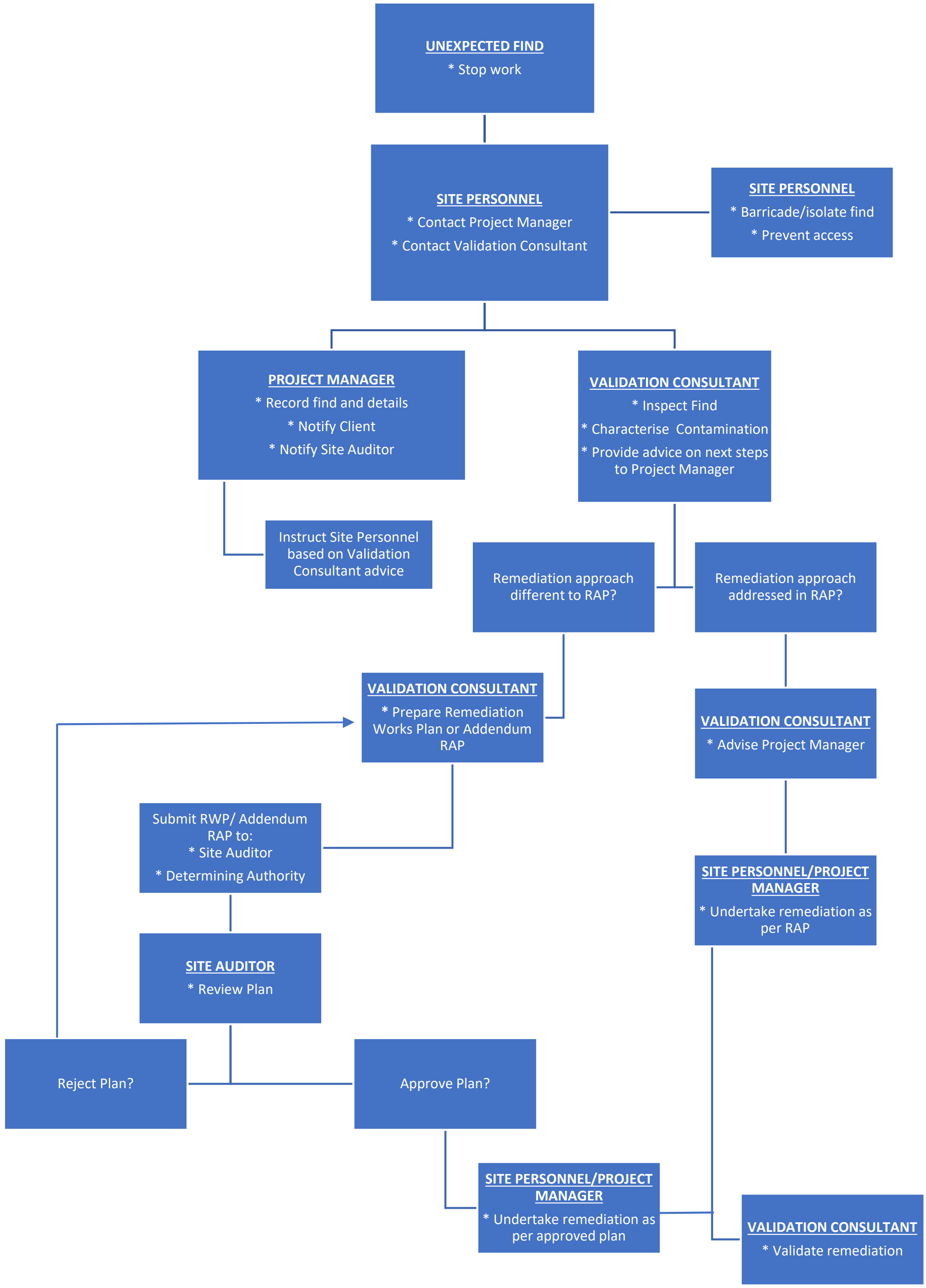
[6] If one is available

[7] If undertaken

Disposal						
Receiving Facility	Receiving Facility Licence Numbr	Disposal Docket Reference	Quantity on Docket (m^3/ tonnes) [4]	Bulking Factor [5]	Consignment Note Reference [6]	Running Total Under the Waste Classification Letter (m3/ tonnes) [4]

Appendix E: Unexpected Finds Protocol Summary

UNEXPECTED FINDS PROTOCOL FLOW-CHART



Appendix F: Guidelines and Reference Documents

Contaminated Land Management Act 1997 (NSW)

Conveyancing Act (1919) (NSW).

Environmental Planning and Assessment Act 1979 (NSW)

Managing Land Contamination, Planning Guidelines SEPP55 – Remediation of Land (1998)

NSW DECCW, (2010). UPSS Technical Note: Decommissioning, Abandonment and Removal of UPSS

NSW DECCW, (2010). UPSS Technical Note: Site Validation Reporting

NSW EPA, (1995). Contaminated Sites Sampling Design Guidelines.

NSW EPA, (2015). Guidelines on the Duty to Report Contamination under Section 60 of the CLM Act 1997

NSW EPA, (2017). Guidelines for the NSW Site Auditor Scheme, 3rd Edition

NSW EPA, (2020). Consultants Reporting on Contaminated Land, Contaminated Land Guidelines

NSW EPA, (2020). Guidelines for the Implementation of the Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2019

National Environment Protection Council (NEPC), (2013). National Environmental Protection (Assessment of Site Contamination) Measure 1999 as amended (2013)

Protection of the Environment Operations Act 1997 (NSW)

Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2019 (NSW)

SafeWork NSW, (2019). Code of Practice, How to Manage and Control Asbestos in the Workplace

Standards Australia, (2002). AS2460: Acoustics – Measurement of the Reverberation Time in Rooms

Standards Australia, (2008). AS4976: The Removal and Disposal of Underground Petroleum Storage Tanks

State Environmental Planning Policy Resilience and Hazards 2021 (NSW)

WA DOH, (2021). Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia

Work Health and Safety Regulation 2017 (NSW)